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Acronyms

AOC - Administrative Order on Consent for Remedial Design for the Lower River Portions of the ROD
APE - Area of Potential Effect
ARARs - Applicable or Relevant and Appropriate Requirements
C&NW - Chicago & Northwestern railroad bridge
CD - Consent Decree
CERCLA - Comprehensive Environmental Response, Compensation and Liability Act
DMR - Discharge Monitoring Report
ESD - Explanation of Significant Differences
FSP - Field Sampling Plan
GAC - Granulated activated carbon
GLNPO - Great Lakes National Program Office
HDPE - High Density Polyethylene
LRRDSOW - Lower River Remedial Design Statement of Work for the Sheboygan River and Harbor Superfund Site
LRRWDP - Lower River Remedial Design Work Plan
MP - Mitigation Plan
NOI - Notice of Intent
NRHP - National Historic Preservation Act
NTUS - Nephelometric Turbidity Units
O&M - Operations and Maintenance
PCB - Polychlorinated Biphenyl
PMP - Post-remediation Monitoring Plan
PPM - Parts Per Million
PSI - Per Square Inch
RA - Remedial Action
RAO - Remedial Action Objective
ROD - Record of Decision
SHPO - Wisconsin State Historic Preservation Officer
SRD - Sediment Removal Design
SWAC - Surface Weighted Average Concentration
THPO - Tribal Historic Preservation Officers
TSCA - Toxic Substances Control Act
TSS - Total Suspended Solids
U.S. EPA - United States Environmental Protection Agency
USACE - United States Army Corp of Engineers
VSP - Verification Sampling Plan
WDNR - Wisconsin Department of Natural Resources
WDOT - Wisconsin Department of Transportation
WPDES - Wisconsin Pollutant Discharge Elimination System
WWTP - Wastewater Treatment Plant

1 Introduction

This Design for the Sheboygan Lower River Reaches has been prepared in response of the selected remedy as set forth in the *Record of Decision* (ROD), *Administrative Order on Consent for Remedial Design for the Lower River Portions of the ROD* (AOC), and *Lower River Remedial Design Statement of Work for the Sheboygan River and Harbor Superfund Site* (LRRDSOW). This Design was developed consistent with the following U.S. EPA guidance documents:

- *Guidance on U.S. EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties, Interim Final,* OSWER Directive No. 9355.5-01. P5-6. April 1990
- *U.S. EPA Remedial Design/Remedial Action Handbook,* OSWER Directive No. 9355.0-4B. June 1995

1.1 Site Description

The Sheboygan River and Harbor Superfund Site (the Site) is located on the western shore of Lake Michigan approximately fifty-five miles north of Milwaukee, Wisconsin, in Sheboygan County. The Sheboygan Lower River Reaches includes the 11 miles of the river from the Waelderhaus Dam downstream to Lake Michigan and is comprised of the Middle River, Lower River, and Inner Harbor reaches. These reaches were defined by the U.S. EPA during the Remedial Investigations (RI), based on physical characteristics such as average depth, width, and level of polychlorinated biphenyl (PCB) sediment contamination. Each of the Sheboygan Lower River Reaches are described below and presented on Figure 1:

<u>Middle River</u> - extends seven miles from the Waelderhaus Dam to the former Chicago & Northwestern (C&NW) railroad bridge.

<u>Lower River</u> - extends three miles from the C&NW railroad bridge to the Pennsylvania Avenue Bridge in downtown Sheboygan.

<u>Inner Harbor</u> - extends from the Pennsylvania Avenue Bridge to the river's outlet to the Outer Harbor. The Outer Harbor is defined as the area formed by the two break-walls.

1.2 Record of Decision (ROD) Lower River Remedial Action

1.2.1 Remediation Objectives

The Remediation Objectives are defined in the ROD, page 32, Section H. The defining objective for this Design is highlighted in bold, as the ROD objectives are referenced, as follows:

1. *Protect human health and the environment from imminent and substantial endangerment due to the PCBs attributed to the Site.*

   To achieve this remediation objective, ***PCB-contaminated Soft Sediment will be removed so that the entire river will reach an average PCB sediment concentration of 0.5 ppm or less over time****. An average PCB sediment concentration of 0.5 ppm results in a excess human health carcinogenic risk of 1.0 x 10^{-4}, or less over time, through the consumption of PCB-contaminated fish.*

1.2.2 ROD Selected Remedy

The selected Remedy is found in Section H of the ROD, pages 66-79. As summarized in the Remedial Design Work Plan, the selected remedy by river reach follows[1].

1.2.2.1 Middle River Selected Remedy

Due to the presence of PCB contamination and the dynamic nature of the river, this component of the river will be characterized to establish a baseline for evaluating natural process trends and tracking Soft Sediment concentrations toward a Soft Sediment SWAC of 0.5 ppm for the Middle River over time.[2] If during baseline characterization PCB concentrations equal to or greater than 26 ppm are found, these Soft Sediment deposits will be removed as they would significantly impair the over Middle River Soft Sediment SWAC from achieving a PCB concentration of 0.5 ppm, or less over time.

An extensive monitoring program would be implemented to gauge the condition of the river and potential human health impacts over time. Long-term monitoring will provide valuable information on changing conditions that may warrant removal of PCB-contaminated sediment. Annual fish sampling will occur. Sediment samples will be taken every five years to document natural process and to ensure that over time the entire river reaches an average PCB sediment concentration of 0.5 ppm, or less.

1.2.2.2 Lower River Selected Remedy

The Lower River remedy includes characterization and a PCB Soft Sediment SWAC of 0.5 ppm, or less over time.[3] Since the river is a dynamic environment and significant time has lapsed since it was last characterized, the Lower River will be characterized to obtain an accurate picture of contaminant distribution in Soft Sediments and to determine if removal of PCB-contaminated Soft Sediment deposits is warranted. PCB-contaminated sediment excess of 26 ppm within the top foot will be removed where water depths are greater than 5 feet and PCB-contaminated sediment in excess of 26 ppm with the top two feet will be removed where water depths are less than 5 feet. Any excavated areas of the Lower River will be backfilled with clean sediment in a manner to minimize the resuspension or disturbance of any remaining contaminated sediments.

Excavation depths and volumes may be increased if through a bathymetry analysis, certain sediment areas are subject to scour greater than the effects of boat disturbance and those areas coincide with areas of high PCB concentration, or if it is determined through a re-evaluation of the Lower River sediment data that Soft Sediment must be removed to achieve a PCB Soft Sediment SWAC of 0.5 ppm. This may take the form of an Explanation of Significant Differences (ESD) or ROD Amendment.

In addition, consistent with the Upper River reaches where contamination was left in place, the Lower River will undergo a long-term monitoring program to assess sediment and fish tissue concentrations over time. Annual fish sampling will occur. Sediment samples will be taken at least once every five years to document natural process and to ensure that over time the entire river will reach an average PCB sediment concentration of 0.5 ppm, or less. Annual bathymetric surveys of the Lower River will be conducted to assess sediment profile changes and determine if buried PCB-contaminated sediment, equal to or greater than 26 ppm, is vulnerable to disturbance and release.

1.2.2.3 Inner Harbor Selected Remedy

The Inner Harbor remedy includes characterization and removal of two (2) feet of contaminated sediment from the Pennsylvania Avenue Bridge to just past the 8th Street Bridge which is depicted as Area A. An

[1] Language quoted directly from Remedial Design Work Plan (RDWP)
[2] The LRRDSOW states that the location, surface area, volume and PCB concentration of all Soft Sediment in the Middle River shall be documented.
[3] See footnote 2, this also applies to the Lower River.

additional two feet of sediment will be removed in those areas of the Inner Harbor where the bathymetry analysis shows scour greater than two (2) feet. These areas are noted as Area B and Area C. Characterization of PCB contamination may also reveal that areas between the 8th Street Bridge and the Inner Harbor mouth contain PCB concentrations above 26 ppm in areas historically vulnerable to scour or within the top foot of the sediment surface. Under these circumstances, contaminated sediment will also be removed between the 8th Street Bridge and the Inner Harbor mouth.[4] Any excavated areas of the Inner Harbor will be backfilled with clean sediment in a manner to minimize resuspension or disturbance of contaminated sediments.

Finally, to keep the most highly contaminated sediment in place, maintenance of the Outer Harbor breakwalls is required. Like the other river segments, a long-term monitoring program will be implemented to assess sediment and fish tissue levels over time. Annual fish sampling will occur. Sediment samples will be taken at least once every five (5) years to document natural process and to ensure that over time the entire river will reach an average PCB sediment concentration of 0.5 ppm, or less. Annual bathymetric surveys of the Lower River will be conducted to assess sediment profile changes and determine if buried PCB-contaminated sediment, equal to or greater than 26 ppm, is vulnerable to disturbance and release.

[4] See footnote 2, this also applies to the Inner Harbor.

2 Design Assumptions

The Pre-Design Investigation Report was submitted for review in October 2009. The Pre-Design Investigation, called the "*characterization*" in the ROD, establishes a firm understanding of the sediment volumes and related PCB concentrations in the Lower River Reaches of the Sheboygan River.

2.1 Spatial Characteristics of PCB Sediment

The Design assumes that the Sheboygan sediment will maintain the Pre-Design concentrations in relative space during the removal actions. With this assumption, the data in the tabular form can estimate a Post-Remediation SWAC and other PCB concentrations by removing data points (representing selected volumes of PCB contaminated sediment) and re-orienting the remaining data concentrations to a new surface. All estimations of post-remediation SWAC in this Design assume that after sediment removal, the underlying and adjacent sediment has maintained the measured concentration from the Pre-Design Investigation. While the Design derives a SWAC based upon the underlying and adjacent sediment concentrations, the actual SWAC calculation will be based upon post-dredge verification sampling as described in the *Verification Sampling Plan*. The substantive data relating to the spatial representation of PCB concentrations in the Pre-Design Investigation is found in tabular form in Appendix A.

2.2 Integration of Pre-Design Information for Attenuation

The second set of information integrated in the Design is an estimate of the attenuation. Consistent with the model used in the Remedial Investigation and Feasibility Study, the Design assumes that the attenuation will follow first-order kinetics. The equation is as follows:

$t = -\ln [PCB\ (T)/PCB\ (0)] * [1/k]$, where

t is the time to reach the Remedial Action Objective (RAO),

PCB (T) is the PCB Concentration to be achieved over time, the RAO, or 0.5 ppm PCB,

PCB (0) is the initial SWAC or the case of the remedy, the predicted post remedy SWAC,

k is the kinematic rate constant,

The Feasibility Study projected or calculated that *k* is 0.09. Using the Pre-Design Investigation data, a more conservative *k* can be calculated. Please see Calculations Appendix D for more details. Solving for *k* and applying the data from the Record of Decision's Remedial Investigation and the data gathered during the Pre-Design Investigation, the equation becomes:

$k = -\ln [PCB\ (2)/PCB\ (1)] * [1/t]$, where

PCB (1) is the Inner Harbor Remedial Investigation PCB Concentration, = 5.6 ppm[5]

PCB (2) is the Pre-Design Investigation Inner Harbor SWAC = 1.63 ppm[6]

t is the elapsed time from the data of the RI to the Pre-Design Investigation = 2009-1990[7] = 19 years

[5] ROD Table 2, Page 9, indicating the Inner Harbor's surface average concentration at the time of the RI, 5.6 ppm PCB. This value is a compilation of several data sets from prior investigations.
[6] See Appendix A, Page 1 Pre Design Investigation Inner Harbor SWAC.
[7] This is the date of the most recent data set from prior investigations.

$k = -\ln(1.63/5.6)/19 = 0.0651$

An Attenuation Table is included in Appendix D.

2.3 Protective Cover

The Design assumes that *sediment removal not sediment cover* creates the remedy. The details for the decision matrix criteria and design for the protective cover applied after dredging are provided in the *Mitigation Plan*. Cover placement will not impede the current and future uses of the river as defined in the ROD, page 71 (i.e. less than 5 feet of draft).

2.4 Upstream Sources

The Design assumes that the remediation will progress from up river to down river and that there is no new introduction of PCB's from any new sources.

2.5 River Uses

The Design assumes the recreational and commercial boat uses as defined in the ROD will be used to set the maintenance draft line.

2.6 Over dredging and Angle of Repose

The Design assumes that 6 inches of over dredging will be included in the removal volume calculations. The Design also assumes that an angle of repose of 2:1 will be established to prevent "sloughing in" of sediment and will be included in the removal volume calculations.

3 Design Evaluation of Sediment Removal to Meeting the RAO

In an effort to measure the suitability of the Design, a three step process is followed to predict a time period for the Design to meet the sediment's Remedial Action Objective of reaching a surface weighted average concentration (SWAC) of 0.5 ppm PCB's. Using the Pre-Design Investigation information, the three step process is as follows:

1. Establish Design Criteria for Sediment Removal

    a. Prescribed Areas (if any) Removal Depths
    b. Sediment Concentration Trigger Level for Removal

2. Use Pre-Design Investigations findings to determine the Dredged surface concentrations. Use the information to estimate Post-Remediation SWAC.

3. Apply Attenuation Rate to the estimated SWAC to project years to RAO.

3.1 Establishing the Design Criteria for Sediment Removal

The Design Criteria for sediment removal is well established and documented relating to the ROD. The Middle River, Lower River and Inner Harbor have specific details established relating to prescribed areas and trigger levels.

With regard to the Submitted Design, significant differences were found between the expectations of the ROD and with the data developed in the Scour Model (or Baird Report) and the Pre-Design Investigation. Removal Criteria for the submitted Design is discussed in Section 5.

3.2 Estimating the Post-Remediation SWAC

The estimated Post-Remediation SWAC is calculated with the Pre-Design Investigation data table. To derive the post remedy SWAC, the sediment concentration is removed from the data table to represent removing the "dredged" sediment. PCB concentrations from below the "dredged" concentration are moved to represent their "new" spatial location relating to a new "design" surface. The sediment surface estimation is made of the top surface concentrations, consistent with the SWAC calculations performed in the Feasibility Study and Pre-Design Investigation. While the Design derives a SWAC based upon the underlying and adjacent sediment concentrations, the actual SWAC calculation will be based upon post-dredge verification sampling as described in the *Verification Sampling Plan*.

3.3 Attenuation Rate Calculation to Remediation Action Objective

The attenuation rate calculation is straight forward, using the design attenuation calculation. The estimated SWAC is applied to the attenuation rate and a time for meeting the remedial action objective is projected. The lower the SWAC, the fewer years it will be to reach the RAO.

See Appendix D for projected attenuation schedule.

4 Record of Decision (ROD) Remedy

The ROD anticipated reaching the Remedial Action Objective (RAO) of 0.5 ppm PCB's over time by removing all surface sediment between the Pennsylvania Avenue and 8th Street bridges, by removing any other sediment above an action "trigger", and by relying on passive attenuation after the removal to reach the surface goal. The ROD selected remedy identifies specific areas for removal, Areas A, B and C, projecting that these areas do not attenuate and also have high concentrations of PCB's. These areas are shown on Figure 2. In addition to the identified areas, the ROD sets a standard of 26 ppm as a removal "trigger" for other sediment. After defined and trigger sediment removal, the ROD anticipates attenuation for reaching the RAO in fewer than 30 years.

The ROD identified the prescribed three areas for special consideration, implying that these sediment areas had PCB concentrations that would not reach the RAO without removal and were the most impacted. The area found between the Pennsylvania Avenue and 8th Street Bridges, named Area A in the ROD, was expected to have high PCB concentrations in the top 2' of sediment. Further, Area A was predicted to have no passive attenuation or new sediment deposition because of natural scouring forces and or boat traffic. The second and third areas, named Areas B and C, were expected to have high probability of natural scour under certain conditions. The Area A-ROD remedy is to remove 2 feet of contaminated sediment. Areas B and C ROD-remedy is to remove 4 feet of sediment.

The ROD calculated a target or trigger level of 26 ppm defining the "dredge" or "no dredge" decision for surface sediment outside of the three areas, A, B, and C. Surface sediment is defined in the ROD remedy as the top 1 foot if there is more than 5 feet of water, and the top 2 feet of surface sediment in areas with less than 5 feet of boat draft. All boat traffic areas with less than five feet of water were thought to have a re-suspension impact of two feet into the sediment. The ROD does detail that after sediment removal, the surface concentration will be compared to 26 ppm for additional activity – either additional removal or cover. After sediment above the remedial trigger level is removed or covered, the post removal surface is expected to reach the RAO.

The ROD selective remedy does not establish a surface concentration objective after sediment removal. Rather, the ROD sets a standard that will be reached with both removal and through attenuation. Again, the selected remedy design implication is that the attenuation should occur in the O&M time period of the ROD, 30 years. The bodies of work that created the basis for the ROD include a Feasibility Study, which predicted attenuation to follow the First Order of Kinetics. In the Feasibility study, there is a kinematical rate constant, *k* that allows the attenuation to be predicted or modeled. The Feasibility Study calculated the k to be .09, which then established the attenuation rate.

The selected remedy remedial design criteria are implied throughout the ROD, the inferences made by this document are, (1) there are certain areas of the river that require removal and will not predictably attenuate because of boat and natural scour, (2) a target removal concentration of 26 ppm is protective, and (3) the attenuation time period will be less than 30 years.

4.1 Evaluation of ROD Remedy Removal Standards

Applying the standards found in Section 3, Design Evaluation, the ROD standards are applied in the three step process, described.

1. Design Criteria for Sediment Removal.
    a. Prescribed Area for Removal
        i. Area A Removal – 2' of Sediment
        ii. Area B and C – 4' Removal
    b. Design Criteria or Trigger Level for Removal
        i. Trigger Level 26 ppm

2. SWAC Estimation
    a. Middle River estimated SWAC of 1.71 ppm
    b. Lower River estimated SWAC of 4.17 ppm
    c. Inner Harbor estimated SWAC of 1.87 ppm
    d. All Lower River Reaches have a combined estimated SWAC of 2.85 ppm.
    e. See Appendix B, Page 1 for each reach's estimated SWAC.
3. Year to meet the RAO
    a. Middle River projects RAO in 18.89 years.
    b. Lower River projects RAO in 32.58 years.
    c. Inner Harbor projects RAO in 20.28 years.
    d. The estimated combined SWAC of 2.85 projects RAO in 26.74 years.
    e. See Appendix B, Page 2 for each reach's projected RAO.

4.2 Summary

Applying strict ROD design criteria to the removal activities of the Sheboygan remedy, the Sheboygan Lower River Reaches (i.e. Middle River – estimated SWAC of 1.71 ppm, Lower River – estimated SWAC of 4.17 ppm, and Inner Harbor – estimated SWAC of 1.87 ppm) attain an estimated overall SWAC of 2.85 ppm after sediment removal. The projected time to the RAO is 26.74 years, with the Middle River projected RAO in 18.89 years, Lower River projected RAO in 32.58 years, and Inner Harbor projected RAO in 20.28 years. The ROD removal design criteria are not acceptable without modification. Appendix B, Pages 1 and 2, provides the estimated Post-remediation SWAC and projected Attenuate Rate for each river reach under the ROD selective remedy without modification.

5 Design Remedy

5.1 Pre-Design Findings and Explanation of Significant Differences

The Pre-Design Investigation, Baird Scour Report and other information were developed after the ROD was written to be used in the Sheboygan River Remedial Design. The information gathered and conclusions drawn follow.

5.1.1 Prescribed Areas for Removal - Remedial Areas A, B and C

The Pre-Design Investigation did not find the 2' surface PCB concentrations between the Pennsylvania Avenue and 8th Street Bridges dissimilar to the balance of the Sheboygan Lower River Reaches. The Pre-Design Investigation did find three significant issues, across all surface sediment:

- High PCB sediment concentration were concentrated in localized areas, in both Area A and the Lower River,
- Boat traffic and scour areas have higher surface PCB concentrations, in both Area A and the Lower River, and
- Deeper water areas have lower surface PCB concentration, in Area A and from the 8th Street Bridge to the mouth.

In general, the Pre-Design Investigation found that shallow depth portions of the river did not exhibit the same general attenuation than the deeper portions. The inference is that boat traffic affects both disbursal and attenuation through deposit action. This set of differing potentials is evidenced by (1) the Lower River reach's SWAC which has not appreciably attenuated during the time period of the ROD and the Pre-Design Investigation, and (2) the Inner Harbor River Right from the Pennsylvania Avenue Bridge to the 8th Street bridge which has good draft and has had marked attenuation.[8]

Deeper water areas are found on River Right from the Pennsylvania Avenue Bridge to the 8th Street Bridge, as well as, both River Left and River Right down river from the 8th Street Bridge. These three areas or ½ reaches exhibit the lowest surface concentration in the Sheboygan River. The significant piece is River Right between Pennsylvania and 8th Street. According to historical information, this reach has had a profound recovery.

The conclusions drawn from the Pre-Design Investigation are that there is no difference between Area A and the balance of the Sheboygan Lower River Reaches. Higher concentration surface sediment is localized to specific known "grids". Finally, special consideration to higher PCB concentrations in smaller sediment volumes (i.e., less than 625 cubic yards) in shallow and deep water areas would be of most benefit.

5.1.2 Integration of Pre-Design Information for Sediment Areas

The Design identifies or categorizes the sediment area characteristics with a specific removal trigger level. The Design has four types or defined areas by which the removal criteria are applied; (1) the surface sediment affected by boat prop wash and natural scour – sediment found in high energy areas, (2) surface sediment not affected by prop wash or scour – sediment found in low energy areas, and (3) sediment below the surface (high or low energy) but may be affected, "Principle Threat Waste", and (4) sediment that has higher concentrations and is in contact with the shore creating a Terrestrial Exposure. More specific definitions are as follows:

[8] For the purposes of this project, river nomenclature was standardized as River Left and River Right as viewed from the centerline of the river facing downstream.

Low Energy Areas – are areas that have a water depth that is relatively deep, greater than five feet in reference to the Low Water Datum (LWD) of 577.5 feet, for boat traffic and natural water flow. This low energy depth is in non-scour areas and is not subject to boat disturbances or natural scour, as shown in the Baird Report. These Low Energy Relative Depth areas should behave as predicted in the ROD. Low Energy Zones are depicted in plan view format and provided in Figures 4 and 5.

High Energy Areas – are areas that have a low water depth, less than five feet in reference to the Low Water Datum (LWD) of 577.5 feet, and have sediment surfaces that have direct and indirect contact with boats' propellers, or prop wash. In addition to the affects of prop wash, these high energy areas have predicted natural scour in the Baird Report. High Energy Zones are depicted in plan view format and provided in Figures 4 and 5.

Protective – "Principle Threat Waste" Areas (PTW) – are areas that have highly concentrated sediment (containing PCB's at 50 ppm or greater) that are not reliably contained, or could present a significant risk to human health and the environment. Generally, these high concentration volumes are in areas with less than 4' of low concentration cover in High Energy Zones and less than 2.5 feet of "cover" in Low Energy Zones.

Protective – "Terrestrial Exposure" Areas (TE) – are the sediment areas that interface with the shoreline or terrestrial environment. These sediment areas have neither sea wall nor protective lining (as in rock or rip rap) and generally found within the near shore profile line. This sediment has a concentration that is near or above 10 ppm.

5.1.3 Attenuation Rate

As detailed above, the appropriate attenuation rate is calculated with a kinematical constant of 0.0651. This attenuation rate is more conservative than the ROD rate.

5.1.4 Sediment Removal Trigger Levels

The Pre-Design Investigation shows that a trigger of 26 ppm will not remove sufficient sediment for all river reaches to the meet the RAO in 30 years or fewer. The Design trigger must be conservatively modified to meet the RAO. The design trigger modifications are

- Differentiate sediment areas by susceptibility to re-suspension – High/Low Energy Areas and Protective Areas; not Areas A, B and C and All other Surfaces. Set a lower trigger concentration in high energy areas,
- Set a lower trigger concentration for possible Terrestrial exposure, and
- Remove high concentration sediment in smaller localized volumes.

Assuming the same spatial integrity of the sediment concentrations, (as in application of the ROD standard), the Design trigger removal concentrations by area are calculated. The trigger concentrations were derived from an iterative process in which post dredge surface is calculated, the SWAC estimated, the attenuation rate applied, and the 0.5 ppm surface concentration RAO is derived to be fewer than 15 years. The triggers are as follows:

River Condition	Sediment Removal Trigger Concentration	Sediment Removal Depth
High Energy Area	6 ppm	2 feet
Low Energy Area	26 ppm	1 foot
Protective Area (PTW)	50 ppm	Generally 4-6 feet
Protective Area (TE)	10 ppm	2.5 feet

5.2 Evaluation of Design Remedy Removal Standard

Applying the standards found above, the Design standards are applied in the three step process, described in Section 3.

1. Design Criteria for Sediment Removal.
    a. Prescribed Area for Removal
        i. No Prescribed Removal Areas
    b. Design Criteria or Trigger Level for Removal
        i. High Energy Areas
            1. 6 ppm
        ii. Low Energy Areas
            1. 26 ppm
        iii. Protective Areas – Principle Threat Waste (PTW)
            1. 50 ppm
        iv. Protective Areas – Terrestrial Exposure (TE)
            1. 10 ppm

2. SWAC Calculation without Dredge Residual
    a. Middle River estimated SWAC of 1.71 ppm
    b. Lower River estimated SWAC of 0.82 ppm
    c. Inner Harbor estimated SWAC of 0.90 ppm
    d. All Lower River Reaches have an estimated combined SWAC of 0.99 ppm
    e. See Appendix C, Page 1 for each reach's estimated SWAC.
3. Years to meet the RAO
    a. Middle River projects RAO in 18.89 years.
    b. Lower River projects RAO in 7.60 years.
    c. Inner Harbor projects RAO in 9.03 years.
    d. The estimated combined SWAC of 0.99 projects RAO in 10.49 years.
    e. See Appendix C, Page 2 for each reach's projected RAO.

5.3 Summary

Analysis of the data from the 2009 Pre-Design Investigation indicates that addressing Area A and the remainder of the Lower River and Inner Harbor reaches based on the ROD trigger levels does not project the sediment to reach the RAO in a reasonable or acceptable time-frame. The data analysis also shows that removal of large portions of Area A has little reducing effect on PCB surface concentrations. If the Design Criteria trigger levels are applied as detailed in Section 5.1.4, the Design projects the river will reach the RAO in 10.49 years, with the Middle River projected RAO in 18.89 years, Lower River projected RAO in 7.60 years, and Inner Harbor projected RAO in 9.03 years. Appendix C, Pages 1 and 2, provides the estimated Post-remediation SWAC and projected Attenuate Rate for each river reach with the Design.

5.4 Significant Differences

There are two significant differences in the submitted Design Removal Criteria and the ROD selected remedy criteria. First, there are no ROD prescribed areas of sediment removal. The Inner Harbor area between the Pennsylvania Avenue Bridge and the 8th Street Bridge recovers consistent with expectations of scour and boat prop wash. Second, the Design differs in setting a lower "trigger" concentration for removal in areas susceptible to high energy scour from prop wash.

6 Design Volume Estimates

6.1 Sediment Volume Removal

The Design Volume calculations apply the data developed in the Pre-Design Investigation to the removal calculation. This Design assumes that each Pre-Design Investigation concentration data result represents a specific volume of sediment. Therefore, for each sediment deposit or sediment grid, a specific volume of sediment is designated for removal, when a specific data result is outside of the Design Criteria.

The removal volume calculations for the Middle River, Lower River, and Inner Harbor are found by grid or deposit in Appendix C. Likewise, a summary of the volume removed by relative area is summarized in Appendix C, Page 3. Referencing this table, no volume of sediment will be removed from the Middle River and Inner Harbor (8th Street Bridge to mouth). PCB impacted sediments will be removed from "localized" areas in the Lower River and Inner Harbor (Penn Ave. to 8th Street Bridges) as shown in Figures 3, 4, and 5.

A comparison in the differences of the estimated removal volumes for the ROD prescribed remedy of 53,000 cubic yards and the design quantity of 50,548 cubic yards is as follows:

1. The ROD data set was limited.
2. The Pre-Design Investigation data shows the PCB impact in "localized" areas.
3. The estimated removal volumes are shifted with respect to their removal locations.

Appendix E provides Cross Section drawings of the Lower River and Inner Harbor Grids from the beginning of the continuous sediment, Station 615+00, Cross Section 317-316; to the end of "Area A", Station 680+00, Cross Section 109-108. Appendix F provides Profiles (Figures 1 – 21) of the Lower River and Inner Harbor Grids. The six Profiles provided for each reach represent the bank, middle, and center of the Grid for River Left and River Right. The dredge removal locations (X, Y, and Z planes) provided in Appendix E and F will be loaded into a dredge software program (i.e. Dredgepack or equivalent) to provide quality control for operator. Additional details will be provided in the Dredge Plan as part of the Remedial Action Work Plan (RAWP). Appendix G (Figures 1 – 5) provides a typical Cross Section drawn to scale showing a representation of the dredge cut line.

6.2 Design Considerations developed from Removal Volume Estimate

The Design removal volume dictates the remainder of the Design calculations, including schedule, calculations, equipment needs and the physical layout of the remedial action components of the Design. Any augmentation of the Design volume will have a cascading impact on schedule, cost and/or physical layout considerations.

7 Design Component Assumptions and Parameters

This section will define the conceptual overview of the physical constraints, capabilities, flows, etc. of the equipment and materials used to remove sediment to meet the Remediation Action Objective (RAO).

Key components of the design are as follows:

1. Access conditions;
2. Dredge, dredge pipeline and booster pumps;
3. Dewatering Area;
4. Wastewater treatment plant; and
5. Loading, Transportation, and Disposal of sediment

The sections below provide "Design" details for each component. Implementation or "how to" details for each defined work feature will be provided in the Remedial Action Work Plan (RAWP).

7.1 Access Conditions

Removal of sediment from the Lower River portion of the Sheboygan River (i.e. Lower River and Inner Harbor) will require coordination with City of Sheboygan and private land owners to implement. Initial discussions with property owners and the City of Sheboygan have occurred to date. Following U.S. EPA's and WDNR's approval of the Design, additional discussions will be necessary with the property owners prior to implementation of the remedial action work. Key issues for efficient implementation of the remedial action are construction access to the river for mobilization and dewatering area development.

7.2 Dredge, Dredge Pipeline, and Booster Pumps

Additional sampling will be performed, prior to dredging, to determine or bound the limits of in-situ TSCA regulated sediment (concentrations ≥ 50 ppm). The grids scheduled for additional sampling are as follows: 175, 184, 173, 182, 169, 165, 163, 172, 133, 131, 138, 125, and 124. Sampling requirements are provided in the *Verification Sampling Plan.*

Consistent with the Upper River sediment removal, an 8-inch Swing and Ladder, Cutterhead Dredge is planned for the removal of Soft Sediment in the Lower River portion of the Sheboygan River (i.e. Lower River and Inner Harbor). The dredge uses three spuds (two aft and one kicker) that hold it in place as the cutterhead swings in a 22.5 foot arc pattern with a digging depth of 15 feet. The dredge equipment will receive a signal from a GPS. The base signal is received through a dual antenna system located on the dredge which provides the heading and cutterhead position. In addition, base stations will be established at multiple locations on the river to provide known X, Y, and Z coordinates. The appropriate base stations (i.e. depending on location of dredge) will be used daily to provide the surface water elevation as input to the dredge software. A display computer, located in the dredge cabin, receives inputs from a rotary encoder to detect the swing angle and an inclinometer to measure the ladder angle relative to vertical. All of these inputs (i.e. GPS, water surface elevation, rotary encoder, inclinometer, and removal locations in Appendix E and F) are received by the software (Dredgepack or equivalent) and display for the operator the appropriate removal elevation relative to the X and Y position. Additional detail will be provided in the Dredge Plan as part of the RAWP. Once the sediments within the arc have been dredged, the two aft spuds will be lifted while the kicker spud drives the dredge forward. Dredging will start upstream and work downstream, as necessary. TSCA sediment will be established in-situ, using the pre-design and pre-dredge sampling data. TSCA sediment will be segregated from non-TSCA sediment by flushing the dredge slurry line with river water before and after dredge removal. Flushing will be determined complete when the density of the slurry (10-15% operational) is less than 1% as indicated by the density loop of the polymer system. Monitoring of sediment resuspension during dredging will occur continuously during the sediment removal effort. Measurement of river water turbidity will be performed 150 feet upstream and 500 feet downstream of removal locations every two hours as described in the *Verification Sampling Plan.*

An 8-inch high density polyethylene (HDPE) pipeline will convey the dredge sediment slurry to the dewatering area. Based on the manufacturer guidance document, HDPE pipe has exceptional durability/integrity to expansion and contraction during a variety of temperatures extremes. However, temperature will have little effect on the HDPE pipe because the dredge line will be in the water (Sheboygan River) which has little change in daily temperatures. The fixed points, dredge and booster pump discharge, will be made with a flexible reinforced rubber hose. In addition, slack will be built into the dredge line to compensate for expansion and daily movements. A temporary pipeline corridor will be established for removal of the Soft Sediments. The corridor will provide access for the dredge pipeline. Ideally, the pipeline would be located to provide the shortest route between the river and the dewatering area. The pipeline will be secured along the riverbank, as necessary. The pipeline will be properly marked with navigational buoys. Access for the pipeline inspections will be via the river and will be performed periodically each day during dredging activities. Varying lengths (i.e. 250', 500' and 1,000') of pipeline will be added as the dredge advances downstream to minimize interference with potential boaters.

Booster pumps will be added to the pipeline approximately every 3,000 to 5,000 feet to assist in conveying the slurry to the dewatering area. The actual spacing will be determined in the field to provide the best removal results using a baseline discharge pressure of 45-50 pounds per square inch (psi) in the dredge and a suction pressure of 18-22 psi in the booster pumps.

Dredging and the dredge pipeline will be installed, inspected, and tested in accordance with the Specifications. The basis for the expected daily volume removed is as follows:

1. Flow rate;
2. Slurry percent solids;
3. Operation hours;

The calculation is provided in Appendix D. The dredge line layout is provided in Figure 6. Additional details will be provided in a Dredge Plan submitted as part of the *Remedial Action Work Plan (RAWP)* as a requirement of the Specification.

7.3 Dewatering Area

Impacted sediment is removed from the river in a slurry form which contains 88% river water. The water is then separated and removed from the sediment to facilitate transportation and reduce disposal costs. The dewatering process will increase the solids content of the slurry by forcing the slurry through geo-textile tubes located on a dewatering area that will allow the excess water to carriage flow out while retaining the solids and bulk of any PCBs. Polymer addition will be applied during the dewatering process. The amount of polymer added to the slurry will be controlled by monitoring the density of the slurry and adjusting the dosage as different slurry characteristics are encountered. The polymer will be added to the slurry pipe prior to entering the geo-textile tubes. Additional detail will be provided in the Dredge Plan as part of the RAWP.

A 2 acre dewatering area will be constructed at the site location described in Section 10 outside the flood zone (i.e. elevation 587). The dewatering area will be constructed with compacted clay and hard fill, and asphalt for purposes of providing a secure area to dewater sediment in geo-textile tubes. The dewatering pad has space for 5 geo-textile tubes east of the drainage swale and 5 west of the drainage swale when placed in a single vertical layer. The preliminary plan will be to place geo-textile tubes in a single layer. Stacking of non-TSCA geo-textile tubes will only be performed, if necessary, to maintain dredge operation efficiency. Based on the manufacturer guidance document, each geo-textile tube can hold approximately 1,100-1,200 cubic yards of sediment.

Because of the de-watering pad size, geo-textile tubes will be "changed out" 4 times (if applied in a single layer) to hold the requirements of the design volume. By "changed out", the Design means the process of laying down a geo-textile tube, filling the tube with sediment, allowing for de-watering, opening the geo-textile and loading the sediment into trucks, disposing the sediment at the appropriate landfill, and re-laying down a new geo-textile tube for the next volume of sediment. 2-3 days of fill time (See Calculation, Appendix D), 1-2 days of dry time and 1 day to load-out are estimated before the geo-textile tube will be ready for change out. In-situ TSCA material will be de-watered in specific and identified geo-textile tubes and disposed at the appropriate out-of-state landfill. Geo-textile tubes will not be re-used or decontaminated but rather disposed with sediment they held (TSCA or non-TSCA). Carriage water from non-TSCA and TSCA geo-textile tubes will not be segregated.

Asphalt pavement will be placed over the prepared dewatering area to create a both a surface for the geo-textile tubes and a surface to flow carriage water from the geo-textile tubes to the trench in real time. The sub-base preparation and asphalt thickness contemplates the use. Asphalt thickness will be generally 4-6 inches. The surface of the dewatering area will be sloped no more than 1% towards the trench. An asphalt berm will be constructed around the perimeter of the dewatering area. The perimeter berm will allow complete storage of a 1-year, 24-hr storm event within the dewatering area during the active project phase. No water will be allowed to be released from the dewatering area without treatment. The trench will be an integral part of the dewatering area and contained within the berm. The trench will deliver water to a sump where a pump will convey the water to the on-site waste water treatment plant (WWTP) where it will be treated and discharged to the Sheboygan River.

The dewatering area will be constructed to provide the location for staging dewatered sediment in accordance with the Specifications. The basis for the dewatering area capacity and berm height design is as follows:

1. Surface Area - Pad;
2. Surface Area/Volume – Geo-textile Tubes; and
3. Rainfall Event – 1-yr, 24 hr

The calculations are provided in Appendix D. The dewatering area and details are provided in Figures 7 and 8.

7.4 Wastewater Treatment Plant (WWTP)

A Wastewater Treatment Plant (WWTP) will be constructed to treat carriage water, backwash water from the WWTP, and precipitation water in real time. The WWTP will be constructed to treat all water generated from these flow rates with minimal storage of water in the dewatering area. To achieve this, water will be conveyed with a 3,200 gpm (maximum output) diesel pump through three multi-media filters (capacity = 1,000 gallons/each) installed in parallel for initial treatment and three granulated activated carbon filter (GAC, capacity = 1,000 gallons/each) installed in parallel for final treatment. The backwash pump, identical in size and capacity as the WWTP pump, will serve as the back-up WWTP pump. The back-up pump will be connected with a series of hoses to by-pass the primary pump and feed the WWTP. Finally, the water will flow to an effluent storage tank (capacity = 22,000 gallons) and gravity feed to the river outfall. Backwashing of the multi-media and GAC filters will be performed, at minimum, daily or when the change in pressure from the influent to effluent stream is 10 psi or greater. The location of the effluent pipe will be placed at the mid-point of the effluent tank to allow for a constant supply of backwash water when dredging is not occurring. In addition, water can be held within the dewatering area if the need for additional backwash water is necessary.

The WWTP will be constructed, inspected, and tested in accordance with the Specifications. The basis for the WWTP design is as follows:

1. Dredge flow rate;

2. Precipitation flow rate; and
3. Backwash flow rate.

The calculation is provided in Appendix D. The WWTP layout is provided in Figure 9.

7.5 Loading, Transportation and Disposal of Sediment

Dewatered sediment will meet a paint filter test prior to disposal. Air drying will be the primary method to assure the dewatered sediment pass the paint filter test. If necessary, water absorption additives may be added to aid or accelerate the drying process. Amendment detail will be provided in the Sediment Management Plan as part of the RAWP.

To protect the surface, sediment within the pad will be moved to the excavator with a rubber tired wheel loader equipped with a rubber leading edge on the bucket to reduce abrasion on the asphalt surface. The sediment will be loaded with an excavator located outside the pad in the “loading area”. After load out, the pad will be inspected and made suitable (i.e. seal coat or new asphalt) before the next phase of geo-textile tubes are placed. Sediment will be loaded into trucks in the “loading area”. The loading area will be designed with containment (i.e. berm) so that truck decontamination can be performed within the confinements of the loading area. Any material spilled during loading will be shoveled and placed back into the truck or dewatering area. Any water generated during decontamination or rainfall events will be pumped to the dewatering area for treatment. Loading will be performed in accordance with the Specification. Air monitoring will occur prior to sediment placement in the dewatering area to establish baseline conditions and during each load out phase of sediment in accordance with procedures provided in the *Verification Sampling Plan.* State regulations require that fugitive dust emission be controlled. Therefore, all roadways, designated work areas, and other possible sources of dust generation will be controlled by application of water when visible dust is observed.

The dewatered non-TSCA sediment will be loaded into quad axle trucks equipped with a leak-proof gate and tarp. The dewatered TSCA sediment will be loaded into semi trucks equipped with a leak-proof gate, bed liner and tarp. All haul trucks will be properly placarded and manifested. Transportation will be performed in accordance with WDOT requirements and Specification.

All non-TSCA sediment will be disposed at Veolia Environmental Services. All TSCA sediment will be disposed at Environmental Quality (EQ), Wayne Disposal located in Michigan. Disposal will be performed in accordance with the Specification.

8 Verification Sampling

The *Verification Sampling Plan* (VSP), submitted as an independent document, provides the complete detail, rationale, and methodologies to perform verification sampling during and following remedial activities.

9 Specifications

The selected contractor will be required to conform to a set of Specifications. PRS will perform the dredging and sediment management work. Incidental electrical and mechanical sub-contractors will be used as needed. Sediment transportation and disposal will be contracted through the disposal location. An Outline of Specifications is provided below. The Specifications are provided in Appendix H.

Specification	Section
DIVISION 1 – GENERAL REQUIREMENTS	
Construction Staking	01050
Summary of Work	01100
Measurement and Payment	01285
Submittals	01330
Environmental Protection	01355
Stormwater Pollution Prevention Measures	01356
Temporary Facilities and Utilities	01510
DIVISION 2 - SITE WORK	
Geo-textile tubes	02074
PVC Pipe and Fittings	02089
HDPE Pipe and Fittings	02090
General Earthwork	02220
Rip Rap	02271
Dredging	02325
Asphalt Pavement	02740
Seeding	02931
DIVISION 11 – EQUIPMENT	
Wastewater Treatment Plant	11355
DIVISION 13 – SPECIAL CONSTRUCTION (TCSA)	
Loading, Transportation, and Disposal of PCB Sediment	13285

10 Proposed Siting/Locations of Processes/Construction Activity

The proposed location is land at Maryland Avenue between South 20th and 21st Street in Sheboygan near river Station 575+00 owned by Ellinger Realty Inc. and Alpine Insulation. The proposed siting area is provided in Figure 10. Wetland delineation for the proposed location is discussed in Section 14. A Wetland Inventory Map is provided in Appendix I.

11 Mitigation to Restore Habitats

The *Mitigation Plan* (MP), submitted as an independent document, provides the complete detail, rationale and methodologies to restore areas following sediment removal. The proposed remedial action in the Lower River portion of the Sheboygan River (i.e. Lower River and Inner Harbor) includes the removal and disposal of PCB contaminated sediments from within the river. The areas that are considered for possible protection and mitigation include the following:

- Riverbanks, Boat Slips, Access Points, and Bridge Structures
- Dewatering Area
- Dredge Sediments

12 Post-Remediation Monitoring

The 2008 *Post-Remediation Monitoring Plan*, submitted as an independent document, provides the complete detail, rationale, and methodologies for the expected long-term operation and monitoring requirements. This Plan, approved September 2008, includes the requirements for annual bathymetric surveys of the Lower River and Inner Harbor conducted to assess sediment profile changes and determine if buried PCB contaminated sediment is vulnerable to disturbance and release.

13 Project Schedule

The *Project Schedule*, presented below, is aggressive to allow effective removal of impacted sediment, shorten the length of time required to facilitate the remedial action and to quicken the recovery of the affected improvements. The need to effectively and quickly initiate and complete remedial activities is underscored by the review process of the required submittals.

Activity	Responsible Party	Dates
Sediment Removal		
Mobilization	PRS	3/28/11 – 4/1/11
Dredge Area 1 (Grid 315-278)	PRS	4/4/11 – 4/8/11
Dredge Area 2 (Grid 254-198)	PRS	4/9/11 – 4/27/11
Dredge Area 3 (Grid 235-189)	PRS	4/28/11 – 5/12/11
Dredge Area 4 (Grid 183-111)	PRS	5/13/11 – 7/13/11
Dredge Area 5 (Grid 194-118)	PRS	7/14/11 – 8/6/111
Cover Placement	PRS	8/8/11 – 8/24/11
Dredge Area 6 (Deposit 3)	PRS	8/25/11 – 8/27/11
Demobilize	PRS	8/29/11 – 9/2/11

14 Permit Equivalency

The Design activities are subject to federal, state and local permit requirements and regulations. Since the Design is being performed under the *Comprehensive Environmental Response, Compensation and Liability Act*, (CERCLA), federal, state or local permits are not required for project activities. However, the activities proposed must comply with the substantive requirements of the federal, state and local permit requirements and regulations. This section identifies the federal, state and local permit requirements and regulations and describes how the proposed remedial design will satisfy the applicable substantive requirements.

For the purpose of this section, on-site is defined as the Lower Sheboygan River and all areas in near-proximity to the river that are necessary to implement remediation. This will, in general, include the following:

- All water based activities including dredging, sampling, monitoring, and any construction required to facilitate the remedial activities.

- All near river activities including restoration and the operation of land based facilities including: equipment loading/unloading into the river, dewatering area, wastewater treatment plant, and loading for off-site disposal.

The following sections describe the various project activities for the Lower River and the relevant federal, state and local environmental substantive requirements that typically apply to these activities. A listing of the approved ARARs can be found in Appendix B of the *Lower River Remedial Design Work Plan* (LRRWDP).

14.1 Section 106 of the National Historical Preservation Act

"Section 106" of the *National Historic Preservation Act*, as amended, requires the effects of the undertakings on historic properties listed in, or eligible for listing in, the NRHP will be accounted. "Section 106" also allows the ACHP an opportunity to provide comment(s) on the undertaking. Historic properties consist of prehistoric or historic sites, structures, buildings, objects, or features that are made or modified in the course of human activities.

To comply with "Section 106" the following will be completed:

- Consult with the Wisconsin State Historic Preservation Officer (SHPO) and the appropriate Tribal Historic Preservation Officers (THPO) who can provide a recommendation regarding the need to conduct further cultural resource studies to identify their concerns about historic properties with traditional religious or cultural significance that may be affected by the Lower Sheboygan River project. Issues raised by SHPO will be addressed in the appropriate manner.

- If it is determined through consultation with the SHPO and Indian tribes that historic or cultural resources have the potential to be affected by the undertaking, a Phase I survey for archaeological and architectural/history resources will be completed in the Area of Potential Effect (APE). The APE is defined as the geographic area(s) in which an undertaking may directly or indirectly cause alteration in the character or use of historic properties. The Phase I investigation will be conducted by individuals who meet the Secretary of Interior's Standards and Guidelines for professional standards.

- If the Phase I survey identifies cultural resources within the APE that are potentially eligible for listing in the NRHP, the undertaking will attempt to minimize impacts to the resources through avoidance. If avoidance is not possible, further investigation of the cultural resources will be conducted in accordance with Federal and State historic preservation regulations.

14.2 Section 404, 10 and 401 Dredge and Fill Permit

14.2.1 Applicability

Several federal and state programs including *Section 404 Dredge and Fill Permit of the Clean Water Act - 33 U.C.S. 1344* (Section 404) is administered by the United States Army Corp of Engineers (USACE) and regulates the following:

- Discharge of dredged or fill material; and
- Disturbance of streambeds.

The following specific Lower River activities would likely require a need to meet substantive requirements of "Section 404":

- Dredging Soft Sediments

The requirements for these activities would also likely require that adverse impact to aquatic ecosystems and human health and the environment be evaluated and minimized.

14.2.2 Compliance

The remedial work proposed includes best management practices to minimize the impacts of dredging to the environment and monitoring the dredging process to assure compliance with the substantive requirements. The best management practices and monitoring that are proposed include the following:

- Hydraulic dredging, a technology that minimizes the suspension of sediment, is proposed for the Lower River. Performance requirements (e.g., best management practices) for minimizing downstream sediment re-suspension will be used. Typical best management practices that will be used are:

    1. Reducing cutterhead rotation speed.
    2. Reducing swing speed of cutterhead.
    3. Turning the main pump off after shutting down the cutterhead auger and turning pump on before starting the cutterhead auger.
    4. Reducing the depth of sediment removed with the cutterhead auger to 75% of the maximum. The cutterhead auger can remove sediment in increments of 2 feet. Reducing to 75% would bring the removal depth to 1.5 feet.

    Best management practices will be implemented anytime trigger or action levels are exceeded. Past experience in the Upper River has shown these techniques to be effective.

- Potential re-suspension of sediment (i.e. Turbidity) will be measured in Nephelometric Turbidity Units (NTUs) and correlated to Total Suspended Solids (TSS) 150 feet upstream and 500 feet downstream every two hours during the dredge operation. The specific details for these monitoring activities are established in the *Verification Sampling Plan*. An NTU trigger level of 35 mg/L and an action level of 70 mg/L, used in the Upper River remediation and found effective, has been established based on the increase in turbidity down-stream compared to upstream of the dredging area. If these levels are exceeded, implementing best management practices (above) are required to reduce sediment suspension.

14.3 WPDES WWTP Discharge Permit

14.3.1 Applicability

A WPDES General Permit is typically required for the discharge of water from the Wastewater Treatment Plant (WWTP). Discharges of treated water to the Lower Sheboygan River are regulated under *Wis.*

Admin. Code Chapters NR 200 to 220 and 299 and Wis. Statues s. 281.41. The substantive requirements are as follows:

- Design the Wastewater Treatment Plant (WWTP) using flows from the dredge, the intensity of the 1-year, 24 hour rainfall event, and backwashing

- Submit a monthly Discharge Monitoring Report (DMR) detailing the results influent and effluent required sampling

14.3.2 Compliance

The following is a general description of the Wastewater Treatment Plant (WWTP) for the Lower River.

The water streams that require treatment include the following:

- Dredge water during the dewatering of the sediment in the dewatering area;

- Backwash water from the WWTP; and

- Water from precipitation that falls within the dewatering pad.

These water streams will be treated at the on-site WWTP.

The water streams will drain to a sump and then be pumped to the WWTP located near the dewatering area. The WWTP will include the following treatment processes:

- Three multi-media filters in parallel for initial treatment; and

- Three granulated activated carbon (GAC) filters for final treatment.

As required by *NR 205 Wis. Admin. Code* the WWTP will be designed to handle the expected dredge and backwash water streams plus the probable intensity of a 1-year, 24-hour rainfall event. Details concerning the WWTP are provided in Section 7.4. Consistent with the Upper River construction, the WWTP will not be required to be enclosed by secondary containment. Rather, a leak test will be performed prior to the use of the WWTP. Daily inspections will be performed to detect any leaks during the operation. Any leaks encountered will follow the procedures defined in the *Contingency Plan* and operations halted until corrective measures can be performed.

14.3.3 Wisconsin Statues Chapter 283- WPDES Permit

As part of the WPDES substantive permit requirements, the WDNR will define specific water quality standards and propose influent and effluent limits for the Lower River WWTP. The influent and effluent from the plant will be sampled for the following parameters, at a minimum:

- Total Suspended Solids (Daily), with real time monitoring of effluent every hour;

- pH (Monthly), effluent only;

- PCBs (Daily); and

- Mercury (Twice/month).

Details for the influent and effluent sampling can be found in the *Verification Sampling Plan* (VSP).

14.4 Storm Water Discharge Permit (WAC NR 151 and 216)

14.4.1 Applicability

The storm water discharge will address the substantive requirements of *Wis. Admin. Codes NR 151 and NR 216*. These codes apply to erosion control on projects that result in land disturbance of greater than one (1) acre, including best management practices for erosion control and storm water management. The process includes filing a Notice of Intent (NOI) for storm water management discharges associated with land disturbance along with an erosion control and post-construction storm water management plan.

The storm water discharge substantive permit requirements cover activities that will occur on the land adjacent to the Lower River that are regulated under *NR 151 and 216*. These land based activities and approximate areas that will be disturbed are as follows:

- Construction of a dewatering area that includes: polymer system, haul roads, and WWTP; and
- Temporary access roads.

14.4.2 Compliance

Because no increase of impervious areas will occur with this design, post-construction storm water runoff calculations will not be needed to comply with the substantive requirements for construction and operation of the dewatering area. The existing conditions and post construction conditions will be the same from a hydrologic standpoint. Control of storm water discharge will be occurring because all precipitation will be contained within the dewatering area.

Substantive compliance with storm water standards also includes a water quality component. To meet NR 151, the following performance will be attained for the project:

- Design using Best Management Practices (BMP) and erosion control system that meet the standards of NR 151. Re-vegetation, buffer strips, and other BMPs will minimize runoff during project activities. Upon completion of the project activities, the landscape will revert to natural conditions
- Complete the required weekly site inspection including post storm event inspections. These reports will be completed by the Project Manager or designee throughout the life of the project

14.5 Chapter 30 Stream Crossings Navigable Waters (Applications on County basis: WI NR 199, 102, 103, 155, 117)

Typically any project activities that require a Wisconsin Stats. Chapter 30 permit in navigable waterways is applied for jointly with the federal requirements for the Section 404, 10 and Chapter 30 permit even though these regulatory standards are not identical. As such, please refer to Section 14.2 (Section 404, 10 and 401 Dredging and Filling Permit) for substantive requirements and compliance discussion of this joint permit.

14.6 NR 103 Water Quality Standards for Wetlands

14.6.1 Applicability

Wis. Admin. Code Chapter NR 103 (NR 103) applies to any proposed activity that may have an adverse cumulative or secondary impact on the value or function of a wetland that meets the definition of a wetland in Wis. Statues s. 23.32(1).

14.6.2 Compliance

A review of Wetland Inventory Maps on the WDNR website showed mapped wetlands around the islands in the Lower River which are outside the project limits.

Although the Wetland Inventory Map identifies no wetland complex within project limits, the protection of any wetland must be secured. To that end, all areas of potential disturbance will be identified in the field and reviewed with WDNR. If wetland sites are identified, methods for avoidance and impact minimization will be reviewed. In all cases, the intent is to return all disturbed areas back to baseline conditions. As such, no long-term impacts to wetlands should result from this project. The Wetland Inventory Map for the site is provided in Appendix I.

14.7 Shoreland-Floodplain Zoning Permit (NR 115 NR 116 and NR117)

14.7.1 Applicability

Floodplain regulations are no longer included in the state Chapter 30 permitting process. As such, the requirements for Floodplain zoning fall within local jurisdiction. To assure compliance in this area, the requirements within NR 115, NR 116 and NR 117 will be followed.

14.7.2 Compliance

The proposed feature that may fall into the floodplain regulations is the dewatering area. A small strip of the dewatering area will be located within the river 100-yr floodway as shown in Figure 10. To assure no flood backwater effect, the dewatering area elevation will be developed above the flood zone and control of run-on/run-off will be maintained with the perimeter berm.

14.8 Section 401 Water Quality Certification – Joint Application with USACE Outside Navigable Waters

Typically any project activities that require a Section 401 Water Quality Certification with the USACE in navigable waterways are applied for jointly with the federal requirements for the Section 404, 10 and Chapter 30 permit. Please refer to Section 14.2 (Section 404, 10 and 401 Dredging and Filling Permit) for substantive requirements and compliance discussion of this joint permit.

14.9 U.S. Fish and Wildlife Service Endangered Species Section 7 Consultation

Part of the substantive requirements for the Lower River project will be to consult the United States Department of Interior Fish and Wildlife Service (Fish and Wildlife Service) of the project area. Based on our discussions with the regulatory community we understand that the Fish and Wildlife Service is the federal agency having jurisdiction with respect to the Sheboygan River project.

14.10 National Marine Fisheries Service Endangered Species Section 7 Consultation

The National Marine Fisheries Service Endangered Species Section 7 consultation is not required for this project. The substantive requirements related to endangered species will be addressed in Section 14.11.

14.11 Natural Heritage Inventory (Wisconsin Endangered Species Law – WI Stats. S. 29.415)

Part of the substantive requirements for the Lower River project is to consult the WDNR, Bureau of Endangered Species for an endangered habitat review of the project area. An investigation of the aquatic species listed in the WDNR Bureau of Endangered Species will be conducted and reported appropriately.

15 References

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U.S. EPA. 1990. *Guidance on EPAS Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties,* OSWER Directive 9355.0-4B. April 1990.

U.S. EPA. 1995. *Remedial Design/Remedial Action Handbook,* OSWER Directive No. 9355.0-4B. June 1995.

U.S. EPA. 2000. *U.S. EPA Superfund Record of Decision (ROD), Sheboygan River and Harbor, Sheboygan, Wisconsin,* May 2000.

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PRS. 2009. *Pre-Design Investigation Report*. October 2009

PRS. 2008. *Post-remediation Monitoring Plan (PMP)*. September 2008

PRS. 2009. *Lower River Remedial Design Work Plan (LRRWDP)*. June 2009

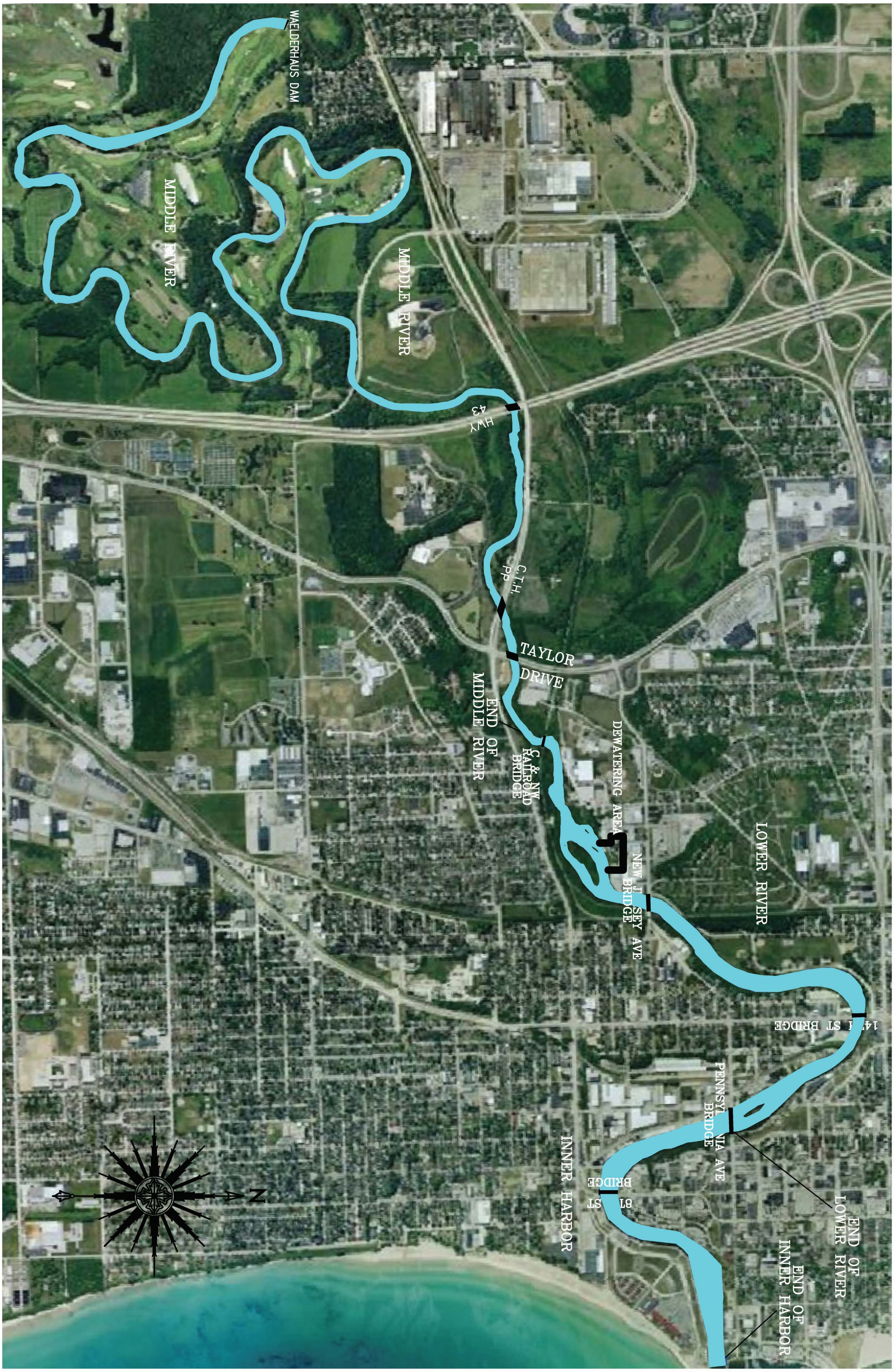

FIGURE NO. 1

Scale: SHOWN

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
LOWER RIVER DESIGN
SHEBOYGAN FALLS, WISCONSIN

RIVER REACHES

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Fax: 513-489-2794

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△				
			REVIEWED	
△				
			DESIGNED	

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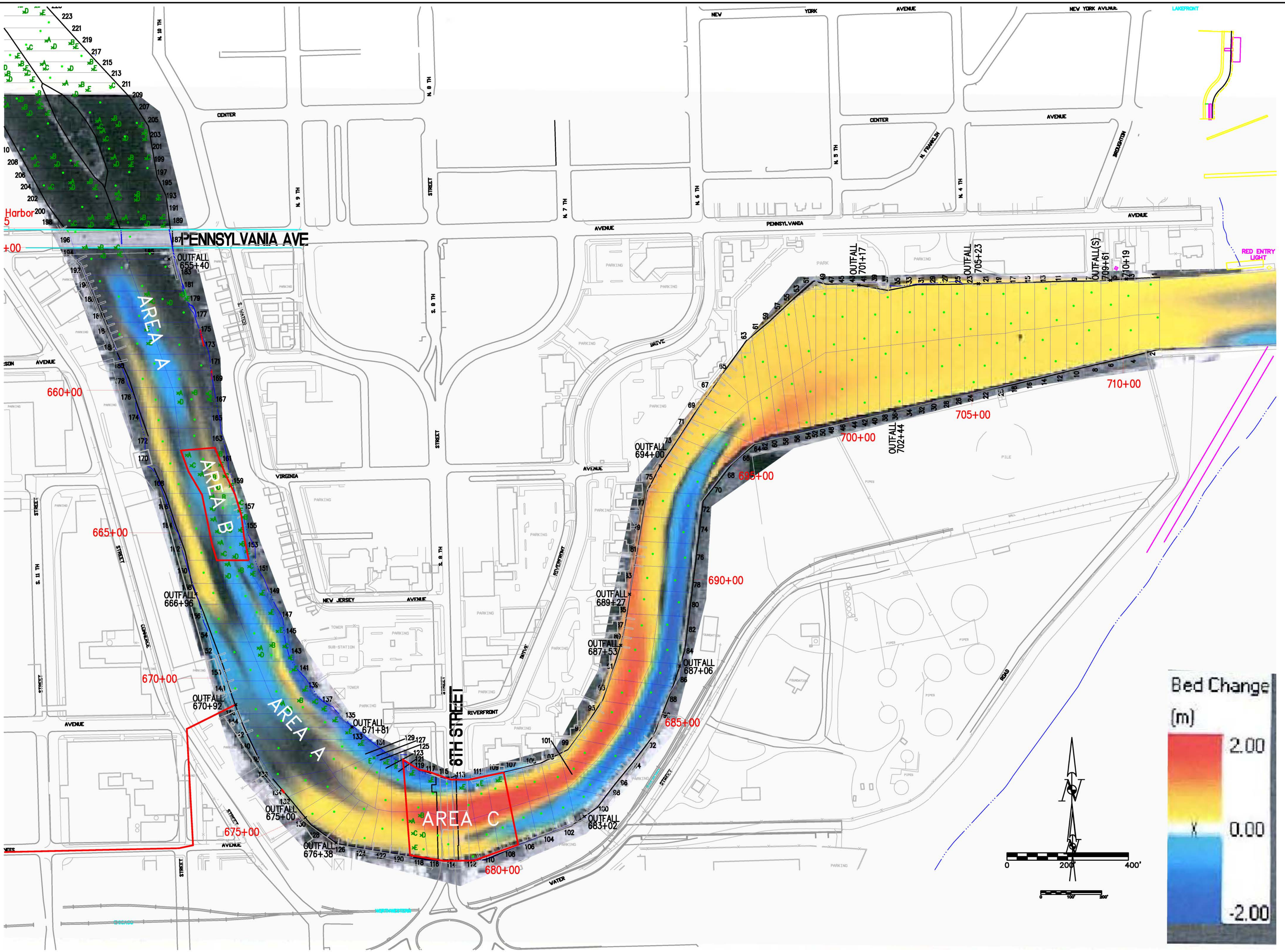

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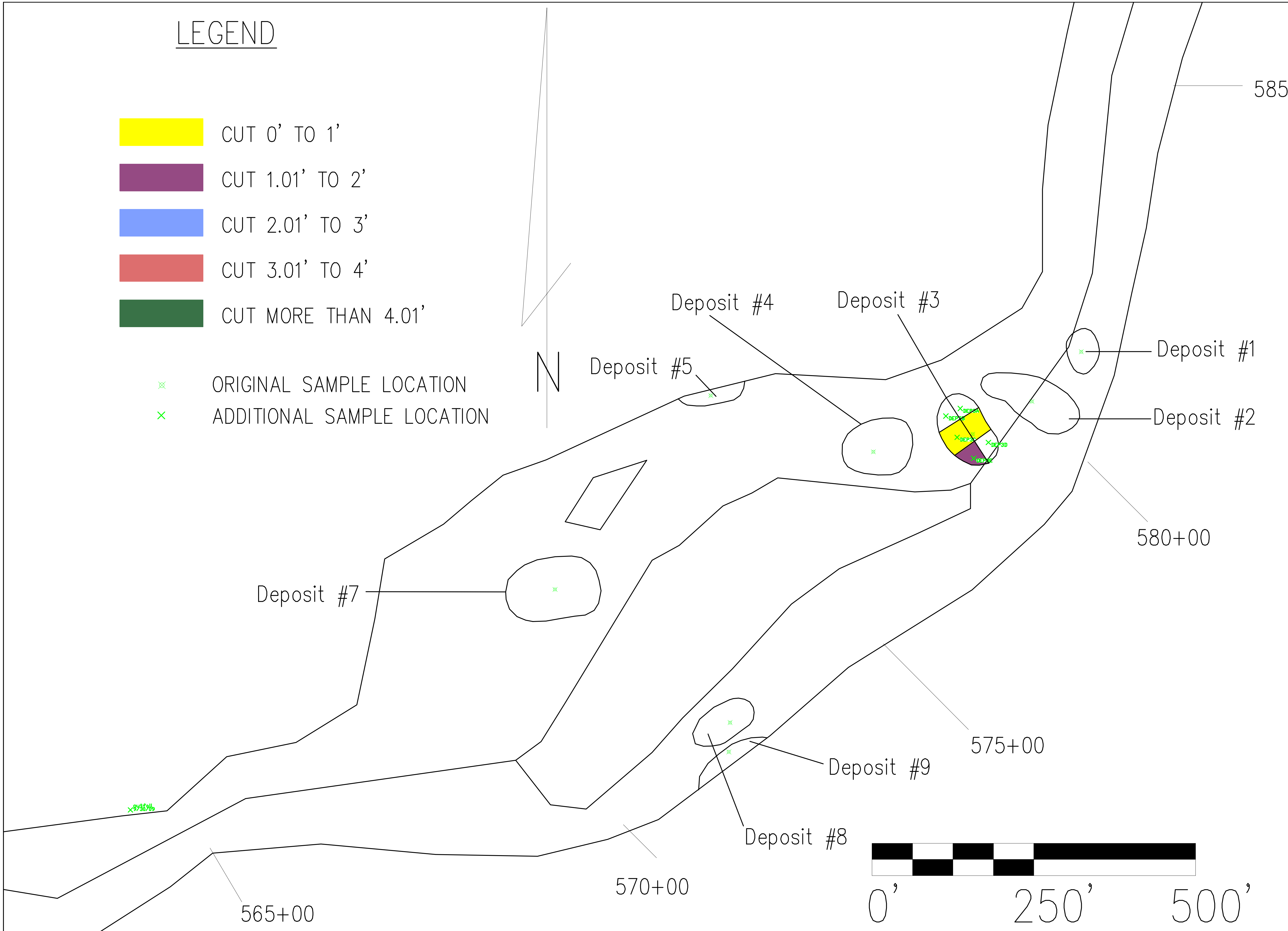
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
LOWER RIVER PLAN
SHEBOYGAN FALLS, WISCONSIN

OVERLAY OF
SEDIMENT TRANSPORT MODELING
AS PREPARED FOR US ARMY CORPS OF ENGINEERS
(USACOE)
BY: WF BAIRD & ASSOCIATES NOVEMBER 2, 2007

Scale: shown

FIGURE NO.
2



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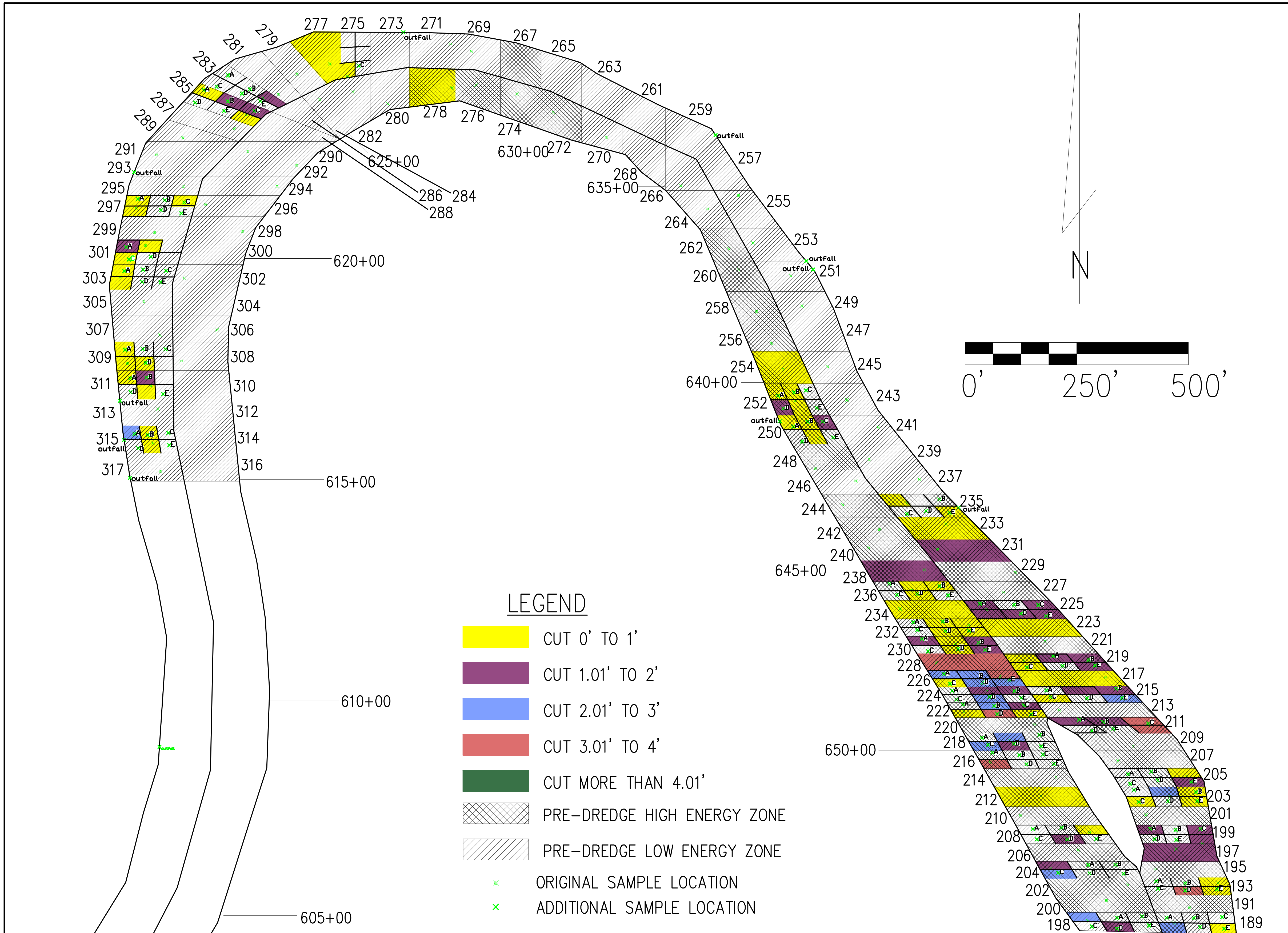
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
LOWER RIVER SEDIMENT REMOVAL DESIGN
SHEBOYGAN FALLS, WISCONSIN

LOWER RIVER
DEPOSIT REMOVAL LOCATIONS

Scale: SHOWN

FIGURE NO. 3



SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
LOWER RIVER DESIGN
SHEBOYGAN FALLS, WISCONSIN

LOWER RIVER
GRID REMOVAL LOCATIONS

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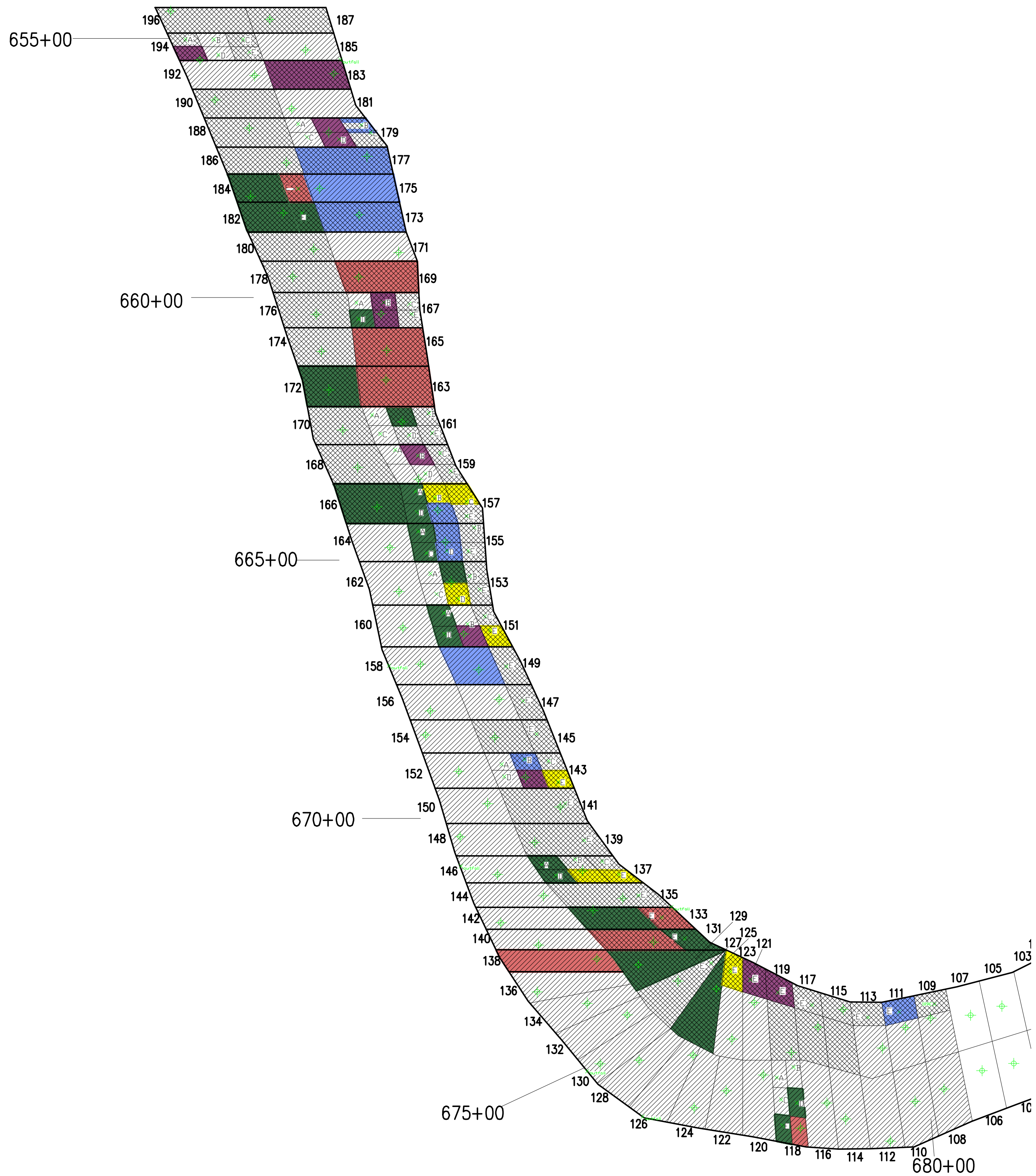
Scale: SHOWN

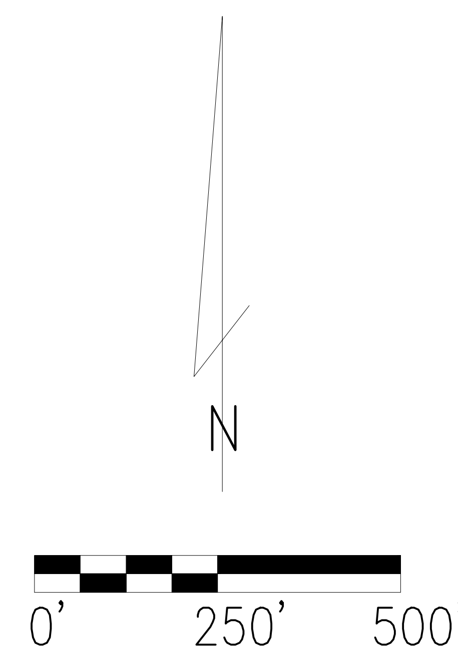
FIGURE NO. 4



LEGEND

CUT 0' TO 1'
CUT 1.01' TO 2'
CUT 2.01' TO 3'
CUT 3.01' TO 4'
CUT MORE THAN 4.01'
PRE DREDGE HIGH ENERGY ZONE
PRE DREDGE LOW ENERGY ZONE

ORIGINAL SAMPLE LOCATION
ADDITIONAL SAMPLE LOCATION



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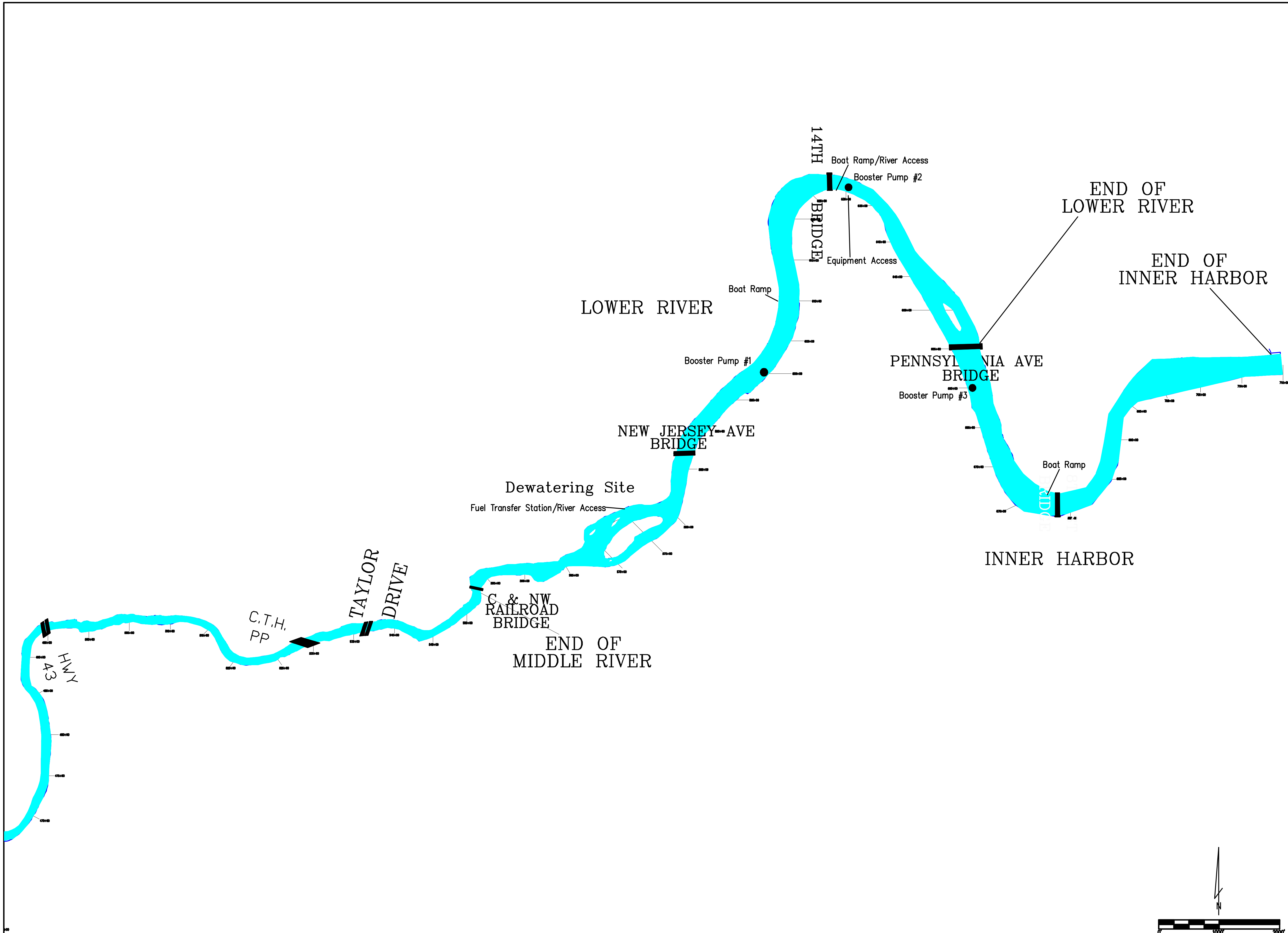
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
LOWER RIVER DESIGN
SHEBOYGAN FALLS, WISCONSIN

INNER HARBOR
(PENN AVE BRIDGE TO 8TH STREET BRIDGE)
GRID REMOVAL LOCATIONS

Scale: SHOWN

FIGURE NO.
5



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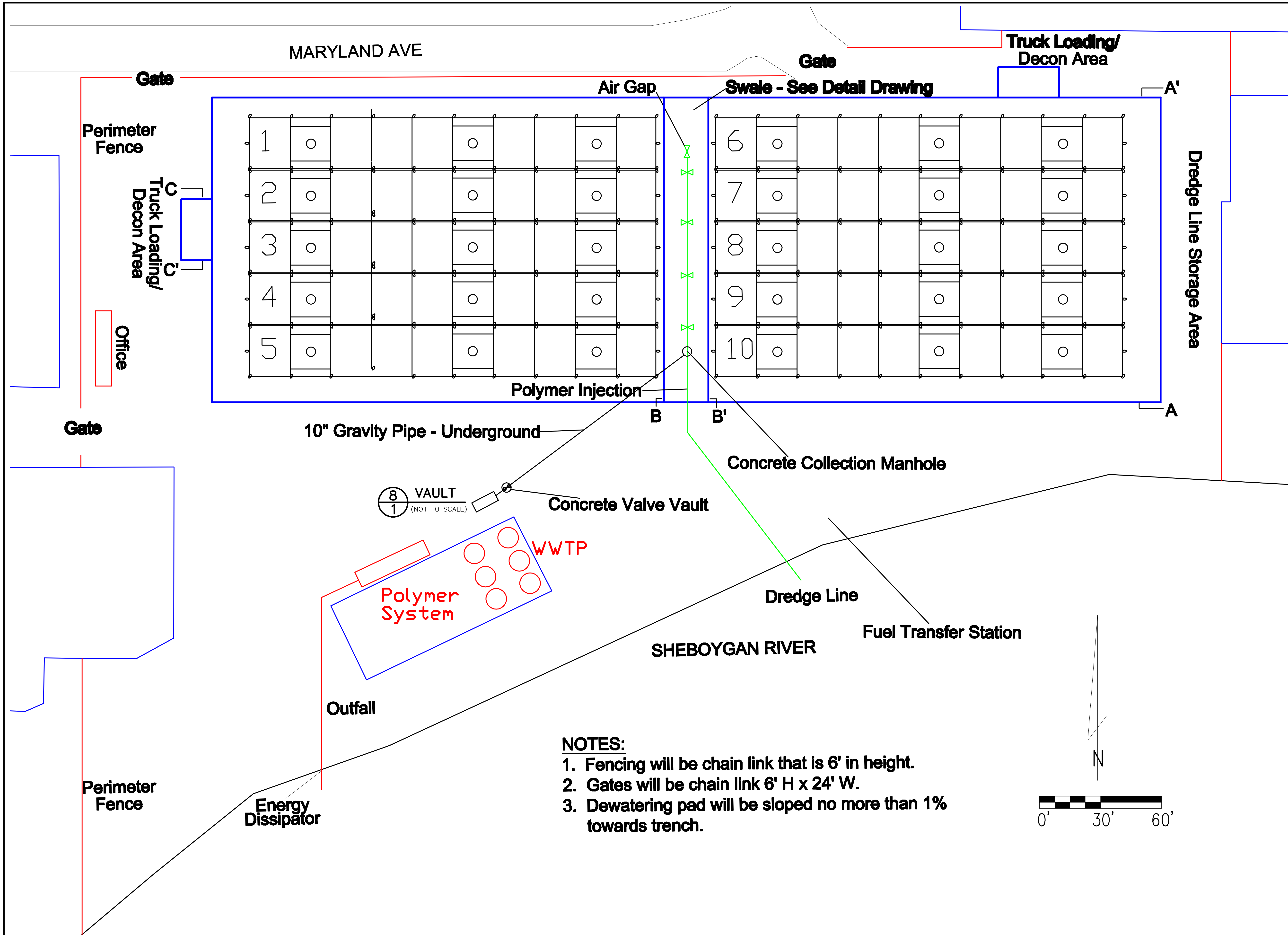
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
LOWER RIVER DESIGN
SHEBOYGAN FALLS, WISCONSIN

DREDGE LAYOUT

Scale: SHOWN

FIGURE NO. 6



NOTES:

1. Fencing will be chain link that is 6' in height.
2. Gates will be chain link 6' H x 24' W.
3. Dewatering pad will be sloped no more than 1% towards trench.

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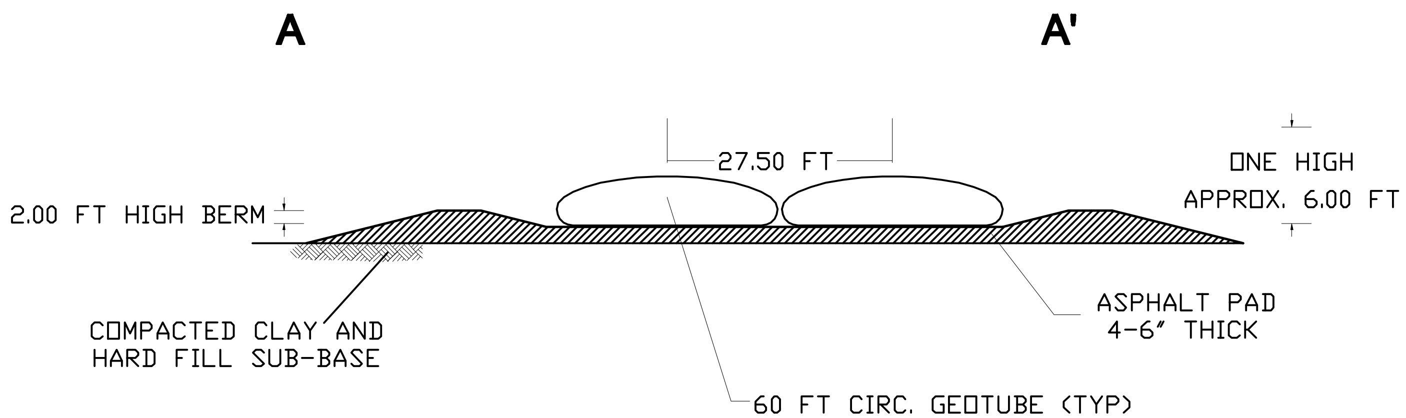
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
LOWER RIVER DESIGN
SHEBOYGAN FALLS, WISCONSIN

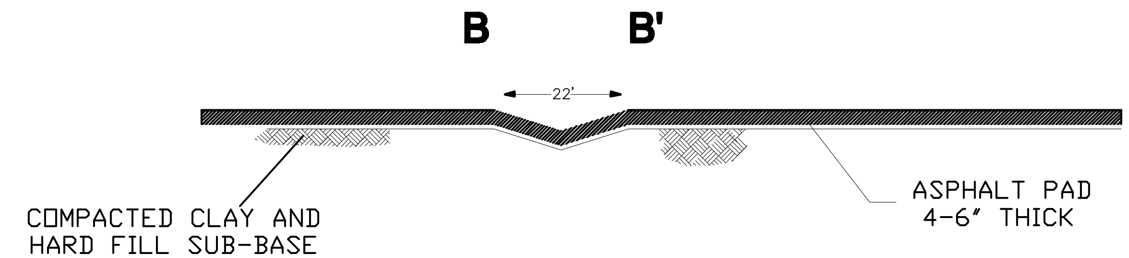
DEWATERING AREA LAYOUT

Scale: SHOWN

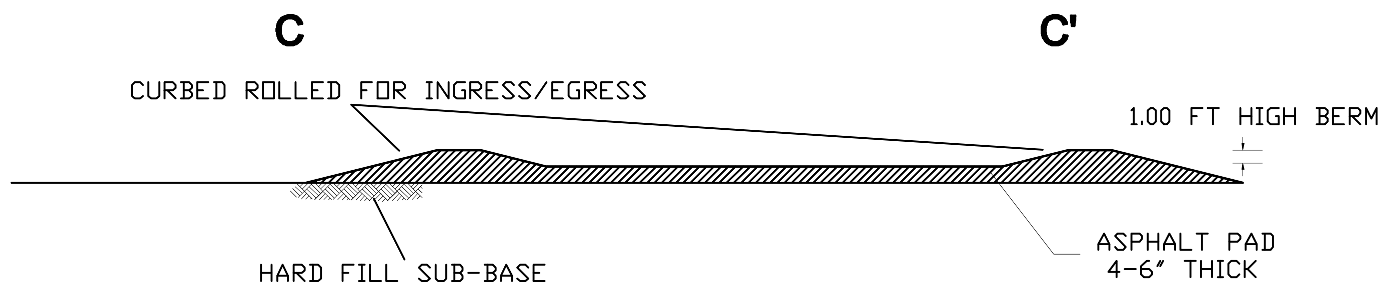
FIGURE NO. 7



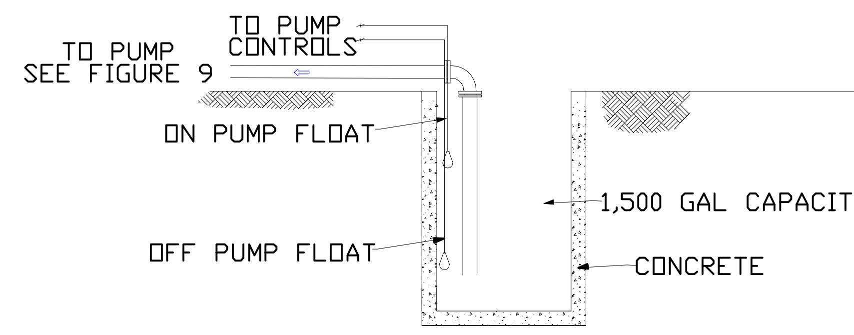
SECTION VIEW - DEWATERING PAD DETAIL



SECTION VIEW - TRENCH DETAIL



SECTION VIEW - TRUCK LOADING/DECONTAMINATION AREA DETAIL



8/1 **VAULT DETAIL**
(NOT TO SCALE)

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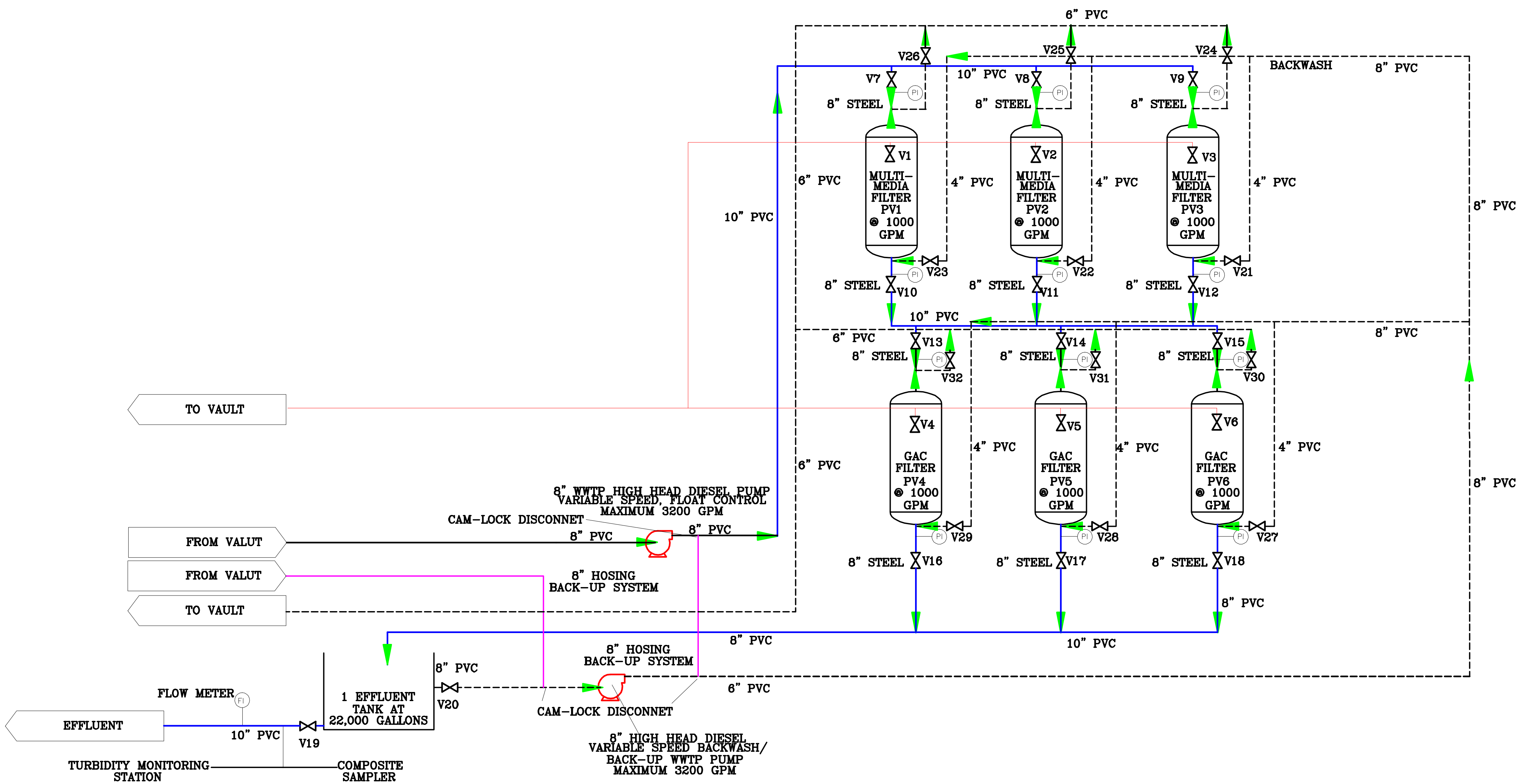
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
LOWER RIVER DESIGN
SHEBOYGAN FALLS, WISCONSIN

DEWATERING AREA DETAILS

Scale: NOT TO SCALE

FIGURE NO. 8



NOTES
1. MULTI-MEDIA AND GAC FILTERS PROVIDED BY CALGON CORPORATION.
2. FILTER PIPING WILL BE 8" STEEL AND PROVIDED BY CALGON CORPORATION.
3. ALL OTHER PIPING WILL BE PVC IN ACCORDANCE WITH SPECIFICATION #02089 IN SIZES NOTED ON DRAWING.
4. OUTFALL WILL BE LINED WITH RIPRAP IN ACCORDANCE WITH SPECIFICATION #02271 FOR EROSION CONTROL.
5. WWTP PROCESS WILL BE INSTALLED WITH SECONDARY CONTAINMENT.

LEGEND
V#A Operational valve shut off location
Operational Flow
Backwash Flow
Pressue Relief Vent Line

FILE NAME:
DRAWN BY: KDA DATE: NOVEMBER 2009

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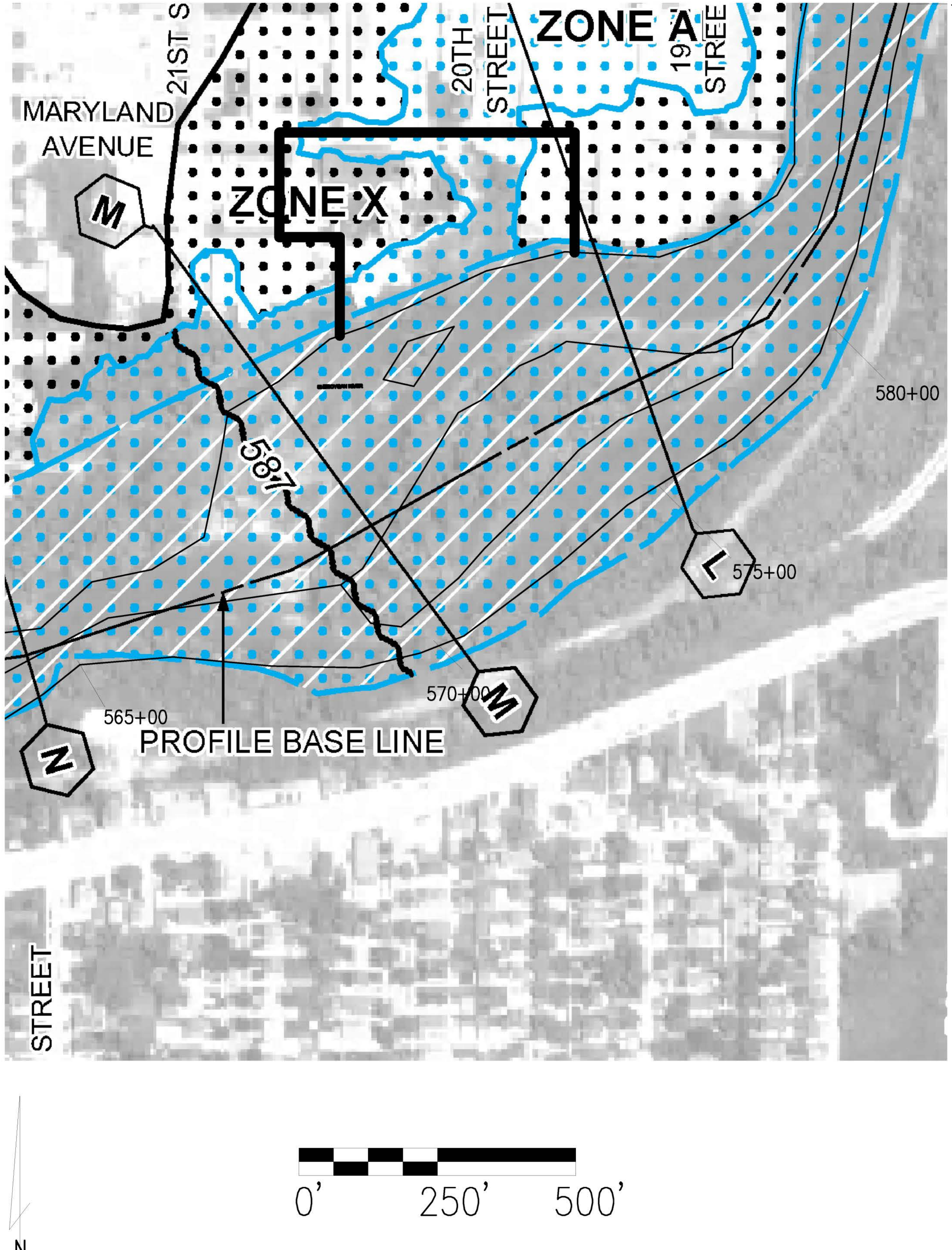
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
LOWER RIVER DESIGN
SHEBOYGAN FALLS, WISCONSIN

WWTP PROCESS FLOW DIAGRAM

SCALE
NOT TO SCALE

FIGURE NO.
9



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- A — A: Cross section line

DEWATERING AREA LOCATION

FILE NAME: DRAWN BY: KDA DATE: NOVEMBER 2009

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SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
LOWER RIVER SEDIMENT DESIGN
SHEBOYGAN FALLS, WISCONSIN

DEWATERING AREA LOCATION

Scale: SHOWN

FIGURE NO. 10

Appendix A
Pre-Design Investigation

Pre-Design Investigation		Middle River Deposits	Lower River Deposits	Lower River River Left	Lower River River Right	Inner Harbor Penn to 8th River Left	Inner Harbor Penn to 8th River Right	Inner Harbor 8th to Mouth River Left	Inner Harbor 8th to Mouth River Right
Area (square feet)	2,325,414	132,967	47,543	424,754	385,656	324,279	340,052	420,907	429,766
% of Sediment Surface	100.00%	5.72%	2.04%	18.27%	16.58%	13.94%	14.62%	18.10%	18.48%
PCB Concentration 0-1 SWAC Measured in the Localized Area (ppm)		1.71	2.89	5.61	5.23	3.87	0.64	1.08	1.25
Surface Weighted Average of All Areas (ppm)	**3.11**								
Surface Weighted Average of Middle River	**1.71**								
Surface Weighted Average of Lower River	**5.29**								
Surface Weighted Average of Inner Harbor	**1.63**								

Appendix A
Pre-Design Investigation

River Reach	SWAC	Approximate Years to RAO Goal (k=.065)
Middle River	1.71	18.89
Lower River	5.29	36.24
Inner Harbor	1.63	18.15
Average Surface All Reaches	**3.11**	**28.08**

Post Removal Surface Concentration t(0)	Time (years) to .5 ppm SWAC from Pre Design Information k(2) = .065
0.60	2.80
0.75	6.23
0.90	9.03
1.05	11.40
1.13	12.52
1.20	13.45
1.35	15.26
1.50	16.88
1.65	18.34
1.71	18.89
1.80	19.68
1.95	20.91
2.10	22.04
2.25	23.10
2.40	24.10
2.55	25.03
2.70	25.90
2.85	26.74
3.00	27.52
3.11	**28.08**
3.15	28.27
3.30	28.99
3.40	29.45
3.50	29.89
3.60	30.32
3.70	30.74
3.80	31.15
3.90	31.55
4.00	31.94
4.10	32.32
4.20	32.69
5.29	**36.24**

Design
Table Definitions

Grid Total or Average -	This value in the fist column of each sub-table representing a different portion of the Lower River or Inner Harbor is the mean (average) PCB concentration for the grids in that portion. The values for each grid is the average PCB concentration for the grid. In grids where more than one core was collected, the grid total or average is calculated using all Core Results.
2' Surface Average-	This value is the mean (average) PCB concentration of all Grid PCB sample data collected in the Top 2 feet of surface sediment during the Pre-Design Investigation. In grids where more than one core was collected, the 2' Surface Average is calculated using all Core Results.
Shore to 4' "Area B" -	This value is the mean (average) PCB concentration of all Grid PCB sample data collected in the four feet of sediment designated as Area B. In grids where more than one core was collected, the Shore to 4' "Area B" is calculated using all Core Results.
All Grids to 4' "Area C" -	This value is the mean (average) PCB concentration of all Grid PCB sample data collected in the four feet of sediment designated as Area C. In grids where more than one core was collected, the Shore to 4' "Area C" is calculated using all Core Results.
No Rec -	Abbreviation for No Recovery. No Sediment was recovered from the sampling event(s).
Single Core Grid	Continuous Soft Sediment Grid that had only one sample core pulled during the Pre-Design Investigation
Two Core Grid	Continuous Soft Sediment Grid that had two sample cores pulled during the Pre-Design Investigation
Six Core Grid	Continuous Soft Sediment Grid that had six sample cores pulled during the Pre-Design Investigation
6 - 26 ppm	Color represents grids with PCB concentrations within the range of 6 - 26 ppm
26 -50 ppm	Color represents grids with PCB concentrations within the range of 26- 50 ppm
> 50	Color represents grids with PCB concentrations > 50 ppm

Appendix A
Pre-Design Investigation
Inner Harbor (8th Street to Mouth) River Left

GRID LOCATIONS		109	107	105	103	101	99	97	95	93	91	89	87	85
Area (square feet)	420,907	7,274	7,224	7,332	7,850	5,931	6,799	7,401	7,612	7,835	7,626	8,357	7,985	8,146
Water Depth at Profile Line (feet)		4.5	4.5	4.5	5.5	5.5	5.5	4.5	4.5	4.5	5.0	5.5	5.5	5.5
PCB Concentration in ppm (By Depth)														
0-1'	1.08	0.42	1.29	1.50	2.01	2.44	0.27	0.19	4.44	4.83	0.23	1.80	1.90	0.74
1-2'	1.03	0.47	1.28	1.00	1.23	1.98	0.44	1.20	0.91	1.27	3.35	0.80	1.43	0.85
2-3'	1.32	0.66	0.59	0.84	1.39	2.08	1.12	1.15	1.39	2.27	1.62	0.87	1.04	0.95
3-4'	1.56	1.09	1.73	1.62	1.15	1.70	1.24	1.38	1.45	1.24		1.12	1.31	1.14
4-5'	1.88	0.63	0.74	1.94	1.42	1.49	1.15	1.50	1.23			1.14	1.68	1.77
5-6'	2.75	2.29	0.62	2.50			1.63					2.11	1.43	1.94
6-7'	6.17													
Grid Total or Average (ppm)	1.43	0.92	1.04	1.57	1.44	1.94	0.98	1.08	1.88	2.40	1.73	1.31	1.47	1.23
2' Surface Average (ppm)	1.05	0.44	1.29	1.25	1.62	2.21	0.36	0.69	2.67	3.05	1.79	1.30	1.67	0.80
Volume (cubic yards)	78,994	1,616	1,605	1,629	1,454	1,098	1,511	1,371	1,410	1,161	847	1,857	1,774	1,810
Mass (pounds PCBs)	238.04	3.12	3.48	5.31	4.35	4.43	3.06	3.09	5.52	5.80	3.05	5.04	5.40	4.64
WEIGHTED AVERAGES														
% of Measured Sediment		2.05%	2.03%	2.06%	1.84%	1.39%	1.91%	1.74%	1.78%	1.47%	1.07%	2.35%	2.25%	2.29%
Contribution to Sediment Concentration (ppm)	1.45	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.03	0.04	0.02	0.03	0.03	0.03
% of Sediment Surface		1.73%	1.72%	1.74%	1.87%	1.41%	1.62%	1.76%	1.81%	1.86%	1.81%	1.99%	1.90%	1.94%
Contribution to SWAC (ppm)	1.078	0.007	0.022	0.026	0.037	0.034	0.004	0.003	0.080	0.090	0.004	0.036	0.036	0.014

Appendix A
Pre-Design Investigation
Inner Harbor (8th Street to Mouth) River Left

GRID LOCATIONS	83	81	79	77	75	73	71	69	67	65	63	61	59	57
Area (square feet)	8,066	7,897	7,848	7,756	8,911	7,764	6,895	8,359	8,033	7,064	7,841	7,972	7,931	7,981
Water Depth at Profile Line (feet)	5.0	5.5	6.5	7.5	8.5	9.5	10.0	12.0	10.5	10.5	10.5	10.5	10.5	10.5
PCB Concentration in ppm (By Depth)														
0-1'	0.67	1.90	2.01	2.01	1.45	1.29	0.45	1.13	0.62	0.70	0.15	0.20	0.21	1.26
1-2'	0.87	0.67	1.10	1.02	1.49	1.29	0.12	0.83	0.56	0.61	0.19	0.34	0.20	1.03
2-3'	1.21	0.74	1.50	1.17	1.31	1.48	0.16	1.06	1.29	3.20	0.51		0.19	0.69
3-4'	1.10	1.27	1.22	0.96	1.30	2.00	0.39	0.33	1.72	1.00	1.40		0.24	0.84
4-5'	1.19	1.64	2.00	1.00	1.39	2.37	3.32	0.61		1.81			0.21	0.59
5-6'	1.52		1.62			4.20				1.99				
6-7'														
Grid Total or Average (ppm)	1.09	1.24	1.58	1.23	1.39	2.11	0.89	0.79	1.05	1.55	0.56	0.27	0.21	0.88
2' Surface Average (ppm)	0.77	1.28	1.56	1.52	1.47	1.29	0.28	0.98	0.59	0.65	0.17	0.27	0.21	1.15
Volume (cubic yards)	1,792	1,462	1,744	1,436	1,650	1,725	1,277	1,548	1,190	1,570	1,162	591	1,469	1,478
Mass (pounds PCBs)	4.07	3.78	5.71	3.68	4.76	7.55	2.35	2.55	2.59	5.06	1.36	0.33	0.64	2.71
WEIGHTED AVERAGES														
% of Measured Sediment	2.27%	1.85%	2.21%	1.82%	2.09%	2.18%	1.62%	1.96%	1.51%	1.99%	1.47%	0.75%	1.86%	1.87%
Contribution to Sediment Concentration (ppm)	0.02	0.02	0.03	0.02	0.03	0.05	0.01	0.02	0.02	0.03	0.01	0.00	0.00	0.02
% of Sediment Surface	1.92%	1.88%	1.86%	1.84%	2.12%	1.84%	1.64%	1.99%	1.91%	1.68%	1.86%	1.89%	1.88%	1.90%
Contribution to SWAC (ppm)	0.013	0.036	0.037	0.037	0.031	0.024	0.007	0.022	0.012	0.012	0.003	0.004	0.004	0.024

Appendix A
Pre-Design Investigation
Inner Harbor (8th Street to Mouth) River Left

GRID LOCATIONS	55	53	51	49	47	45	43	41	39	37	35	33	31	29
Area (square feet)	8,049	7,422	7,448	8,023	7,642	7,627	7,600	7,393	7,217	6,941	7,028	7,279	7,514	7,529
Water Depth at Profile Line (feet)	11.0	10.5	10.0	10.5	11.5	11.5	11.5	12.0	12.0	12.0	12.5	12.5	12.5	12.5
PCB Concentration in ppm (By Depth)														
0-1'	0.57	1.33	1.00	0.78	1.92	0.53	0.69	0.37	1.05	1.15	1.38	0.56	1.24	0.83
1-2'	0.71	1.34	0.82	1.14	0.85	2.71	0.66	1.20	2.53	2.11	0.74	2.06	1.78	0.15
2-3'	0.06	1.41	5.07	3.03	0.90	1.58	0.48	0.93	5.12	3.56	1.97	3.20	1.55	0.44
3-4'		5.08	2.48	2.69	1.19	1.96	1.28	4.07	2.93	4.06	2.05	1.57	2.21	1.94
4-5'		2.28	5.21	4.25	1.55		1.54	3.78	6.54		4.48		3.21	2.71
5-6'				7.95	3.74			6.95						3.75
6-7'					6.17									
Grid Total or Average (ppm)	0.44	2.29	2.92	3.31	2.33	1.70	0.93	2.88	3.63	2.72	2.12	1.85	2.00	1.64
2' Surface Average (ppm)	0.64	1.34	0.91	0.96	1.38	1.62	0.68	0.79	1.79	1.63	1.06	1.31	1.51	0.49
Volume (cubic yards)	894	1,374	1,379	1,783	1,981	1,130	1,407	1,643	1,336	1,028	1,301	1,078	1,391	1,673
Mass (pounds PCBs)	0.83	6.54	8.36	12.26	9.60	3.98	2.72	9.85	10.10	5.81	5.75	4.14	5.78	5.69
WEIGHTED AVERAGES														
% of Measured Sediment	1.13%	1.74%	1.75%	2.26%	2.51%	1.43%	1.78%	2.08%	1.69%	1.30%	1.65%	1.37%	1.76%	2.12%
Contribution to Sediment Concentration (ppm)	0.01	0.04	0.05	0.07	0.06	0.02	0.02	0.06	0.06	0.04	0.03	0.03	0.04	0.03
% of Sediment Surface	1.91%	1.76%	1.77%	1.91%	1.82%	1.81%	1.81%	1.76%	1.71%	1.65%	1.67%	1.73%	1.79%	1.79%
Contribution to SWAC (ppm)	0.011	0.023	0.018	0.015	0.035	0.010	0.012	0.007	0.018	0.019	0.023	0.010	0.022	0.015

Appendix A
Pre-Design Investigation
Inner Harbor (8th Street to Mouth) River Left

GRID LOCATIONS	27	25	23	21	19	17	15	13	11	9	7	5	3	1
Area (square feet)	7,541	7,534	7,544	7,644	7,748	7,741	7,623	7,813	7,853	7,922	7,628	7,593	7,970	8,351
Water Depth at Profile Line (feet)	12.5	12.5	12.5	13.0	13.0	13.0	13.0	13.0	13.5	13.5	13.5	13.5	13.5	14.0
PCB Concentration in ppm (By Depth)														
0-1'	0.22	0.44	2.35	1.05	0.91	0.49	0.90	0.49	0.93	0.36	0.69	0.54	0.23	0.28
1-2'	0.31	0.43	0.34	2.11	0.76	0.49	1.08	0.92	0.40	1.42	0.85	1.53	0.27	0.40
2-3'	0.45	0.73	0.14	1.99	1.20	0.57	1.32	1.07	0.30	0.98	1.02	0.90	0.34	0.46
3-4'	0.38	1.14	0.24	3.33	1.47	2.15	1.27	1.59	0.49	1.63	1.07	1.54	0.40	0.74
4-5'	0.82	1.57	0.26	5.15			1.16	1.69	0.44	1.03	1.06	1.04	0.38	
5-6'			0.54					2.45		1.86		3.21		
6-7'														
Grid Total or Average (ppm)	0.44	0.86	0.64	2.73	1.08	0.93	1.15	1.37	0.51	1.21	0.94	1.46	0.32	0.47
2' Surface Average (ppm)	0.27	0.44	1.34	1.58	0.83	0.49	0.99	0.70	0.67	0.89	0.77	1.03	0.25	0.34
Volume (cubic yards)	1,396	1,395	1,676	1,416	1,148	1,147	1,412	1,736	1,454	1,760	1,413	1,687	1,476	1,237
Mass (pounds PCBs)	1.27	2.50	2.25	8.02	2.59	2.21	3.36	4.94	1.55	4.44	2.75	5.12	1.00	1.21
WEIGHTED AVERAGES														
% of Measured Sediment	1.77%	1.77%	2.12%	1.79%	1.45%	1.45%	1.79%	2.20%	1.84%	2.23%	1.79%	2.14%	1.87%	1.57%
Contribution to Sediment Concentration (ppm)	0.01	0.02	0.01	0.05	0.02	0.01	0.02	0.03	0.01	0.03	0.02	0.03	0.01	0.01
% of Sediment Surface	1.79%	1.79%	1.79%	1.82%	1.84%	1.84%	1.81%	1.86%	1.87%	1.88%	1.81%	1.80%	1.89%	1.98%
Contribution to SWAC (ppm)	0.004	0.008	0.042	0.019	0.017	0.009	0.016	0.009	0.017	0.007	0.012	0.010	0.004	0.006

Appendix A
Pre-Design Investigation
Inner Harbor (8th Street to mouth) River Right

GRID LOCATIONS		108	106	104	102	100	98	96	94	92	90	88	86	84	82	80
Area (square feet)	429,766	8,445	8,217	8,245	8,110	7,507	5,500	5,839	7,803	8,174	8,161	8,229	7,346	7,969	8,201	8,227
Water Depth at Profile Line (feet)		8.0	8.5	8.5	8.5	9.0	9.0	10.0	11.0	11.0	12.0	12.5	13.0	13.5	14.0	14.5
PCB Concentration in ppm (By Depth)																
0-1'	1.24	0.99	0.39	0.65	0.91	1.80	0.81	1.06	0.62	1.53	0.98	1.57	0.78	0.68	1.03	0.68
1-2'	1.51	0.48	0.81	0.25	0.87	1.50	0.98	1.19	0.91	2.18	0.85	1.58	1.47	0.18	1.01	1.30
2-3'	0.95	0.83	0.94	0.60	0.90	1.84		1.62	1.22	2.40	1.62	1.52	1.41	0.18	1.15	0.92
3-4'	0.97	0.40	0.81	0.23	1.33	0.64		2.14	1.23	3.08	1.23	2.23			1.13	1.77
4-5'	1.21		0.93	0.35	1.14			2.49	1.79	3.59	2.44	3.68				
5-6'	0.86							2.85								
6-7'	0.74															
Grid Total or Average (ppm)	1.16	0.67	0.78	0.42	1.03	1.44	0.89	1.89	1.15	2.56	1.43	2.12	1.22	0.34	1.08	1.17
2' Surface Average (ppm)	1.38	0.73	0.60	0.45	0.89	1.65	0.89	1.13	0.76	1.86	0.92	1.58	1.12	0.43	1.02	0.99
Volume (cubic yards)	77,713	1,251	1,522	1,527	1,502	1,112	407	1,298	1,445	1,514	1,511	1,524	816	885	1,215	1,219
Mass (pounds PCBs)	183.92	1.75	2.45	1.32	3.22	3.34	0.76	5.10	3.46	8.04	4.48	6.70	2.07	0.63	2.73	2.96
WEIGHTED AVERAGES																
% of Measured Sediment		1.61%	1.96%	1.96%	1.93%	1.43%	0.52%	1.67%	1.86%	1.95%	1.94%	1.96%	1.05%	1.14%	1.56%	1.57%
Contribution to Sediment Concentration (ppm)	1.14	0.01	0.02	0.01	0.02	0.02	0.00	0.03	0.02	0.05	0.03	0.04	0.01	0.00	0.02	0.02
% of Sediment Surface		1.97%	1.91%	1.92%	1.89%	1.75%	1.28%	1.36%	1.82%	1.90%	1.90%	1.91%	1.71%	1.85%	1.91%	1.91%
Contribution to SWAC (ppm)	1.248	0.019	0.007	0.013	0.017	0.031	0.010	0.014	0.011	0.029	0.019	0.030	0.013	0.013	0.020	0.013

Appendix A
Pre-Design Investigation
Inner Harbor (8th Street to mouth) River Right

GRID LOCATIONS	78	76	74	72	70	68	66	64	62	60	58	56	54	52	50	48	46	44
Area (square feet)	8,106	8,027	8,073	8,151	7,744	8,505	8,355	7,927	5,891	6,586	6,872	7,107	7,331	6,598	7,978	8,251	8,268	8,270
Water Depth at Profile Line (feet)	14.5	14.0	14.0	13.5	13.5	11.0	9.0	7.5	7.0	6.5	6.0	6.5	6.5	6.0	6.0	6.0	6.0	7.0
PCB Concentration in ppm (By Depth)																		
0-1'	0.40	0.74	0.25	1.01	0.38	0.64	0.21	1.08	1.46	0.29	1.94	0.97	1.54	1.24	0.26	3.37	2.31	1.34
1-2'	0.33	1.19	0.30	0.80	0.27	0.58	0.23	0.69	6.06	1.31	4.54	3.34	1.06	2.96	2.48	1.15	3.40	1.02
2-3'	1.14	1.39	0.52	1.46	0.36	0.69	0.23	0.53	0.84	0.48	1.63	1.10	1.16	1.75	1.39	1.38	1.44	0.51
3-4'	2.26	1.24	0.85	1.98	0.74	0.83	0.33		1.66	1.25	1.03	1.03	1.15		0.70	0.95		0.43
4-5'	2.41								0.47	1.16		1.31	1.14		1.22			0.68
5-6'												1.31						
6-7'																		
Grid Total or Average (ppm)	1.31	1.14	0.48	1.31	0.44	0.68	0.25	0.77	2.10	0.90	2.29	1.51	1.21	1.98	1.21	1.71	2.38	0.80
2' Surface Average (ppm)	0.36	0.97	0.27	0.90	0.32	0.61	0.22	0.89	3.76	0.80	3.24	2.15	1.30	2.10	1.37	2.26	2.86	1.18
Volume (cubic yards)	1,501	1,189	1,196	1,208	1,147	1,260	1,238	881	1,091	1,220	1,018	1,579	1,358	733	1,477	1,222	919	1,531
Mass (pounds PCBs)	4.08	2.82	1.19	3.29	1.04	1.79	0.64	1.40	4.76	2.27	4.84	4.96	3.42	3.02	3.72	4.35	4.55	2.54
WEIGHTED AVERAGES																		
% of Measured Sediment	1.93%	1.53%	1.54%	1.55%	1.48%	1.62%	1.59%	1.13%	1.40%	1.57%	1.31%	2.03%	1.75%	0.94%	1.90%	1.57%	1.18%	1.97%
Contribution to Sediment Concentration (ppm)	0.03	0.02	0.01	0.02	0.01	0.01	0.00	0.01	0.03	0.01	0.03	0.03	0.02	0.02	0.02	0.03	0.03	0.02
% of Sediment Surface	1.89%	1.87%	1.88%	1.90%	1.80%	1.98%	1.94%	1.84%	1.37%	1.53%	1.60%	1.65%	1.71%	1.54%	1.86%	1.92%	1.92%	1.92%
Contribution to SWAC (ppm)	0.008	0.014	0.005	0.019	0.007	0.013	0.004	0.020	0.020	0.004	0.031	0.016	0.026	0.019	0.005	0.065	0.044	0.026

Appendix A
Pre-Design Investigation
Inner Harbor (8th Street to mouth) River Right

GRID LOCATIONS	42	40	38	36	34	32	30	28	26	24	22	20	18	16	14	12	10
Area (square feet)	8,295	8,336	8,330	8,314	8,324	8,366	8,369	8,369	8,339	8,298	8,266	8,230	8,328	8,338	8,383	8,378	8,402
Water Depth at Profile Line (feet)	7.0	7.0	7.5	7.5	7.5	7.5	7.5	7.5	8.0	8.0	8.0	8.5	8.5	8.5	9.0	9.5	10.0
PCB Concentration in ppm (By Depth)																	
0-1'	1.18	1.88	1.40	1.09	3.97	1.70	1.27	1.09	1.65	1.96	3.66	2.33	1.84	1.65	0.99	1.96	0.78
1-2'	0.64	1.70	2.48	1.18	3.23	2.80	0.91	2.31	1.87	0.77	1.10	3.91	0.78	1.76	1.84	0.50	2.17
2-3'	0.68	0.97	0.75	0.96	1.02	1.25	0.75	0.58	0.50	0.68	1.29	1.38	0.72	0.80	0.67	0.26	0.45
3-4'	0.60	0.55		1.12	0.57	0.96	0.68	0.49	0.53	0.52	1.93	1.01	0.66	0.69	0.47	0.29	0.34
4-5'	1.18	0.71		1.16	0.84	1.27	1.30	0.31	0.39	0.58	4.00	0.94	0.32	0.47	0.48	0.69	0.32
5-6'	0.64	0.63		1.09	0.76		0.98	0.38		0.45	1.13	2.23			0.35	0.46	0.40
6-7'												1.31					
Grid Total or Average (ppm)	0.82	1.07	1.54	1.10	1.73	1.60	0.98	0.86	0.99	0.83	2.19	1.87	0.86	1.07	0.80	0.69	0.74
2' Surface Average (ppm)	0.91	1.79	1.94	1.14	3.60	2.25	1.09	1.70	1.76	1.36	2.38	3.12	1.31	1.71	1.41	1.23	1.47
Volume (cubic yards)	1,843	1,852	926	1,848	1,850	1,549	1,860	1,860	1,544	1,844	1,837	2,134	1,542	1,544	1,863	1,862	1,867
Mass (pounds PCBs)	3.13	4.13	2.97	4.23	6.66	5.14	3.79	3.32	3.17	3.17	8.34	8.31	2.77	3.45	3.09	2.69	2.89
WEIGHTED AVERAGES																	
% of Measured Sediment	2.37%	2.38%	1.19%	2.38%	2.38%	1.99%	2.39%	2.39%	1.99%	2.37%	2.36%	2.75%	1.98%	1.99%	2.40%	2.40%	2.40%
Contribution to Sediment Concentration (ppm)	0.02	0.03	0.02	0.03	0.04	0.03	0.02	0.02	0.02	0.02	0.05	0.05	0.02	0.02	0.02	0.02	0.02
% of Sediment Surface	1.93%	1.94%	1.94%	1.93%	1.94%	1.95%	1.95%	1.95%	1.94%	1.93%	1.92%	1.91%	1.94%	1.94%	1.95%	1.95%	1.96%
Contribution to SWAC (ppm)	0.023	0.036	0.027	0.021	0.077	0.033	0.025	0.021	0.032	0.038	0.070	0.045	0.036	0.032	0.019	0.038	0.015

Appendix A
Pre-Design Investigation
Inner Harbor (8th Street to mouth) River Right

GRID LOCATIONS	8	6	4	2
Area (square feet)	8,380	8,358	8,754	8,596
Water Depth at Profile Line (feet)	10.5	11.0	11.5	12.5
PCB Concentration in ppm (By Depth)				
0-1'	1.23	0.92	0.54	0.05
1-2'	1.34	2.54	0.48	0.17
2-3'	0.42	0.70	0.44	0.21
3-4'	0.27	0.86	0.16	0.25
4-5'	0.45	0.73	0.11	
5-6'	0.31	0.48	0.23	
6-7'		0.66	0.25	
Grid Total or Average (ppm)	0.67	0.98	0.32	0.17
2' Surface Average (ppm)	1.29	1.73	0.51	0.11
Volume (cubic yards)	1,862	2,167	2,270	1,273
Mass (pounds PCBs)	2.59	4.43	1.49	0.45
WEIGHTED AVERAGES				
% of Measured Sediment	2.40%	2.79%	2.92%	1.64%
Contribution to Sediment Concentration (ppm)	0.02	0.03	0.01	0.00
% of Sediment Surface	1.95%	1.94%	2.04%	2.00%
Contribution to SWAC (ppm)	0.024	0.018	0.011	0.001

Appendix A
Pre-Design Investigation
Inner Harbor (Between Bridges) River Left

GRID LOCATIONS		187	185	183	181	179	177	175	173	171	169	167	165	163	161	159	157
Area (square feet)	324,279	6,822	7,189	7,390	7,492	8,412	8,450	8,165	8,238	7,997	8,043	8,272	9,101	9,692	9,085	9,065	9,754
Water Depth at Profile Line (feet)		6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.5	6.5	6.5	7.0	7.0	7.0	6.5	6.5	6.5
PCB Concentration in ppm (By Depth)																	
0-1'	3.92	0.32	1.06	7.11	2.86	3.29	1.75	0.41	2.48	0.17	1.95	5.23	3.61	0.66	1.10	0.56	3.53
1-2'	9.17	4.03	3.42	6.35	4.99	**65.97**	23.20	1.71	8.65	0.01	4.57	45.19	7.78	2.89	1.46	2.72	21.63
2-3'	17.42				0.15	36.82	9.19	**80.80**	**131.00**		9.88	1.81	**117.00**	4.03	22.18	6.88	24.23
3-4'	33.12				0.01	0.38	0.53	0.41			**87.10**	18.36	**164.00**	**76.10**	49.61	22.41	**153.43**
4-5'	33.52				0.02	0.02		0.19				23.05			**91.98**	28.20	**67.35**
5-6'	8.59				0.02	-						13.30			-	24.40	-
6-7'	8.87					-						-			-	-	-
Grid Total or Average (ppm)	14.91	2.18	2.24	6.73	1.34	29.31	8.67	16.70	47.38	0.09	25.88	18.19	**73.10**	20.92	23.58	7.91	35.08
2' Surface Average (ppm)	6.39	2.18	2.24	6.73	3.93	34.63	12.48	1.06	5.57	0.09	3.26	23.39	5.70	1.78	1.27	1.64	10.20
Shore to 4' "Area B" (ppm)	5.61														1.53	0.03	3.53
All Grids to 4' "Area C" (ppm)	1.10																
Volume (cubic yards)	47,848	600	600	600	1,800	1,064	1,200	1,500	900	600	1,200	894	1,200	1,200	1,206	1,175	933
Mass (pounds of PCBs)	1,548.20	2.71	2.79	8.40	5.02	65.11	21.62	52.09	88.65	0.11	64.55	33.93	182.36	52.19	59.33	19.39	68.33
WEIGHTED AVERAGES																	
% of Measured Sediment		1.25%	1.25%	1.25%	3.76%	2.22%	2.51%	3.13%	1.88%	1.25%	2.51%	1.87%	2.51%	2.51%	2.52%	2.46%	1.95%
Contribution to Sediment Concentration (ppm)	15.53	0.03	0.03	0.08	0.05	0.65	0.22	0.52	0.89	0.00	0.65	0.34	1.83	0.52	0.59	0.19	0.68
% of Sediment Surface		2.10%	2.22%	2.28%	2.31%	2.59%	2.61%	2.52%	2.54%	2.47%	2.48%	2.55%	2.81%	2.99%	2.80%	2.80%	3.01%
Contribution to SWAC (ppm)	3.873	0.007	0.023	0.162	0.066	0.085	0.046	0.010	0.063	0.004	0.048	0.133	0.101	0.020	0.031	0.016	0.106

Appendix A
Pre-Design Investigation
Inner Harbor (Between Bridges) River Left

GRID LOCATIONS	155	153	151	149	147	145	143	141	139	137	135	133	131	129	127	125	123	121	119	117
Area (square feet)	9,323	9,905	9,548	9,343	8,813	8,377	8,742	8,809	8,738	8,005	8,271	7,686	7,717	8,045	8,148	8,075	8,125	8,077	7,663	6,873
Water Depth at Profile Line (feet)	6.5	6.5	6.5	6.5	5.0	5.0	5.0	5.0	5.0	5.0	4.0	3.5	3.0	3.0	2.5	2.5	2.5	3.0	3.5	3.5
PCB Concentration in ppm (By Depth)																				
0-1'	0.89	2.68	1.46	1.35	0.15	0.58	10.66	0.02	0.86	19.95	0.26	1.66	1.90	0.23	0.29	1.18	48.20	20.32	0.55	0.26
1-2'	23.81	0.84	16.03	11.06	0.02	1.83	**58.78**	0.01	2.15	0.78	0.13	4.75	1.79	3.16	0.50	6.74	0.49	15.43	0.46	1.08
2-3'	16.53	2.28	5.11	24.56	-	8.00	2.98	0.01	0.02	4.28	0.02	27.80	6.00	5.81	0.70	35.80	0.68	1.33	0.81	1.54
3-4'	49.51	38.79	**89.53**	0.27	-	15.20	2.22	0.02	0.02	21.57	0.02	**157.00**	26.32	10.20	1.86	**67.70**	0.83	2.60	0.69	2.31
4-5'	**156.42**	**67.30**	**68.95**	-	-	22.20	8.34	-	0.01	19.68	0.02	**148.86**	17.79	21.50	7.68	**80.40**	0.02	2.55		3.97
5-6'	32.97	-	-	-	-	-	0.02	-	0.01	0.02	0.02	0.06	29.31		-	0.56	0.02	-		0.02
6-7'	-	-	-	-	-	-	-	-	-	0.02	0.02	0.02	44.11		-		-	-		-
Grid Total or Average (ppm)	35.87	9.25	27.32	9.31	0.11	7.17	17.76	0.02	0.76	11.29	0.08	**56.68**	18.17	8.18	1.60	32.06	10.04	8.44	0.63	1.67
2' Surface Average (ppm)	12.35	1.85	6.92	6.20	0.11	1.21	34.72	0.02	1.50	10.37	0.19	3.20	1.85	1.69	0.39	3.96	24.34	17.87	0.51	0.67
Shore to 4' "Area B" (ppm)	0.36	0.25	5.83	0.01	0.02	0.02	4.95	0.02	0.02	0.85	0.06	43.76	4.18		0.02		24.04	17.23		
All Grids to 4' "Area C" (ppm)																				1.30
Volume (cubic yards)	1,468	1,009	825	1,384	490	1,086	1,430	979	1,295	1,482	1,685	1,708	2,001	1,500	1,358	1,800	1,505	1,496	1,200	1,400
Mass (pounds of PCBs)	109.85	19.48	47.05	26.89	0.11	16.26	53.01	0.03	2.05	34.92	0.29	202.06	75.88	25.51	4.53	119.99	31.54	26.36	1.57	4.87
WEIGHTED AVERAGES																				
% of Measured Sediment	3.07%	2.11%	1.72%	2.89%	1.02%	2.27%	2.99%	2.05%	2.71%	3.10%	3.52%	3.57%	4.18%	3.13%	2.84%	3.76%	3.14%	3.13%	2.51%	2.93%
Contribution to Sediment Concentration (ppm)	1.10	0.20	0.47	0.27	0.00	0.16	0.53	0.00	0.02	0.35	0.00	2.02	0.76	0.26	0.05	1.21	0.32	0.26	0.02	0.05
% of Sediment Surface	2.87%	3.05%	2.94%	2.88%	2.72%	2.58%	2.70%	2.72%	2.69%	2.47%	2.55%	2.37%	2.38%	2.48%	2.51%	2.49%	2.51%	2.49%	2.36%	2.12%
Contribution to SWAC (ppm)	0.026	0.082	0.043	0.039	0.004	0.015	0.288	0.000	0.023	0.492	0.007	0.039	0.045	0.006	0.007	0.029	1.208	0.506	0.013	0.005

Appendix A
Pre-Design Investigation
Inner Harbor (Between Bridges) River Left

GRID LOCATIONS	115	113	111
Area (square feet)	7,231	7,954	7,644
Water Depth at Profile Line (feet)	3.5	3.5	4.0
PCB Concentration in ppm (By Depth)			
0-1'	2.10	0.39	0.75
1-2'	1.36	1.38	0.58
2-3'	0.46	0.08	3.58
3-4'	0.02	-	0.68
4-5'	0.02	-	1.56
5-6'		-	19.50
6-7'		-	0.16
Grid Total or Average (ppm)	0.79	0.73	4.11
2' Surface Average (ppm)	1.73	0.89	0.66
Shore to 4' "Area B" (ppm)			
All Grids to 4' "Area C" (ppm)	0.98	0.73	1.40
Volume (cubic yards)	1,500	736	1,840
Mass (pounds of PCBs)	2.47	1.12	15.79
WEIGHTED AVERAGES			
% of Measured Sediment	3.13%	1.54%	3.85%
Contribution to Sediment Concentration (ppm)	0.02	0.01	0.16
% of Sediment Surface	2.23%	2.45%	2.36%
Contribution to SWAC (ppm)	0.047	0.010	0.018

Appendix A
Pre-Design Investigation
Inner Harbor (Between Bridges) River Right

GRID LOCATIONS		196	194	192	190	188	186	184	182	180	178	176	174	172	170	168	166	164	162	160	158
Area (square feet)	340,052	7,539	7,774	7,862	7,768	7,575	7,026	7,146	7,579	7,379	7,618	8,285	8,053	7,448	7,304	8,194	8,343	7,473	7,765	7,761	7,462
Water Depth at Profile Line (feet)		3.5	3.5	4.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	5.0	5.0	5.0	5.0	5.5	5.5	6.0	6.5	6.5	6.5
PCB Concentration in ppm (By Depth)																					
0-1'	0.64	1.34	0.46	0.38	0.74	1.73	1.85	0.67	0.85	0.22	0.44	0.89	0.18	0.63	0.35	0.25	0.16	0.17	0.28	0.69	0.81
1-2'	2.21	2.71	16.91	2.95	3.16	3.52	6.88	2.57	1.04	2.74	0.82	1.05	1.16	0.57	1.20	0.41	0.26	0.37	0.33	0.59	4.82
2-3'	2.45	11.10	2.11	0.88	0.46	5.86	0.02	2.73	2.43	2.78	1.58	2.19	1.52	1.77	1.65	0.56	0.51	1.74	0.55	2.08	1.51
3-4'	6.75		2.62	0.02	0.53		0.57	**56.55**	5.51	3.96	5.16	0.94	0.86	3.49	2.39	0.50	7.02	6.00		1.48	9.39
4-5'	17.77		-	0.02	0.02		0.02	8.77	**92.80**	7.35	44.50	13.50	0.66	**54.50**	27.40	13.70	15.80			0.62	
5-6'	30.48		-					-	-												
6-7'	**84.57**		-					-	-												
Grid Total or Average (ppm)	4.46	5.05	6.21	0.85	0.98	3.70	1.87	14.26	20.52	3.41	10.50	3.71	0.88	12.19	6.60	3.08	4.75	2.07	0.39	1.09	4.13
2' Surface Average (ppm)	1.41	2.03	8.29	1.66	1.95	2.63	4.37	1.62	0.94	1.48	0.63	0.97	0.67	0.60	0.78	0.33	0.21	0.27	0.30	0.64	2.81
Shore to 4' "Area B" (ppm)																					
All Grids to 4' "Area C" (ppm)	0.72																				
Volume (cubic yards)	54,435	838	768	1,500	1,500	900	1,500	1,323	1,404	1,366	1,411	1,534	1,491	1,379	1,353	1,517	1,545	1,107	863	1,437	1,105
Mass (pounds of PCBs)	547.59	8.79	9.96	2.64	3.06	6.93	5.82	39.38	60.12	9.69	30.80	11.85	2.72	34.96	18.56	9.73	15.26	4.76	0.69	3.26	9.50
WEIGHTED AVERAGES																					
% of Measured Sediment		1.54%	1.41%	2.76%	2.76%	1.65%	2.76%	2.43%	2.58%	2.51%	2.59%	2.82%	2.74%	2.53%	2.48%	2.79%	2.84%	2.03%	1.58%	2.64%	2.03%
Contribution to Sediment Concentration (ppm)	4.83	0.08	0.09	0.02	0.03	0.06	0.05	0.35	0.53	0.09	0.27	0.10	0.02	0.31	0.16	0.09	0.13	0.04	0.01	0.03	0.08
% of Sediment Surface		2.22%	2.29%	2.31%	2.28%	2.23%	2.07%	2.10%	2.23%	2.17%	2.24%	2.44%	2.37%	2.19%	2.15%	2.41%	2.45%	2.20%	2.28%	2.28%	2.19%
Contribution to SWAC (ppm)	0.637	0.030	0.010	0.009	0.017	0.039	0.038	0.014	0.019	0.005	0.010	0.022	0.004	0.014	0.008	0.006	0.004	0.004	0.006	0.016	0.018

Appendix A
Pre-Design Investigation
Inner Harbor (Between Bridges) River Right

GRID LOCATIONS	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116
Area (square feet)	7,015	6,813	7,322	7,662	7,471	6,764	7,022	7,024	7,319	8,246	8,277	8,141	8,108	8,016	8,263	8,308	7,667	7,627	8,015	8,392	8,197
Water Depth at Profile Line (feet)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.0	7.0	7.0	7.5	8.0	8.0
PCB Concentration in ppm (By Depth)																					
0-1'	0.19	1.09	0.31	0.20	0.16	0.62	0.47	0.56	0.34	0.75	1.21	0.99	0.13	0.87	0.19	1.51	1.72	0.31	0.16	1.43	1.13
1-2'	1.14	2.20	2.27	0.49	0.32	0.72	0.75	0.35	1.58	2.80	0.95	1.62	0.79	1.37	1.48	0.18	2.39	0.17	1.43	17.89	1.25
2-3'	1.40	1.47	3.42	1.52	0.19	0.74	1.49	0.31	1.56	1.83	1.24	1.78	1.03	1.54	1.92	1.26	4.42	0.75	0.88	31.21	
3-4'	3.08	13.40	5.14		0.52	5.13		0.33	3.18	**51.50**	1.73	2.43	1.62	2.16	2.35	2.12	10.20	1.25	1.82	30.98	
4-5'								2.23	10.90		2.01			2.78			**59.10**		1.67	14.89	
5-6'											38.10									22.85	
6-7'																				**84.57**	
Grid Total or Average (ppm)	1.45	4.54	2.79	0.74	0.30	1.80	0.90	0.76	3.51	14.22	7.54	1.71	0.89	1.74	1.49	1.27	15.57	0.62	1.19	23.889	1.19
2' Surface Average (ppm)	0.67	1.65	1.29	0.35	0.24	0.67	0.61	0.46	0.96	1.78	1.08	1.31	0.46	1.12	0.84	0.84	2.06	0.24	0.79	9.6603	1.19
Shore to 4' "Area B" (ppm)																					
All Grids to 4' "Area C" (ppm)																					1.19
Volume (cubic yards)	1,039	1,009	1,085	851	1,107	1,002	780	1,301	1,355	1,222	1,839	1,206	1,201	1,484	1,224	1,231	1,420	1,130	1,484	1,606	607
Mass (pounds of PCBs)	3.14	9.53	6.28	1.30	0.68	3.75	1.46	2.04	9.90	36.12	28.83	4.28	2.23	5.38	3.78	3.24	45.95	1.45	3.68	80.06	1.50
WEIGHTED AVERAGES																					
% of Measured Sediment	1.91%	1.85%	1.99%	1.56%	2.03%	1.84%	1.43%	2.39%	2.49%	2.24%	3.38%	2.22%	2.21%	2.73%	2.25%	2.26%	2.61%	2.08%	2.73%	2.95%	1.12%
Contribution to Sediment Concentration (ppm)	0.03	0.08	0.06	0.01	0.01	0.03	0.01	0.02	0.09	0.32	0.25	0.04	0.02	0.05	0.03	0.03	0.41	0.01	0.03	0.70	0.01
% of Sediment Surface	2.06%	2.00%	2.15%	2.25%	2.20%	1.99%	2.06%	2.07%	2.15%	2.42%	2.43%	2.39%	2.38%	2.36%	2.43%	2.44%	2.25%	2.24%	2.36%	2.47%	2.41%
Contribution to SWAC (ppm)	0.004	0.022	0.007	0.005	0.003	0.012	0.010	0.012	0.007	0.018	0.029	0.024	0.003	0.021	0.005	0.037	0.039	0.007	0.004	0.035	0.027

Appendix A
Pre-Design Investigation
Inner Harbor (Between Bridges) River Right

GRID LOCATIONS	114	112	110
Area (square feet)	8,096	8,144	8,789
Water Depth at Profile Line (feet)	8.0	8.0	8.0
PCB Concentration in ppm (By Depth)			
0-1'	0.02	0.02	0.59
1-2'	0.02	0.02	0.97
2-3'	0.03	0.02	1.36
3-4'		0.02	3.65
4-5'			
5-6'			
6-7'			
Grid Total or Average (ppm)	0.0205	0.0175	1.6428
2' Surface Average (ppm)	0.0181	0.0165	0.7805
Shore to 4' "Area B" (ppm)			
All Grids to 4' "Area C" (ppm)	0.02	0.02	1.64
Volume (cubic yards)	900	1,207	1,302
Mass (pounds of PCBs)	0.04	0.04	4.45
WEIGHTED AVERAGES			
% of Measured Sediment	1.65%	2.22%	2.39%
Contribution to Sediment Concentration (ppm)	0.00	0.00	0.04
% of Sediment Surface	2.38%	2.39%	2.58%
Contribution to SWAC (ppm)	0.000	0.000	0.015

Appendix A
Pre-Design Investigation
Lower River Deposits

Deposits	Totals or Averages	1	2	3	4	5	7	8	9
Area (square feet)	47,543	2,703	8,632	7,212	7,837	2,031	12,053	4,617	2,459
Average Thickness (feet)	1.58	1.00	1.92	2.72	1.17	1.33	1.00	1.00	2.50
PCB Concentration in ppm (By Depth)									
0-1'	2.57	3.02	0.46	12.47	3.55	0.37	0.48	0.22	0.02
1-2'	1.70	0.01		6.77	0.02				0.02
2-3'	0.02	0.02		0.04	0.01				0.01
3-4'	0.20			0.02	0.37				
Deposit Total or Average (ppm)	1.12	1.02	0.46	4.82	0.99	0.37	0.48	0.22	0.02
Volume (cubic yards)	2688.67	100.10	613.85	690.04	339.61	100.03	446.39	171.00	227.66
Mass (pounds of PCBs)	16.33	0.85	0.79	10.11	3.74	0.10	0.60	0.10	0.03
WEIGHTED AVERAGES									
% of Measured Sediment		3.72%	22.83%	25.66%	12.63%	3.72%	16.60%	6.36%	8.47%
Contribution to Sediment Concentration (ppm)	1.61	0.0379	0.1050	1.2381	0.1247	0.0138	0.0797	0.0140	0.0014
% of Sediment Surface		5.68%	18.16%	15.17%	16.48%	4.27%	25.35%	9.71%	5.17%
Contribution to SWAC (ppm)	2.89	0.172	0.084	1.892	0.585	0.016	0.122	0.021	0.001

Appendix A
Pre-Design Investigation
Lower River - River Left Grid

GRID LOCATIONS		317	315	313	311	309	307	305	303	301	299	297	295	293	291	289	287
Area (square feet)	424,754	7,497	6,959	7,193	6,554	6,748	8,099	8,068	7,832	5,400	8,109	7,321	6,668	No Rec	7,726	5,068	7,664
Water Depth at Profile Line (feet)		2.5	3.0	3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
PCB Concentration in ppm (By Depth)																	
0-1'	5.96	0.23	23.22	2.06	28.55	32.08	0.49	0.06	26.00	14.31	0.08	16.97	0.24		0.02	0.01	0.25
1-2'	5.17	0.02	0.64	4.10	4.79	0.39	0.02		0.93	1.72	0.43	0.10			0.02	0.01	0.21
2-3'	6.46		42.77		0.02	0.13			0.02	0.01		0.17					
3-4'	3.45		0.02		-	0.06			0.02	0.08		0.18					
4-5'			-		-	-			-	-		-					
5-6'			-		-	-			-	-		-					
6-7'			-		-	-			-	-		-					
Grid Total or Average (ppm)	4.62	0.12	19.56	3.08	16.19	13.28	0.25	0.06	11.33	6.67	0.25	10.42	0.24		0.02	0.01	0.23
2' Surface Average (ppm)	5.15	0.12	15.25	3.08	17.99	18.21	0.25	0.06	18.29	8.44	0.25	12.47	0.24		0.02	0.01	0.23
Volume (cubic yards)	29,854	555	473	533	405	458	600	299	508	317	601	407	247		572	375	568
Mass (pounds PCBs)	294.83	0.14	19.29	3.41	13.67	12.70	0.31	0.03	12.00	4.41	0.32	8.84	0.12		0.02	0.01	0.27
WEIGHTED AVERAGES																	
% of Measured Sediment		1.86%	1.58%	1.78%	1.36%	1.53%	2.01%	1.00%	1.70%	1.06%	2.01%	1.36%	0.83%		1.92%	1.26%	1.90%
Contribution to Sediment Concentration (ppm)	4.74	0.00	0.31	0.05	0.22	0.20	0.01	0.00	0.19	0.07	0.01	0.14	0.00		0.00	0.00	0.00
% of Sediment Surface		1.77%	1.64%	1.69%	1.54%	1.59%	1.91%	1.90%	1.84%	1.27%	1.91%	1.72%	1.57%		1.82%	1.19%	1.80%
Contribution to SWAC (ppm)	5.612	0.004	0.380	0.035	0.441	0.510	0.009	0.001	0.479	0.182	0.001	0.292	0.004		0.000	0.000	0.005

Appendix A
Pre-Design Investigation
Lower River - River Left Grid

GRID LOCATIONS	285	283	281	279	277	275	273	271	269	267	265	263	261	259	257	255	253	251
Area (square feet)	7,992	8,092	8,132	8,026	8,211	2,250	No Rec	8,113	8,120	No Rec	No Rec	No Rec	No Rec	No Rec	No Rec	8,087	8,094	8,099
Water Depth at Profile Line (feet)	3.0	4.0	5.0	5.0	6.0	6.0	7.0	7.0	5.0	5.0	5.0	5.0	5.0	5.5	5.5	7.0	7.0	7.0
PCB Concentration in ppm (By Depth)																		
0-1'	7.53	1.74	0.32	0.41	7.63	17.52		0.24	0.02							0.17	0.57	0.22
1-2'	9.65	46.05				0.89												
2-3'	0.03	12.70				15.50												
3-4'	-	-				-												
4-5'	-	-				-												
5-6'	-	-				-												
6-7'	-	-				-												
Grid Total or Average (ppm)	7.41	12.06	0.32	0.41	7.63	12.86		0.24	0.02							0.17	0.57	0.22
2' Surface Average (ppm)	8.28	11.96	0.32	0.41	7.63	11.98		0.24	0.02							0.17	0.57	0.22
Volume (cubic yards)	469	375	301	297	304	56		300	301							300	300	300
Mass (pounds PCBs)	7.25	9.43	0.20	0.25	4.82	1.49		0.15	0.01							0.11	0.36	0.14
WEIGHTED AVERAGES																		
% of Measured Sediment	1.57%	1.25%	1.01%	1.00%	1.02%	0.19%		1.01%	1.01%							1.00%	1.00%	1.00%
Contribution to Sediment Concentration (ppm)	0.12	0.15	0.00	0.00	0.08	0.02		0.00	0.00							0.00	0.01	0.00
% of Sediment Surface	1.88%	1.91%	1.91%	1.89%	1.93%	0.53%		1.91%	1.91%							1.90%	1.91%	1.91%
Contribution to SWAC (ppm)	0.142	0.033	0.006	0.008	0.147	0.093		0.005	0.000							0.003	0.011	0.004

Appendix A
Pre-Design Investigation
Lower River - River Left Grid

GRID LOCATIONS	249	247	245	243	241	239	237	235	233	231	229	227	225	223	221	219	217	215	213
Area (square feet)	8,100	No Rec	8,100	8,098	8,095	8,097	8,098	6,749	8,098	8,108	8,099	8,101	8,099	8,099	8,099	8,100	8,098	8,098	8,098
Water Depth at Profile Line (feet)	7.0	7.0	6.5	6.5	6.0	5.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0	3.5
PCB Concentration in ppm (By Depth)																			
0-1'	0.57		0.26	0.19	0.11	0.62	0.35	8.70	17.30	1.95	4.74	0.55	5.88	6.62	0.55	11.16	13.70	6.16	0.27
1-2'								0.46		8.75	2.16	0.02	10.39	0.77	0.64	16.93	0.08	25.56	0.82
2-3'								0.02			0.20		0.13	0.02		0.40	0.02	2.34	0.02
3-4'								0.03			0.05		0.02	0.02		0.03	0.02	0.34	
4-5'								-					-			-		-	
5-6'								-					-			-		-	
6-7'								-					-			-		-	
Grid Total or Average (ppm)	0.57		0.26	0.19	0.11	0.62	0.35	4.25	17.30	5.35	1.79	0.28	5.48	1.86	0.60	10.67	3.45	11.38	0.37
2' Surface Average (ppm)	0.57		0.26	0.19	0.11	0.62	0.35	5.76	17.30	5.35	3.45	0.28	7.93	3.70	0.60	13.63	6.89	15.86	0.55
Volume (cubic yards)	300		300	300	300	300	300	396	300	601	1,200	600	800	1,200	600	675	1,200	875	900
Mass (pounds PCBs)	0.36		0.16	0.12	0.07	0.39	0.22	3.51	10.79	6.68	4.46	0.35	9.15	4.63	0.74	15.03	8.62	20.78	0.69
WEIGHTED AVERAGES																			
% of Measured Sediment	1.00%		1.00%	1.00%	1.00%	1.00%	1.00%	1.33%	1.00%	2.01%	4.02%	2.01%	2.68%	4.02%	2.01%	2.26%	4.02%	2.93%	3.01%
Contribution to Sediment Concentration (ppm)	0.01		0.00	0.00	0.00	0.01	0.00	0.06	0.17	0.11	0.07	0.01	0.15	0.07	0.01	0.24	0.14	0.33	0.01
% of Sediment Surface	1.91%		1.91%	1.91%	1.91%	1.91%	1.91%	1.59%	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%
Contribution to SWAC (ppm)	0.011		0.005	0.004	0.002	0.012	0.007	0.138	0.330	0.037	0.090	0.010	0.112	0.126	0.011	0.213	0.261	0.117	0.005

Appendix A
Pre-Design Investigation
Lower River - River Left Grid

GRID LOCATIONS	211	209	207	205	203	201	199	197	195	193	191	189
Area (square feet)	8,100	8,101	8,099	8,099	7,841	7,329	6,780	6,510	6,881	7,225	7,203	8,030
Water Depth at Profile Line (feet)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	4.0	4.5	5.0
PCB Concentration in ppm (By Depth)												
0-1'	0.93	0.35	0.41	19.79	25.04	0.85	3.44	1.02	0.05	17.01	1.17	3.00
1-2'	7.38	1.71	0.02	5.38	0.78	0.01	30.16	6.09	0.02	0.76	4.37	8.39
2-3'	**55.90**			1.08	18.41	0.02	0.44			1.15		3.64
3-4'	**52.40**			1.93	0.32	0.01	0.02			1.78		8.33
4-5'	-			-	-		-			-		-
5-6'	-			-	-		-			-		-
6-7'	-			-	-		-			-		-
Grid Total or Average (ppm)	17.61	1.03	0.21	8.43	13.30	0.22	10.51	3.56	0.03	6.91	2.77	5.50
2' Surface Average (ppm)	3.69	1.03	0.21	12.58	13.44	0.43	14.89	3.56	0.03	10.51	2.77	5.31
Volume (cubic yards)	725	600	600	950	799	1,086	628	482	510	736	534	843
Mass (pounds PCBs)	26.65	1.29	0.26	16.72	22.17	0.50	13.77	3.56	0.04	10.62	3.07	9.67
WEIGHTED AVERAGES												
% of Measured Sediment	2.43%	2.01%	2.01%	3.18%	2.68%	3.64%	2.10%	1.62%	1.71%	2.46%	1.79%	2.82%
Contribution to Sediment Concentration (ppm)	0.43	0.02	0.00	0.27	0.36	0.01	0.22	0.06	0.00	0.17	0.05	0.16
% of Sediment Surface	1.91%	1.91%	1.91%	1.91%	1.85%	1.73%	1.60%	1.53%	1.62%	1.70%	1.70%	1.89%
Contribution to SWAC (ppm)	0.018	0.007	0.008	0.377	0.462	0.015	0.055	0.016	0.001	0.289	0.020	0.057

Appendix A
Pre-Design Investigation
Lower River - River Right Grid

GRID LOCATIONS		316	314	312	310	308	306	304	302	300	298	296	294	292	290	288	286
Area (square feet)	385,656	No Rec	No Rec	No Rec	No Rec	7,749	7,656	No Rec	8,100	No Rec	8,098	8,093	8,109	8,099	8,111	No Rec	No Rec
Water Depth at Profile Line (feet)		3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	2.5	2.5	2.5	2.5	2.5	3.0	3.0
PCB Concentration in ppm (By Depth)																	
0-1'	5.16					0.21	0.02		0.13		0.02	0.17	0.02	0.02	0.32		
1-2'	9.65						0.02				0.02	0.27	0.04	0.02			
2-3'	18.07										0.10			0.02			
3-4'	27.84																
4-5'																	
5-6'																	
6-7'																	
Grid Total or Average (ppm)	6.94					0.21	0.02		0.13		0.05	0.22	0.03	0.02	0.32		
2' Surface Average (ppm)	6.24					0.21	0.02		0.13		0.02	0.22	0.03	0.02	0.32		
Volume (cubic yards)	28,172					287	567		300		900	599	601	900	300		
Mass (pounds PCBs)	472.26					0.12	0.02		0.08		0.09	0.27	0.03	0.03	0.20		
WEIGHTED AVERAGES																	
% of Measured Sediment						1.02%	2.01%		1.06%		3.19%	2.13%	2.13%	3.19%	1.07%		
Contribution to Sediment Concentration (ppm)	8.04					0.00	0.00		0.00		0.00	0.00	0.00	0.00	0.00		
% of Sediment Surface						2.01%	1.99%		2.10%		2.10%	2.10%	2.10%	2.10%	2.10%		
Contribution to SWAC (ppm)	5.234					0.004	0.000		0.003		0.000	0.004	0.000	0.000	0.007		

Appendix A
Pre-Design Investigation
Lower River - River Right Grid

GRID LOCATIONS	284	282	280	278	276	274	272	270	268	266	264	262	260	258	256	254	252	250
Area (square feet)	5,866	8,141	8,138	8,168	8,108	8,099	8,080	6,631	No Rec	7,263	8,105	6,194	6,297	6,599	7,070	7,687	7,915	7,811
Water Depth at Profile Line (feet)	3.0	3.0	4.0	4.0	5.0	5.0	5.0	6.0	6.0	6.0	6.0	6.0	5.5	5.5	5.0	5.0	4.5	4.5
PCB Concentration in ppm (By Depth)																		
0-1'	0.13	2.61	5.34	25.10	0.21	0.27	1.00	0.24		1.43	0.33	0.49	0.28	0.26	0.08	24.70	15.20	17.37
1-2'							0.25						0.51	0.13	0.02	4.21	7.80	10.43
2-3'													1.53	0.74	0.01	0.01	0.02	0.02
3-4'																0.02	0.02	0.02
4-5'																	-	-
5-6'																		
6-7'																		
Grid Total or Average (ppm)	0.13	2.61	5.34	25.10	0.21	0.27	0.62	0.24		1.43	0.33	0.49	0.77	0.38	0.04	7.24	6.74	10.10
2' Surface Average (ppm)	0.13	2.61	5.34	25.10	0.21	0.27	0.62	0.24		1.43	0.33	0.49	0.39	0.19	0.05	14.46	11.50	14.22
Volume (cubic yards)	217	302	301	303	300	300	599	246		269	300	229	700	733	786	1,139	1,002	747
Mass (pounds PCBs)	0.06	1.64	3.35	15.79	0.13	0.17	0.77	0.12		0.80	0.21	0.23	1.12	0.57	0.06	17.13	14.09	15.75
WEIGHTED AVERAGES																		
% of Measured Sediment	0.77%	1.07%	1.07%	1.07%	1.07%	1.06%	2.12%	0.87%		0.95%	1.07%	0.81%	2.48%	2.60%	2.79%	4.04%	3.56%	2.65%
Contribution to Sediment Concentration (ppm)	0.00	0.03	0.06	0.27	0.00	0.00	0.01	0.00		0.01	0.00	0.00	0.02	0.01	0.00	0.29	0.24	0.27
% of Sediment Surface	1.52%	2.11%	2.11%	2.12%	2.10%	2.10%	2.10%	1.72%		1.88%	2.10%	1.61%	1.63%	1.71%	1.83%	1.99%	2.05%	2.03%
Contribution to SWAC (ppm)	0.002	0.055	0.113	0.532	0.004	0.006	0.021	0.004		0.027	0.007	0.008	0.005	0.004	0.001	0.492	0.312	0.352

Appendix A
Pre-Design Investigation
Lower River - River Right Grid

GRID LOCATIONS	248	246	244	242	240	238	236	234	232	230	228	226	224	222	220	218	216	214
Area (square feet)	7,009	6,653	7,007	7,228	7,414	7,446	7,422	7,424	7,465	7,464	7,304	7,142	6,989	6,890	6,966	7,450	7,702	7,748
Water Depth at Profile Line (feet)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	4.0	4.0	4.0	4.0
PCB Concentration in ppm (By Depth)																		
0-1'	0.02	0.16	1.51	0.78	0.01	4.10	12.17	19.70	41.15	29.59	3.55	2.60	0.72	10.99	0.39	1.82	1.48	0.02
1-2'	0.02	0.02	0.01		0.02	12.00	0.25	0.01	1.05	19.04	2.89	**78.21**	**97.33**	18.49		7.15	4.00	
2-3'	0.02		0.01		0.02		0.02	0.02	0.02	0.02	6.99	35.39	18.65	**80.08**		**111.36**	**150.06**	
3-4'							0.02		0.02	-	18.00	**177.40**	1.91	**72.70**		0.29	35.80	
4-5'							-		-	-		-	-	-		-	-	
5-6'																		
6-7'																		
Grid Total or Average (ppm)	0.02	0.09	0.51	0.78	0.02	8.05	6.15	6.58	21.84	22.20	7.86	**50.16**	37.51	28.21	0.39	27.09	23.75	0.02
2' Surface Average (ppm)	0.02	0.09	0.76	0.78	0.02	8.05	8.20	9.86	25.11	25.70	3.22	40.40	49.03	14.40	0.39	4.10	2.54	0.02
Volume (cubic yards)	779	493	779	268	824	552	550	825	530	507	1,082	816	777	595	258	736	571	287
Mass (pounds PCBs)	0.03	0.09	0.83	0.44	0.03	9.23	7.06	11.28	24.15	23.48	17.68	85.37	60.78	35.06	0.21	41.60	28.28	0.01
WEIGHTED AVERAGES																		
% of Measured Sediment	2.76%	1.75%	2.76%	0.95%	2.92%	1.96%	1.95%	2.93%	1.88%	1.80%	3.84%	2.90%	2.76%	2.11%	0.92%	2.61%	2.03%	1.02%
Contribution to Sediment Concentration (ppm)	0.00	0.00	0.01	0.01	0.00	0.16	0.12	0.19	0.41	0.40	0.30	1.45	1.03	0.60	0.00	0.71	0.48	0.00
% of Sediment Surface	1.82%	1.73%	1.82%	1.87%	1.92%	1.93%	1.92%	1.93%	1.94%	1.94%	1.89%	1.85%	1.81%	1.79%	1.81%	1.93%	2.00%	2.01%
Contribution to SWAC (ppm)	0.000	0.003	0.027	0.015	0.000	0.079	0.234	0.379	0.797	0.573	0.067	0.048	0.013	0.196	0.007	0.035	0.030	0.000

Appendix A
Pre-Design Investigation
Lower River - River Right Grid

GRID LOCATIONS	212	210	208	206	204	202	200	198
Area (square feet)	8,099	8,103	8,099	8,099	8,099	8,101	8,100	8,046
Water Depth at Profile Line (feet)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
PCB Concentration in ppm (By Depth)								
0-1'	9.85	4.16	7.74	2.96	3.46	3.45	3.70	1.21
1-2'			8.01		29.96	0.02	0.57	6.07
2-3'			0.02		3.89			24.72
3-4'			-		-			-
4-5'			-		-			-
5-6'								
6-7'								
Grid Total or Average (ppm)	9.85	4.16	7.13	2.96	13.07	1.73	2.13	8.48
2' Surface Average (ppm)	9.85	4.16	7.84	2.96	14.82	1.73	2.13	3.53
Volume (cubic yards)	300	300	550	300	625	600	600	745
Mass (pounds PCBs)	6.14	2.60	8.19	1.85	17.05	2.16	2.66	13.18
WEIGHTED AVERAGES								
% of Measured Sediment	1.06%	1.07%	1.95%	1.06%	2.22%	2.13%	2.13%	2.64%
Contribution to Sediment Concentration (ppm)	0.10	0.04	0.14	0.03	0.29	0.04	0.05	0.22
% of Sediment Surface	2.10%	2.10%	2.10%	2.10%	2.10%	2.10%	2.10%	2.09%
Contribution to SWAC (ppm)	0.207	0.087	0.162	0.062	0.073	0.072	0.078	0.025

Appendix A
Pre-Design Investigation
Middle River Deposits

Deposits	Totals or Averages	10, 11, 12, 13	14, 15, 16	17, 18	19, 20, 21	22, 23	24	25	26	27	28	29, 30	31	32, 33	34	35, 36	37	38, 39	40
Area (square feet)	132,967	6,002	3,140	1,945	3,550	5,173	4,468	7,850	7,027	4,193	9,837	7,412	2,574	2,485	3,221	1,914	1,037	4,517	10,384
Average Thickness (feet)	1.25	1.25	1.21	1.36	1.08	1.38	1.50	2.15	1.54	1.03	1.03	1.17	1.00	1.30	1.17	1.06	1.17	1.32	1.47
PCB Concentration in ppm	1.69	0.54	10.10	0.61	1.06	1.32	1.68	0.88	14.20	0.21	0.64	0.53	0.76	3.95	0.58	2.29	3.66	0.94	0.40
Volume (cubic yards)	6325	242.59	121.68	92.61	137.85	259.14	248.24	625.00	400.81	159.96	375.27	319.97	95.33	124.14	139.56	84.97	44.96	220.37	565.34
Mass (pounds of PCBs)	32.32	0.37	3.43	0.16	0.41	0.95	1.16	1.54	15.88	0.09	0.67	0.47	0.20	1.37	0.22	0.54	0.46	0.58	0.62
WEIGHTED AVERAGES																			
% of Sediment Surface		4.51%	2.36%	1.46%	2.67%	3.89%	3.36%	5.90%	5.28%	3.15%	7.40%	5.57%	1.94%	1.87%	2.42%	1.44%	0.78%	3.40%	7.81%
Contribution to SWAC	1.71	0.02	0.24	0.01	0.03	0.05	0.06	0.05	0.75	0.01	0.05	0.03	0.01	0.07	0.01	0.03	0.03	0.03	0.03

Appendix A
Pre-Design Investigation
Middle River Deposits

Deposits	41, 42	43	44, 45	46	47, 48, 49	50, 51,52, 53	54, 55, 56	57	58, 59	60, 61	62, 63	64
Area (square feet)	5,849	2,436	2,660	2,769	4,056	6,887	7,014	5,815	2,401	3,432	1,573	1,344
Average Thickness (feet)	1.11	1.35	1.04	1.19	1.21	1.07	1.13	1.20	1.25	1.69	0.96	1.14
PCB Concentration in ppm	0.54	0.37	0.18	1.01	0.10	0.36	1.04	0.46	0.93	0.52	0.32	0.50
Volume (cubic yards)	270.21	121.80	102.88	122.06	170.80	275.54	301.63	258.46	108.67	222.57	55.84	56.75
Mass (pounds of PCBs)	0.40	0.12	0.05	0.34	0.05	0.28	0.88	0.33	0.28	0.33	0.05	0.08
WEIGHTED AVERAGES												
% of Sediment Surface	4.40%	1.83%	2.00%	2.08%	3.05%	5.18%	5.27%	4.37%	1.81%	2.58%	1.18%	1.01%
Contribution to SWAC	0.02	0.01	0.00	0.02	0.00	0.02	0.05	0.02	0.02	0.01	0.00	0.01

Appendix B
ROD Remedy

ROD Remedy		Middle River Deposits	Lower River Deposits	Lower River River Left	Lower River River Right	Inner Harbor Penn to 8th River Left	Inner Harbor Penn to 8th River Right	Inner Harbor 8th to Mouth River Left	Inner Harbor 8th to Mouth River Right
Area (square feet)	2,325,414	132,967	47,543	424,754	385,656	324,279	340,052	420,907	429,766
% of Sediment Surface	100.00%	5.72%	2.04%	18.27%	16.58%	13.94%	14.62%	18.10%	18.48%
PCB Concentration After Remediation 0-1 SWAC Measured in the Localized Area (ppm)		1.71	2.89	4.23	4.26	3.92	1.66	1.08	1.25
Surface Weighted Average of All Areas (ppm)	**2.85**								
Surface Weighted Average of Middle River	**1.71**								
Surface Weighted Average of Lower River	**4.17**								
Surface Weighted Average of Inner Harbor	**1.87**								

Appendix B
ROD Remedy

River Reach	Post Remediation SWAC	Approximate Years to RAO Goal (k=.065)
Middle River	1.71	18.89
Lower River	**4.17**	**32.58**
Inner Harbor	1.87	20.26
Average Surface All Reaches	**2.85**	**26.74**

Post Removal Surface Concentration t(0)	Time (years) to .5 ppm SWAC from Pre Design Information k(2) = .065
0.60	2.80
0.75	6.23
0.90	9.03
1.05	11.40
1.20	13.45
1.35	15.26
1.50	16.88
1.65	18.34
1.71	18.89
1.80	19.68
1.95	20.91
2.10	22.04
2.25	23.10
2.40	24.10
2.55	25.03
2.70	25.90
2.85	**26.74**
3.00	27.52
3.15	28.27
3.30	28.99
3.40	29.45
3.50	29.89
3.60	30.32
3.70	30.74
3.80	31.15
3.90	31.55
4.00	31.94
4.10	32.32
4.17	**32.58**
4.20	32.69
4.30	33.05

Design
Table Definitions

Grid Total or Average -	This value in the fist column of each sub-table representing a different portion of the Lower River or Inner Harbor is the mean (average) PCB concentration for the grids in that portion. The values for each grid is the average PCB concentration for the grid. In grids where more than one core was collected, the grid total or average is calculated using all Core Results.
2' Surface Average-	This value is the mean (average) PCB concentration of all Grid PCB sample data collected in the Top 2 feet of surface sediment during the Pre-Design Investigation. In grids where more than one core was collected, the 2' Surface Average is calculated using all Core Results.
Shore to 4' "Area B" -	This value is the mean (average) PCB concentration of all Grid PCB sample data collected in the four feet of sediment designated as Area B. In grids where more than one core was collected, the Shore to 4' "Area B" is calculated using all Core Results.
All Grids to 4' "Area C" -	This value is the mean (average) PCB concentration of all Grid PCB sample data collected in the four feet of sediment designated as Area C. In grids where more than one core was collected, the Shore to 4' "Area C" is calculated using all Core Results.
No Rec -	Abbreviation for No Recovery. No Sediment was recovered from the sampling event(s).
Single Core Grid	Continuous Soft Sediment Grid that had only one sample core pulled during the Pre-Design Investigation
Two Core Grid	Continuous Soft Sediment Grid that had two sample cores pulled during the Pre-Design Investigation
Six Core Grid	Continuous Soft Sediment Grid that had six sample cores pulled during the Pre-Design Investigation
6 - 26 ppm	Color represents grids with PCB concentrations within the range of 6 - 26 ppm
26 -50 ppm	Color represents grids with PCB concentrations within the range of 26- 50 ppm
> 50	Color represents grids with PCB concentrations > 50 ppm

Appendix B
ROD Remedy
Inner Harbor (8th Street to Mouth) - River Left

GRID LOCATIONS		109	107	105	103	101	99	97	95	93	91	89	87	85
Area (square feet)	420,907	7,274	7,224	7,332	7,850	5,931	6,799	7,401	7,612	7,835	7,626	8,357	7,985	8,146
Water Depth at Profile Line (feet)		4.5	4.5	4.5	5.5	5.5	5.5	4.5	4.5	4.5	5.0	5.5	5.5	5.5
PCB Concentration in ppm (By Depth)														
0-1'	1.08	0.42	1.29	1.50	2.01	2.44	0.27	0.19	4.44	4.83	0.23	1.80	1.90	0.74
1-2'	1.03	0.47	1.28	1.00	1.23	1.98	0.44	1.20	0.91	1.27	3.35	0.80	1.43	0.85
2-3'	1.32	0.66	0.59	0.84	1.39	2.08	1.12	1.15	1.39	2.27	1.62	0.87	1.04	0.95
3-4'	1.56	1.09	1.73	1.62	1.15	1.70	1.24	1.38	1.45	1.24		1.12	1.31	1.14
4-5'	1.88	0.63	0.74	1.94	1.42	1.49	1.15	1.50	1.23			1.14	1.68	1.77
5-6'	2.75	2.29	0.62	2.50			1.63					2.11	1.43	1.94
6-7'	6.17													
Grid Total or Average (ppm)	1.43	0.92	1.04	1.57	1.44	1.94	0.98	1.08	1.88	2.40	1.73	1.31	1.47	1.23
2' Surface Average (ppm)	1.05	0.44	1.29	1.25	1.62	2.21	0.36	0.69	2.67	3.05	1.79	1.30	1.67	0.80
Volume (cubic yards)	78,994	1,616	1,605	1,629	1,454	1,098	1,511	1,371	1,410	1,161	847	1,857	1,774	1,810
Mass (pounds PCBs)	238.04	3.12	3.48	5.31	4.35	4.43	3.06	3.09	5.52	5.80	3.05	5.04	5.40	4.64
WEIGHTED AVERAGES														
% of Measured Sediment		2.05%	2.03%	2.06%	1.84%	1.39%	1.91%	1.74%	1.78%	1.47%	1.07%	2.35%	2.25%	2.29%
Contribution to Sediment Concentration (ppm)	1.45	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.03	0.04	0.02	0.03	0.03	0.03
% of Sediment Surface		1.73%	1.72%	1.74%	1.87%	1.41%	1.62%	1.76%	1.81%	1.86%	1.81%	1.99%	1.90%	1.94%
Contribution to SWAC (ppm)	1.078	0.007	0.022	0.026	0.037	0.034	0.004	0.003	0.080	0.090	0.004	0.036	0.036	0.014

Appendix B
ROD Remedy
Inner Harbor (8th Street to Mouth) - River Left

GRID LOCATIONS	83	81	79	77	75	73	71	69	67	65	63	61	59	57
Area (square feet)	8,066	7,897	7,848	7,756	8,911	7,764	6,895	8,359	8,033	7,064	7,841	7,972	7,931	7,981
Water Depth at Profile Line (feet)	5.0	5.5	6.5	7.5	8.5	9.5	10.0	12.0	10.5	10.5	10.5	10.5	10.5	10.5
PCB Concentration in ppm (By Depth)														
0-1'	0.67	1.90	2.01	2.01	1.45	1.29	0.45	1.13	0.62	0.70	0.15	0.20	0.21	1.26
1-2'	0.87	0.67	1.10	1.02	1.49	1.29	0.12	0.83	0.56	0.61	0.19	0.34	0.20	1.03
2-3'	1.21	0.74	1.50	1.17	1.31	1.48	0.16	1.06	1.29	3.20	0.51		0.19	0.69
3-4'	1.10	1.27	1.22	0.96	1.30	2.00	0.39	0.33	1.72	1.00	1.40		0.24	0.84
4-5'	1.19	1.64	2.00	1.00	1.39	2.37	3.32	0.61		1.81			0.21	0.59
5-6'	1.52		1.62			4.20				1.99				
6-7'														
Grid Total or Average (ppm)	1.09	1.24	1.58	1.23	1.39	2.11	0.89	0.79	1.05	1.55	0.56	0.27	0.21	0.88
2' Surface Average (ppm)	0.77	1.28	1.56	1.52	1.47	1.29	0.28	0.98	0.59	0.65	0.17	0.27	0.21	1.15
Volume (cubic yards)	1,792	1,462	1,744	1,436	1,650	1,725	1,277	1,548	1,190	1,570	1,162	591	1,469	1,478
Mass (pounds PCBs)	4.07	3.78	5.71	3.68	4.76	7.55	2.35	2.55	2.59	5.06	1.36	0.33	0.64	2.71
WEIGHTED AVERAGES														
% of Measured Sediment	2.27%	1.85%	2.21%	1.82%	2.09%	2.18%	1.62%	1.96%	1.51%	1.99%	1.47%	0.75%	1.86%	1.87%
Contribution to Sediment Concentration (ppm)	0.02	0.02	0.03	0.02	0.03	0.05	0.01	0.02	0.02	0.03	0.01	0.00	0.00	0.02
% of Sediment Surface	1.92%	1.88%	1.86%	1.84%	2.12%	1.84%	1.64%	1.99%	1.91%	1.68%	1.86%	1.89%	1.88%	1.90%
Contribution to SWAC (ppm)	0.013	0.036	0.037	0.037	0.031	0.024	0.007	0.022	0.012	0.012	0.003	0.004	0.004	0.024

Appendix B
ROD Remedy
Inner Harbor (8th Street to Mouth) - River Left

GRID LOCATIONS	55	53	51	49	47	45	43	41	39	37	35	33	31	29
Area (square feet)	8,049	7,422	7,448	8,023	7,642	7,627	7,600	7,393	7,217	6,941	7,028	7,279	7,514	7,529
Water Depth at Profile Line (feet)	11.0	10.5	10.0	10.5	11.5	11.5	11.5	12.0	12.0	12.0	12.5	12.5	12.5	12.5
PCB Concentration in ppm (By Depth)														
0-1'	0.57	1.33	1.00	0.78	1.92	0.53	0.69	0.37	1.05	1.15	1.38	0.56	1.24	0.83
1-2'	0.71	1.34	0.82	1.14	0.85	2.71	0.66	1.20	2.53	2.11	0.74	2.06	1.78	0.15
2-3'	0.06	1.41	5.07	3.03	0.90	1.58	0.48	0.93	5.12	3.56	1.97	3.20	1.55	0.44
3-4'		5.08	2.48	2.69	1.19	1.96	1.28	4.07	2.93	4.06	2.05	1.57	2.21	1.94
4-5'		2.28	5.21	4.25	1.55		1.54	3.78	6.54		4.48		3.21	2.71
5-6'				7.95	3.74			6.95						3.75
6-7'					6.17									
Grid Total or Average (ppm)	0.44	2.29	2.92	3.31	2.33	1.70	0.93	2.88	3.63	2.72	2.12	1.85	2.00	1.64
2' Surface Average (ppm)	0.64	1.34	0.91	0.96	1.38	1.62	0.68	0.79	1.79	1.63	1.06	1.31	1.51	0.49
Volume (cubic yards)	894	1,374	1,379	1,783	1,981	1,130	1,407	1,643	1,336	1,028	1,301	1,078	1,391	1,673
Mass (pounds PCBs)	0.83	6.54	8.36	12.26	9.60	3.98	2.72	9.85	10.10	5.81	5.75	4.14	5.78	5.69
WEIGHTED AVERAGES														
% of Measured Sediment	1.13%	1.74%	1.75%	2.26%	2.51%	1.43%	1.78%	2.08%	1.69%	1.30%	1.65%	1.37%	1.76%	2.12%
Contribution to Sediment Concentration (ppm)	0.01	0.04	0.05	0.07	0.06	0.02	0.02	0.06	0.06	0.04	0.03	0.03	0.04	0.03
% of Sediment Surface	1.91%	1.76%	1.77%	1.91%	1.82%	1.81%	1.81%	1.76%	1.71%	1.65%	1.67%	1.73%	1.79%	1.79%
Contribution to SWAC (ppm)	0.011	0.023	0.018	0.015	0.035	0.010	0.012	0.007	0.018	0.019	0.023	0.010	0.022	0.015

Appendix B
ROD Remedy
Inner Harbor (8th Street to Mouth) - River Left

GRID LOCATIONS	27	25	23	21	19	17	15	13	11	9	7	5	3	1
Area (square feet)	7,541	7,534	7,544	7,644	7,748	7,741	7,623	7,813	7,853	7,922	7,628	7,593	7,970	8,351
Water Depth at Profile Line (feet)	12.5	12.5	12.5	13.0	13.0	13.0	13.0	13.0	13.5	13.5	13.5	13.5	13.5	14.0
PCB Concentration in ppm (By Depth)														
0-1'	0.22	0.44	2.35	1.05	0.91	0.49	0.90	0.49	0.93	0.36	0.69	0.54	0.23	0.28
1-2'	0.31	0.43	0.34	2.11	0.76	0.49	1.08	0.92	0.40	1.42	0.85	1.53	0.27	0.40
2-3'	0.45	0.73	0.14	1.99	1.20	0.57	1.32	1.07	0.30	0.98	1.02	0.90	0.34	0.46
3-4'	0.38	1.14	0.24	3.33	1.47	2.15	1.27	1.59	0.49	1.63	1.07	1.54	0.40	0.74
4-5'	0.82	1.57	0.26	5.15			1.16	1.69	0.44	1.03	1.06	1.04	0.38	
5-6'			0.54					2.45		1.86		3.21		
6-7'														
Grid Total or Average (ppm)	0.44	0.86	0.64	2.73	1.08	0.93	1.15	1.37	0.51	1.21	0.94	1.46	0.32	0.47
2' Surface Average (ppm)	0.27	0.44	1.34	1.58	0.83	0.49	0.99	0.70	0.67	0.89	0.77	1.03	0.25	0.34
Volume (cubic yards)	1,396	1,395	1,676	1,416	1,148	1,147	1,412	1,736	1,454	1,760	1,413	1,687	1,476	1,237
Mass (pounds PCBs)	1.27	2.50	2.25	8.02	2.59	2.21	3.36	4.94	1.55	4.44	2.75	5.12	1.00	1.21
WEIGHTED AVERAGES														
% of Measured Sediment	1.77%	1.77%	2.12%	1.79%	1.45%	1.45%	1.79%	2.20%	1.84%	2.23%	1.79%	2.14%	1.87%	1.57%
Contribution to Sediment Concentration (ppm)	0.01	0.02	0.01	0.05	0.02	0.01	0.02	0.03	0.01	0.03	0.02	0.03	0.01	0.01
% of Sediment Surface	1.79%	1.79%	1.79%	1.82%	1.84%	1.84%	1.81%	1.86%	1.87%	1.88%	1.81%	1.80%	1.89%	1.98%
Contribution to SWAC (ppm)	0.004	0.008	0.042	0.019	0.017	0.009	0.016	0.009	0.017	0.007	0.012	0.010	0.004	0.006

Appendix B
ROD Remedy
Inner Harbor (8th Street to Mouth) - River Right

GRID LOCATIONS		108	106	104	102	100	98	96	94	92	90	88	86	84	82	80
Area (square feet)	429,766	8,445	8,217	8,245	8,110	7,507	5,500	5,839	7,803	8,174	8,161	8,229	7,346	7,969	8,201	8,227
Water Depth at Profile Line (feet)		8.0	8.5	8.5	8.5	9.0	9.0	10.0	11.0	11.0	12.0	12.5	13.0	13.5	14.0	14.5
PCB Concentration in ppm (By Depth)																
0-1'	1.24	0.99	0.39	0.65	0.91	1.80	0.81	1.06	0.62	1.53	0.98	1.57	0.78	0.68	1.03	0.68
1-2'	1.51	0.48	0.81	0.25	0.87	1.50	0.98	1.19	0.91	2.18	0.85	1.58	1.47	0.18	1.01	1.30
2-3'	0.95	0.83	0.94	0.60	0.90	1.84		1.62	1.22	2.40	1.62	1.52	1.41	0.18	1.15	0.92
3-4'	0.97	0.40	0.81	0.23	1.33	0.64		2.14	1.23	3.08	1.23	2.23			1.13	1.77
4-5'	1.21		0.93	0.35	1.14			2.49	1.79	3.59	2.44	3.68				
5-6'	0.86							2.85								
6-7'	0.74															
Grid Total or Average (ppm)	1.16	0.67	0.78	0.42	1.03	1.44	0.89	1.89	1.15	2.56	1.43	2.12	1.22	0.34	1.08	1.17
2' Surface Average (ppm)	1.38	0.73	0.60	0.45	0.89	1.65	0.89	1.13	0.76	1.86	0.92	1.58	1.12	0.43	1.02	0.99
Volume (cubic yards)	77,713	1,251	1,522	1,527	1,502	1,112	407	1,298	1,445	1,514	1,511	1,524	816	885	1,215	1,219
Mass (pounds PCBs)	183.92	1.75	2.45	1.32	3.22	3.34	0.76	5.10	3.46	8.04	4.48	6.70	2.07	0.63	2.73	2.96
WEIGHTED AVERAGES																
% of Measured Sediment		1.61%	1.96%	1.96%	1.93%	1.43%	0.52%	1.67%	1.86%	1.95%	1.94%	1.96%	1.05%	1.14%	1.56%	1.57%
Contribution to Sediment Concentration (ppm)	1.14	0.01	0.02	0.01	0.02	0.02	0.00	0.03	0.02	0.05	0.03	0.04	0.01	0.00	0.02	0.02
% of Sediment Surface		1.97%	1.91%	1.92%	1.89%	1.75%	1.28%	1.36%	1.82%	1.90%	1.90%	1.91%	1.71%	1.85%	1.91%	1.91%
Contribution to SWAC (ppm)	1.248	0.019	0.007	0.013	0.017	0.031	0.010	0.014	0.011	0.029	0.019	0.030	0.013	0.013	0.020	0.013

Appendix B
ROD Remedy
Inner Harbor (8th Street to Mouth) - River Right

GRID LOCATIONS	78	76	74	72	70	68	66	64	62	60	58	56	54	52	50	48	46	44
Area (square feet)	8,106	8,027	8,073	8,151	7,744	8,505	8,355	7,927	5,891	6,586	6,872	7,107	7,331	6,598	7,978	8,251	8,268	8,270
Water Depth at Profile Line (feet)	14.5	14.0	14.0	13.5	13.5	11.0	9.0	7.5	7.0	6.5	6.0	6.5	6.5	6.0	6.0	6.0	6.0	7.0
PCB Concentration in ppm (By Depth)																		
0-1'	0.40	0.74	0.25	1.01	0.38	0.64	0.21	1.08	1.46	0.29	1.94	0.97	1.54	1.24	0.26	3.37	2.31	1.34
1-2'	0.33	1.19	0.30	0.80	0.27	0.58	0.23	0.69	6.06	1.31	4.54	3.34	1.06	2.96	2.48	1.15	3.40	1.02
2-3'	1.14	1.39	0.52	1.46	0.36	0.69	0.23	0.53	0.84	0.48	1.63	1.10	1.16	1.75	1.39	1.38	1.44	0.51
3-4'	2.26	1.24	0.85	1.98	0.74	0.83	0.33		1.66	1.25	1.03	1.03	1.15		0.70	0.95		0.43
4-5'	2.41								0.47	1.16		1.31	1.14		1.22			0.68
5-6'												1.31						
6-7'																		
Grid Total or Average (ppm)	1.31	1.14	0.48	1.31	0.44	0.68	0.25	0.77	2.10	0.90	2.29	1.51	1.21	1.98	1.21	1.71	2.38	0.80
2' Surface Average (ppm)	0.36	0.97	0.27	0.90	0.32	0.61	0.22	0.89	3.76	0.80	3.24	2.15	1.30	2.10	1.37	2.26	2.86	1.18
Volume (cubic yards)	1,501	1,189	1,196	1,208	1,147	1,260	1,238	881	1,091	1,220	1,018	1,579	1,358	733	1,477	1,222	919	1,531
Mass (pounds PCBs)	4.08	2.82	1.19	3.29	1.04	1.79	0.64	1.40	4.76	2.27	4.84	4.96	3.42	3.02	3.72	4.35	4.55	2.54
WEIGHTED AVERAGES																		
% of Measured Sediment	1.93%	1.53%	1.54%	1.55%	1.48%	1.62%	1.59%	1.13%	1.40%	1.57%	1.31%	2.03%	1.75%	0.94%	1.90%	1.57%	1.18%	1.97%
Contribution to Sediment Concentration (ppm)	0.03	0.02	0.01	0.02	0.01	0.01	0.00	0.01	0.03	0.01	0.03	0.03	0.02	0.02	0.02	0.03	0.03	0.02
% of Sediment Surface	1.89%	1.87%	1.88%	1.90%	1.80%	1.98%	1.94%	1.84%	1.37%	1.53%	1.60%	1.65%	1.71%	1.54%	1.86%	1.92%	1.92%	1.92%
Contribution to SWAC (ppm)	0.008	0.014	0.005	0.019	0.007	0.013	0.004	0.020	0.020	0.004	0.031	0.016	0.026	0.019	0.005	0.065	0.044	0.026

Appendix B
ROD Remedy
Inner Harbor (8th Street to Mouth) - River Right

GRID LOCATIONS	42	40	38	36	34	32	30	28	26	24	22	20	18	16	14	12	10
Area (square feet)	8,295	8,336	8,330	8,314	8,324	8,366	8,369	8,369	8,339	8,298	8,266	8,230	8,328	8,338	8,383	8,378	8,402
Water Depth at Profile Line (feet)	7.0	7.0	7.5	7.5	7.5	7.5	7.5	7.5	8.0	8.0	8.0	8.5	8.5	8.5	9.0	9.5	10.0
PCB Concentration in ppm (By Depth)																	
0-1'	1.18	1.88	1.40	1.09	3.97	1.70	1.27	1.09	1.65	1.96	3.66	2.33	1.84	1.65	0.99	1.96	0.78
1-2'	0.64	1.70	2.48	1.18	3.23	2.80	0.91	2.31	1.87	0.77	1.10	3.91	0.78	1.76	1.84	0.50	2.17
2-3'	0.68	0.97	0.75	0.96	1.02	1.25	0.75	0.58	0.50	0.68	1.29	1.38	0.72	0.80	0.67	0.26	0.45
3-4'	0.60	0.55		1.12	0.57	0.96	0.68	0.49	0.53	0.52	1.93	1.01	0.66	0.69	0.47	0.29	0.34
4-5'	1.18	0.71		1.16	0.84	1.27	1.30	0.31	0.39	0.58	4.00	0.94	0.32	0.47	0.48	0.69	0.32
5-6'	0.64	0.63		1.09	0.76		0.98	0.38		0.45	1.13	2.23			0.35	0.46	0.40
6-7'												1.31					
Grid Total or Average (ppm)	0.82	1.07	1.54	1.10	1.73	1.60	0.98	0.86	0.99	0.83	2.19	1.87	0.86	1.07	0.80	0.69	0.74
2' Surface Average (ppm)	0.91	1.79	1.94	1.14	3.60	2.25	1.09	1.70	1.76	1.36	2.38	3.12	1.31	1.71	1.41	1.23	1.47
Volume (cubic yards)	1,843	1,852	926	1,848	1,850	1,549	1,860	1,860	1,544	1,844	1,837	2,134	1,542	1,544	1,863	1,862	1,867
Mass (pounds PCBs)	3.13	4.13	2.97	4.23	6.66	5.14	3.79	3.32	3.17	3.17	8.34	8.31	2.77	3.45	3.09	2.69	2.89
WEIGHTED AVERAGES																	
% of Measured Sediment	2.37%	2.38%	1.19%	2.38%	2.38%	1.99%	2.39%	2.39%	1.99%	2.37%	2.36%	2.75%	1.98%	1.99%	2.40%	2.40%	2.40%
Contribution to Sediment Concentration (ppm)	0.02	0.03	0.02	0.03	0.04	0.03	0.02	0.02	0.02	0.02	0.05	0.05	0.02	0.02	0.02	0.02	0.02
% of Sediment Surface	1.93%	1.94%	1.94%	1.93%	1.94%	1.95%	1.95%	1.95%	1.94%	1.93%	1.92%	1.91%	1.94%	1.94%	1.95%	1.95%	1.96%
Contribution to SWAC (ppm)	0.023	0.036	0.027	0.021	0.077	0.033	0.025	0.021	0.032	0.038	0.070	0.045	0.036	0.032	0.019	0.038	0.015

Appendix B
ROD Remedy
Inner Harbor (8th Street to Mouth) - River Right

GRID LOCATIONS	8	6	4	2
Area (square feet)	8,380	8,358	8,754	8,596
Water Depth at Profile Line (feet)	10.5	11.0	11.5	12.5
PCB Concentration in ppm (By Depth)				
0-1'	1.23	0.92	0.54	0.05
1-2'	1.34	2.54	0.48	0.17
2-3'	0.42	0.70	0.44	0.21
3-4'	0.27	0.86	0.16	0.25
4-5'	0.45	0.73	0.11	
5-6'	0.31	0.48	0.23	
6-7'		0.66	0.25	
Grid Total or Average (ppm)	0.67	0.98	0.32	0.17
2' Surface Average (ppm)	1.29	1.73	0.51	0.11
Volume (cubic yards)	1,862	2,167	2,270	1,273
Mass (pounds PCBs)	2.59	4.43	1.49	0.45
WEIGHTED AVERAGES				
% of Measured Sediment	2.40%	2.79%	2.92%	1.64%
Contribution to Sediment Concentration (ppm)	0.02	0.03	0.01	0.00
% of Sediment Surface	1.95%	1.94%	2.04%	2.00%
Contribution to SWAC (ppm)	0.024	0.018	0.011	0.001

Appendix B
ROD Remedy
Inner Harbor (Between Bridges) - River Left

GRID LOCATIONS		187	185	183	181	179	177	175	173	171	169	167	165
Area (square feet)	324,279	6,822	7,189	7,390	7,492	8,412	8,450	8,165	8,238	7,997	8,043	8,272	9,101
Water Depth at Profile Line (feet)		6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.5	6.5	6.5	7.0	7.0
PCB Concentration in ppm (By Depth)													
0-1'	3.89	0.02	0.02	0.02	0.15	0.33	9.19	26.00	26.00	0.02	9.88	1.81	26.00
1-2'	31.97	0.02	0.02	0.02	0.01	45.91	0.53	0.41		0.02	**87.10**	18.36	**164.00**
2-3'	17.62				0.02	0.02		0.19				23.05	
3-4'	20.96				0.02	-						13.30	
4-5'	11.18					-						-	
5-6'	-					-						-	
6-7'	-					-						-	
Grid Total or Average (ppm)	18.04	0.02	0.02	0.02	0.05	19.50	4.86	8.87	26.00	0.02	48.49	9.39	**95.00**
2' Surface Average (ppm)	16.59	0.02	0.02	0.02	0.05	20.59	4.86	13.21	26.00	0.02	48.49	5.49	**95.00**
Shore to 4' "Area B" (ppm)	6.90												
All Grids to 4' "Area C" (ppm)	2.33												
WEIGHTED AVERAGES													
% of Measured Sediment		0.00%	0.00%	0.00%	5.20%	2.14%	2.60%	3.90%	1.30%	0.00%	2.60%	1.44%	2.60%
Contribution to Sediment Concentration (ppm)	19.65	-	-	-	0.00	0.42	0.13	0.35	0.34	-	1.26	0.13	2.47
% of Sediment Surface		2.10%	2.22%	2.28%	2.31%	2.59%	2.61%	2.52%	2.54%	2.47%	2.48%	2.55%	2.81%
Contribution to SWAC (ppm)	3.925	0.000	0.000	0.000	0.003	0.008	0.239	0.655	0.661	0.000	0.245	0.046	0.730

Appendix B
ROD Remedy
Inner Harbor (Between Bridges) - River Left

GRID LOCATIONS	163	161	159	157	155	153	151	149	147	145	143	141
Area (square feet)	9,692	9,085	9,065	9,754	9,323	9,905	9,548	9,343	8,813	8,377	8,742	8,809
Water Depth at Profile Line (feet)	7.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	5.0	5.0	5.0	5.0
PCB Concentration in ppm (By Depth)												
0-1'	4.03	0.02	0.02	0.02	0.02	0.02	5.11	0.02	0.02	8.00	2.98	0.01
1-2'	**76.10**	**91.98**	31.33	**67.35**	**187.70**	**67.30**	**89.53**	24.56	0.02	15.20	2.22	0.02
2-3'		-	24.40	-	49.45	-	**68.95**	0.53	-	22.20	8.34	-
3-4'		-	-	-	-	-	-	-	-	-	0.02	-
4-5'		-	-	-	-	-	-	-	-	-		-
5-6'		-	-	-	-	-	-	-	-	-		-
6-7'		-	-	-	-	-	-	-	-	-	-	-
Grid Total or Average (ppm)	40.07	41.82	14.81	22.46	**79.81**	33.66	**54.53**	9.94	0.11	15.13	3.72	0.02
2' Surface Average (ppm)	40.07	41.82	13.44	22.46	**85.33**	33.66	47.32	12.29	0.11	11.60	2.63	0.02
Shore to 4' "Area B" (ppm)					0.02			0.01	0.02		0.02	0.02
All Grids to 4' "Area C" (ppm)												
WEIGHTED AVERAGES												
% of Measured Sediment	2.60%	1.34%	0.97%	0.78%	1.62%	0.53%	1.53%	3.75%	0.00%	2.02%	3.39%	1.41%
Contribution to Sediment Concentration (ppm)	1.04	0.56	0.14	0.18	1.29	0.18	0.84	0.37	-	0.30	0.13	0.00
% of Sediment Surface	2.99%	2.80%	2.80%	3.01%	2.87%	3.05%	2.94%	2.88%	2.72%	2.58%	2.70%	2.72%
Contribution to SWAC (ppm)	0.120	0.000	0.000	0.001	0.001	0.001	0.150	0.000	0.001	0.207	0.080	0.000

Appendix B
ROD Remedy
Inner Harbor (Between Bridges) - River Left

GRID LOCATIONS	139	137	135	133	131	129	127	125	123	121	119	117
Area (square feet)	8,738	8,005	8,271	7,686	7,717	8,045	8,148	8,075	8,125	8,077	7,663	6,873
Water Depth at Profile Line (feet)	5.0	5.0	4.0	3.5	3.0	3.0	2.5	2.5	2.5	3.0	3.5	3.5
PCB Concentration in ppm (By Depth)												
0-1'	0.02	4.28	0.02	9.66	6.00	5.81	0.70	0.02	0.68	1.33	0.55	1.54
1-2'	0.02	21.57	0.02	**91.65**	26.32	10.20	1.86	35.80	0.83	2.60	0.46	2.31
2-3'	0.01	19.68	0.02	**83.86**	17.79	21.50	7.68	**67.70**	0.02	2.55	0.81	3.97
3-4'	0.01	0.02	0.02	**148.53**	29.31		-	**80.40**	0.02	-	0.69	0.02
4-5'	-		0.02	0.02	44.11		-	0.56	-	-		-
5-6'	-		-	-	-		-		-	-		-
6-7'	-	-	-	-	-		-		-	-		-
Grid Total or Average (ppm)	0.02	11.90	0.02	**74.16**	24.70	12.50	2.56	36.90	0.51	2.16	0.63	2.24
2' Surface Average (ppm)	0.02	12.92	0.02	**50.65**	16.16	8.01	1.28	17.91	0.68	1.96	0.51	1.92
Shore to 4' "Area B" (ppm)	0.02	0.02	0.02	**83.15**	6.20		0.02		0.02	0.17		
All Grids to 4' "Area C" (ppm)												2.24
WEIGHTED AVERAGES												
% of Measured Sediment	2.80%	3.64%	4.64%	5.55%	6.19%	3.90%	3.27%	6.50%	3.91%	3.89%	5.20%	3.86%
Contribution to Sediment Concentration (ppm)	0.00	0.43	0.00	4.11	1.53	0.49	0.08	2.40	0.02	0.08	0.03	0.09
% of Sediment Surface	2.69%	2.47%	2.55%	2.37%	2.38%	2.48%	2.51%	2.49%	2.51%	2.49%	2.36%	2.12%
Contribution to SWAC (ppm)	0.000	0.106	0.001	0.229	0.143	0.144	0.018	0.000	0.017	0.033	0.013	0.033

Appendix B
ROD Remedy
Inner Harbor (Between Bridges) - River Left

GRID LOCATIONS	115	113	111
Area (square feet)	7,231	7,954	7,644
Water Depth at Profile Line (feet)	3.5	3.5	4.0
PCB Concentration in ppm (By Depth)			
0-1'	0.02	0.02	1.56
1-2'		0.02	19.50
2-3'		0.02	0.16
3-4'		-	0.12
4-5'		-	-
5-6'		-	-
6-7'		-	-
Grid Total or Average (ppm)	0.02	0.02	7.07
2' Surface Average (ppm)	0.02	0.02	10.53
Shore to 4' "Area B" (ppm)			
All Grids to 4' "Area C" (ppm)	0.02	0.02	7.07
WEIGHTED AVERAGES			
% of Measured Sediment	1.30%	0.00%	3.68%
Contribution to Sediment Concentration (ppm)	0.00	-	0.26
% of Sediment Surface	2.23%	2.45%	2.36%
Contribution to SWAC (ppm)	0.000	0.000	0.037

Appendix B
ROD Remedy
Inner Harbor (Between Bridges) - River Right

GRID LOCATIONS		196	194	192	190	188	186	184	182	180	178	176	174	172	170	168	166	164	162
Area (square feet)	340,052	7,539	7,774	7,862	7,768	7,575	7,026	7,146	7,579	7,379	7,618	8,285	8,053	7,448	7,304	8,194	8,343	7,473	7,765
Water Depth at Profile Line (feet)		3.5	3.5	4.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	5.0	5.0	5.0	5.0	5.5	5.5	6.0	6.5
PCB Concentration in ppm (By Depth)																			
0-1'	1.68	11.10	2.99	0.88	0.46	5.86	0.02	2.73	2.43	2.78	1.58	2.19	1.52	1.77	1.65	0.56	0.51	1.74	0.55
1-2'	6.61		2.62	0.02	0.53		0.57	**56.55**	5.51	3.96	5.16	0.94	0.86	3.49	2.39	0.50	7.02	6.00	
2-3'	15.82			0.02	0.02		0.02	8.77	**92.80**	7.35	44.50	13.50	0.66	**54.50**	27.40	13.70	15.80		
3-4'	18.86							-	-										
4-5'	**85.13**		-					-	-										
5-6'	-		-					-	-										
6-7'	-		-					-	-										
Grid Total or Average (ppm)	6.54	11.10	2.25	0.30	0.33	5.86	0.20	22.68	33.58	4.70	17.08	5.54	1.01	19.92	10.48	4.92	7.78	3.87	0.55
2' Surface Average (ppm)	3.97	11.10	2.25	0.45	0.49	5.86	0.30	29.64	3.97	3.37	3.37	1.57	1.19	2.63	2.02	0.53	3.77	3.87	0.55
Shore to 4' "Area B" (ppm)																			
All Grids to 4' "Area C" (ppm)	0.02																		
WEIGHTED AVERAGES																			
% of Measured Sediment		1.01%	0.70%	3.26%	3.26%	1.09%	3.26%	2.88%	3.05%	2.97%	3.07%	3.34%	3.24%	3.00%	2.94%	3.30%	3.36%	2.01%	1.04%
Contribution to Sediment Concentration (ppm)	8.06	0.11	0.02	0.01	0.01	0.06	0.01	0.65	1.03	0.14	0.52	0.19	0.03	0.60	0.31	0.16	0.26	0.08	0.01
% of Sediment Surface		2.22%	2.29%	2.31%	2.28%	2.23%	2.07%	2.10%	2.23%	2.17%	2.24%	2.44%	2.37%	2.19%	2.15%	2.41%	2.45%	2.20%	2.28%
Contribution to SWAC (ppm)	1.664	0.246	0.068	0.020	0.010	0.131	0.000	0.057	0.054	0.060	0.035	0.053	0.036	0.039	0.035	0.013	0.013	0.038	0.013

Appendix B
ROD Remedy
Inner Harbor (Between Bridges) - River Right

GRID LOCATIONS	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126
Area (square feet)	7,761	7,462	7,015	6,813	7,322	7,662	7,471	6,764	7,022	7,024	7,319	8,246	8,277	8,141	8,108	8,016	8,263	8,308
Water Depth at Profile Line (feet)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.0
PCB Concentration in ppm (By Depth)																		
0-1'	2.08	1.51	1.40	1.47	3.42	1.52	0.19	0.74	1.49	0.31	1.56	1.83	1.24	1.78	1.03	1.54	1.92	1.26
1-2'	1.48	9.39	3.08	13.40	5.14		0.52	5.13		0.33	3.18	**51.50**	1.73	2.43	1.62	2.16	2.35	2.12
2-3'	0.62									2.23	10.90		2.01			2.78		
3-4'													38.10					
4-5'																		
5-6'																		
6-7'																		
Grid Total or Average (ppm)	1.39	5.45	2.24	7.44	4.28	1.52	0.36	2.94	1.49	0.96	5.21	26.67	10.77	2.11	1.33	2.16	2.14	1.69
2' Surface Average (ppm)	1.78	5.45	2.24	7.44	4.28	1.52	0.36	2.94	1.49	0.32	2.37	26.67	1.49	2.11	1.33	1.85	2.14	1.69
Shore to 4' "Area B" (ppm)																		
All Grids to 4' "Area C" (ppm)																		
WEIGHTED AVERAGES																		
% of Measured Sediment	3.13%	2.00%	1.88%	1.83%	1.97%	1.03%	2.01%	1.82%	0.94%	2.83%	2.95%	2.21%	4.45%	2.19%	2.18%	3.23%	2.22%	2.23%
Contribution to Sediment Concentration (ppm)	0.04	0.11	0.04	0.14	0.08	0.02	0.01	0.05	0.01	0.03	0.15	0.59	0.48	0.05	0.03	0.07	0.05	0.04
% of Sediment Surface	2.28%	2.19%	2.06%	2.00%	2.15%	2.25%	2.20%	1.99%	2.06%	2.07%	2.15%	2.42%	2.43%	2.39%	2.38%	2.36%	2.43%	2.44%
Contribution to SWAC (ppm)	0.047	0.033	0.029	0.029	0.074	0.034	0.004	0.015	0.031	0.006	0.034	0.044	0.030	0.043	0.025	0.036	0.047	0.031

Appendix B
ROD Remedy
Inner Harbor (Between Bridges) - River Right

GRID LOCATIONS	124	122	120	118	116	114	112	110
Area (square feet)	7,667	7,627	8,015	8,392	8,197	8,096	8,144	8,789
Water Depth at Profile Line (feet)	7.0	7.0	7.5	8.0	8.0	8.0	8.0	8.0
PCB Concentration in ppm (By Depth)								
0-1'	4.42	0.75	0.88	0.39	0.02	0.02	0.02	0.02
1-2'	10.20	1.25	1.82	42.86	0.02	0.02	0.02	0.02
2-3'	**59.10**		1.67	21.33		0.02	0.02	0.02
3-4'				37.30			0.02	0.02
4-5'				**85.13**				
5-6'								
6-7'								
Grid Total or Average (ppm)	24.57	1.00	1.46	28.2442	0.02	0.0187	0.01751	0.02
2' Surface Average (ppm)	7.31	1.00	1.35	20.7056	0.02	0.0181	0.01653	0.02
Shore to 4' "Area B" (ppm)								
All Grids to 4' "Area C" (ppm)					0.02	0.02	0.02	0.02
WEIGHTED AVERAGES								
% of Measured Sediment	3.09%	2.05%	3.23%	3.76%	0.00%	0.00%	0.00%	0.00%
Contribution to Sediment Concentration (ppm)	0.76	0.02	0.05	1.06	-	-	-	-
% of Sediment Surface	2.25%	2.24%	2.36%	2.47%	2.41%	2.38%	2.39%	2.58%
Contribution to SWAC (ppm)	0.100	0.017	0.021	0.010	0.000	0.000	0.000	0.001

Appendix B
ROD Remedy
Lower River Deposits

Deposits	Totals or Averages	1	2	3	4	5	7	8	9
Area (square feet)	47,543	2,703	8,632	7,212	7,837	2,031	12,053	4,617	2,459
Average Thickness (feet)	1.58	1.00	1.92	2.72	1.17	1.33	1.00	1.00	2.50
PCB Concentration in ppm (By Depth)									
0-1'	2.57	3.02	0.46	12.47	3.55	0.37	0.48	0.22	0.02
1-2'	1.70	0.01		6.77	0.02				0.02
2-3'	0.02	0.02		0.04	0.01				0.01
3-4'	0.20			0.02	0.37				
Deposit Total or Average (ppm)	1.12	1.02	0.46	4.82	0.99	0.37	0.48	0.22	0.02
Volume (cubic yards)	2688.67	100.10	613.85	690.04	339.61	100.03	446.39	171.00	227.66
Mass (pounds of PCBs)	16.33	0.85	0.79	10.11	3.74	0.10	0.60	0.10	0.03
WEIGHTED AVERAGES									
% of Measured Sediment		3.72%	22.83%	25.66%	12.63%	3.72%	16.60%	6.36%	8.47%
Contribution to Sediment Concentration (ppm)	1.61	0.0379	0.1050	1.2381	0.1247	0.0138	0.0797	0.0140	0.0014
% of Sediment Surface		5.68%	18.16%	15.17%	16.48%	4.27%	25.35%	9.71%	5.17%
Contribution to SWAC (ppm)	2.89	0.172	0.084	1.892	0.585	0.016	0.122	0.021	0.001

Appendix B
ROD Remedy
Lower River - River Left Grid

GRID LOCATIONS		317	315	313	311	309	307	305	303	301	299	297	295	293	291	289
Area (square feet)	424,754	7,497	6,959	7,193	6,554	6,748	8,099	8,068	7,832	5,400	8,109	7,321	6,668	No Rec	7,726	5,068
Water Depth at Profile Line (feet)		2.5	3.0	3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
PCB Concentration in ppm (By Depth)																
0-1'	4.46	0.23	23.22	2.06	0.56	0.39	0.49	0.06	0.46	14.31	0.08	16.97	0.24		0.02	0.01
1-2'	3.24	0.02	0.64	4.10	2.02	0.10	0.02		0.02	1.72	0.43	0.10			0.02	0.01
2-3'	6.46		42.77		-	0.06			0.02	0.01		0.17				
3-4'	3.86		0.02		-	-			-	0.08		0.18				
4-5'			-		-	-			-	-		-				
5-6'			-		-	-			-	-		-				
6-7'			-		-	-			-	-		-				
Grid Total or Average (ppm)	3.62	0.12	19.56	3.08	1.19	0.26	0.25	0.06	0.25	6.67	0.25	10.42	0.24		0.02	0.01
2' Surface Average (ppm)	3.85	0.12	15.25	3.08	1.19	0.29	0.25	0.06	0.33	8.44	0.25	12.47	0.24		0.02	0.01
WEIGHTED AVERAGES																
% of Measured Sediment		1.89%	1.61%	1.82%	0.97%	1.14%	2.05%	1.02%	1.40%	1.08%	2.05%	1.39%	0.84%		1.95%	1.28%
Contribution to Sediment Concentration (ppm)	3.91	0.00	0.32	0.06	0.01	0.00	0.01	0.00	0.00	0.07	0.01	0.14	0.00		0.00	0.00
% of Sediment Surface		1.77%	1.64%	1.69%	1.54%	1.59%	1.91%	1.90%	1.84%	1.27%	1.91%	1.72%	1.57%		1.82%	1.19%
Contribution to SWAC (ppm)	4.230	0.004	0.380	0.035	0.009	0.006	0.009	0.001	0.009	0.182	0.001	0.292	0.004		0.000	0.000

Appendix B
ROD Remedy
Lower River - River Left Grid

GRID LOCATIONS	287	285	283	281	279	277	275	273	271	269	267	265	263	261	259	257	255
Area (square feet)	7,664	7,992	8,092	8,132	8,026	8,211	2,250	No Rec	8,113	8,120	No Rec	No Rec	No Rec	No Rec	No Rec	No Rec	8,087
Water Depth at Profile Line (feet)	3.0	3.0	4.0	5.0	5.0	6.0	6.0	7.0	7.0	5.0	5.0	5.0	5.0	5.0	5.5	5.5	7.0
PCB Concentration in ppm (By Depth)																	
0-1'	0.25	7.53	3.96	0.32	0.41	7.63	17.52		0.24	0.02							0.17
1-2'	0.21	9.65	0.34				0.89										
2-3'		0.03	-				15.50										
3-4'		-	-				-										
4-5'		-	-				-										
5-6'		-	-				-										
6-7'		-	-				-										
Grid Total or Average (ppm)	0.23	7.41	3.63	0.32	0.41	7.63	12.86		0.24	0.02							0.17
2' Surface Average (ppm)	0.23	8.28	3.63	0.32	0.41	7.63	11.98		0.24	0.02							0.17
WEIGHTED AVERAGES																	
% of Measured Sediment	1.94%	1.60%	0.94%	1.03%	1.01%	1.04%	0.19%		1.02%	1.03%							1.02%
Contribution to Sediment Concentration (ppm)	0.00	0.12	0.03	0.00	0.00	0.08	0.02		0.00	0.00							0.00
% of Sediment Surface	1.80%	1.88%	1.91%	1.91%	1.89%	1.93%	0.53%		1.91%	1.91%							1.90%
Contribution to SWAC (ppm)	0.005	0.142	0.075	0.006	0.008	0.147	0.093		0.005	0.000							0.003

Appendix B
ROD Remedy
Lower River - River Left Grid

GRID LOCATIONS	253	251	249	247	245	243	241	239	237	235	233	231	229	227	225	223	221	219
Area (square feet)	8,094	8,099	8,100	No Rec	8,100	8,098	8,095	8,097	8,098	6,749	8,098	8,108	8,099	8,101	8,099	8,099	8,099	8,100
Water Depth at Profile Line (feet)	7.0	7.0	7.0	7.0	6.5	6.5	6.0	5.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
PCB Concentration in ppm (By Depth)																		
0-1'	0.57	0.22	0.57		0.26	0.19	0.11	0.62	0.35	8.70	17.30	1.95	4.74	0.55	5.88	6.62	0.55	11.16
1-2'										0.46		8.75	2.16	0.02	10.39	0.77	0.64	16.93
2-3'										0.02			0.20		0.13	0.02		0.40
3-4'										0.03			0.05		0.02	0.02		0.03
4-5'										-					-			-
5-6'										-					-			-
6-7'										-					-			-
Grid Total or Average (ppm)	0.57	0.22	0.57		0.26	0.19	0.11	0.62	0.35	4.25	17.30	5.35	1.79	0.28	5.48	1.86	0.60	10.67
2' Surface Average (ppm)	0.57	0.22	0.57		0.26	0.19	0.11	0.62	0.35	5.76	17.30	5.35	3.45	0.28	7.93	3.70	0.60	13.63
WEIGHTED AVERAGES																		
% of Measured Sediment	1.02%	1.02%	1.02%		1.02%	1.02%	1.02%	1.02%	1.02%	1.35%	1.02%	2.05%	4.09%	2.05%	2.73%	4.09%	2.05%	2.30%
Contribution to Sediment Concentration (ppm)	0.01	0.00	0.01		0.00	0.00	0.00	0.01	0.00	0.06	0.18	0.11	0.07	0.01	0.15	0.08	0.01	0.25
% of Sediment Surface	1.91%	1.91%	1.91%		1.91%	1.91%	1.91%	1.91%	1.91%	1.59%	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%
Contribution to SWAC (ppm)	0.011	0.004	0.011		0.005	0.004	0.002	0.012	0.007	0.138	0.330	0.037	0.090	0.010	0.112	0.126	0.011	0.213

Appendix B
ROD Remedy
Lower River - River Left Grid

GRID LOCATIONS	217	215	213	211	209	207	205	203	201	199	197	195	193	191	189
Area (square feet)	8,098	8,098	8,098	8,100	8,101	8,099	8,099	7,841	7,329	6,780	6,510	6,881	7,225	7,203	8,030
Water Depth at Profile Line (feet)	3.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	4.0	4.5	5.0
PCB Concentration in ppm (By Depth)															
0-1'	13.70	6.16	0.27	0.93	0.35	0.41	19.79	25.04	0.85	2.34	1.02	0.05	17.01	1.17	3.00
1-2'	0.08	25.56	0.82	7.38	1.71	0.02	5.38	0.78	0.01	4.49	6.09	0.02	0.76	4.37	8.39
2-3'	0.02	2.34	0.02	**55.90**			1.08	18.41	0.02	0.31			1.15		3.64
3-4'	0.02	0.34		**52.40**			1.93	0.32	0.01	0.02			1.78		8.33
4-5'		-		-			-	-		-			-		-
5-6'		-		-			-	-		-			-		-
6-7'		-		-			-	-		-			-		-
Grid Total or Average (ppm)	3.45	11.38	0.37	17.61	1.03	0.21	8.43	13.30	0.22	2.34	3.56	0.03	6.91	2.77	5.50
2' Surface Average (ppm)	6.89	15.86	0.55	3.69	1.03	0.21	12.58	13.44	0.43	3.13	3.56	0.03	10.51	2.77	5.31
WEIGHTED AVERAGES															
% of Measured Sediment	4.09%	2.98%	3.07%	2.47%	2.05%	2.05%	3.24%	2.72%	3.70%	1.86%	1.64%	1.74%	2.51%	1.82%	2.87%
Contribution to Sediment Concentration (ppm)	0.14	0.34	0.01	0.44	0.02	0.00	0.27	0.36	0.01	0.04	0.06	0.00	0.17	0.05	0.16
% of Sediment Surface	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%	1.85%	1.73%	1.60%	1.53%	1.62%	1.70%	1.70%	1.89%
Contribution to SWAC (ppm)	0.261	0.117	0.005	0.018	0.007	0.008	0.377	0.462	0.015	0.037	0.016	0.001	0.289	0.020	0.057

Appendix B
ROD Remedy
Lower River - River Right Grid

GRID LOCATIONS		316	314	312	310	308	306	304	302	300	298	296	294	292
Area (square feet)	385,656	No Rec	No Rec	No Rec	No Rec	7,749	7,656	No Rec	8,100	No Rec	8,098	8,093	8,109	8,099
Water Depth at Profile Line (feet)		3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	2.5	2.5	2.5	2.5
PCB Concentration in ppm (By Depth)														
0-1'	4.18					0.21	0.02		0.13		0.02	0.17	0.02	0.02
1-2'	2.97						0.02				0.02	0.27	0.04	0.02
2-3'	18.43										0.10			0.02
3-4'	35.72													
4-5'														
5-6'														
6-7'														
Grid Total or Average (ppm)	5.04					0.21	0.02		0.13		0.05	0.22	0.03	0.02
2' Surface Average (ppm)	3.61					0.21	0.02		0.13		0.02	0.22	0.03	0.02
WEIGHTED AVERAGES														
% of Measured Sediment						1.06%	2.09%		1.10%		3.31%	2.21%	2.21%	3.31%
Contribution to Sediment Concentration (ppm)	5.54					0.00	0.00		0.00		0.00	0.00	0.00	0.00
% of Sediment Surface						2.01%	1.99%		2.10%		2.10%	2.10%	2.10%	2.10%
Contribution to SWAC (ppm)	4.260					0.004	0.000		0.003		0.000	0.004	0.000	0.000

Appendix B
ROD Remedy
Lower River - River Right Grid

GRID LOCATIONS	290	288	286	284	282	280	278	276	274	272	270	268	266	264
Area (square feet)	8,111	No Rec	No Rec	5,866	8,141	8,138	8,168	8,108	8,099	8,080	6,631	No Rec	7,263	8,105
Water Depth at Profile Line (feet)	2.5	3.0	3.0	3.0	3.0	4.0	4.0	5.0	5.0	5.0	6.0	6.0	6.0	6.0
PCB Concentration in ppm (By Depth)														
0-1'	0.32			0.13	2.61	5.34	25.10	0.21	0.27	1.00	0.24		1.43	0.33
1-2'										0.25				
2-3'														
3-4'														
4-5'														
5-6'														
6-7'														
Grid Total or Average (ppm)	0.32			0.13	2.61	5.34	25.10	0.21	0.27	0.62	0.24		1.43	0.33
2' Surface Average (ppm)	0.32			0.13	2.61	5.34	25.10	0.21	0.27	0.62	0.24		1.43	0.33
WEIGHTED AVERAGES														
% of Measured Sediment	1.11%			0.80%	1.11%	1.11%	1.11%	1.11%	1.10%	2.20%	0.90%		0.99%	1.11%
Contribution to Sediment Concentration (ppm)	0.00			0.00	0.03	0.06	0.28	0.00	0.00	0.01	0.00		0.01	0.00
% of Sediment Surface	2.10%			1.52%	2.11%	2.11%	2.12%	2.10%	2.10%	2.10%	1.72%		1.88%	2.10%
Contribution to SWAC (ppm)	0.007			0.002	0.055	0.113	0.532	0.004	0.006	0.021	0.004		0.027	0.007

Appendix B
ROD Remedy
Lower River - River Right Grid

GRID LOCATIONS	262	260	258	256	254	252	250	248	246	244	242	240	238	236
Area (square feet)	6,194	6,297	6,599	7,070	7,687	7,915	7,811	7,009	6,653	7,007	7,228	7,414	7,446	7,422
Water Depth at Profile Line (feet)	6.0	5.5	5.5	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.0
PCB Concentration in ppm (By Depth)														
0-1'	0.49	0.28	0.26	0.08	24.70	15.20	17.37	0.02	0.16	1.51	0.78	0.01	4.10	12.17
1-2'		0.51	0.13	0.02	4.21	7.80	10.43	0.02	0.02	0.01		0.02	12.00	0.25
2-3'		1.53	0.74	0.01	0.01	0.02	0.02	0.02		0.01		0.02		0.02
3-4'					0.02	0.02	0.02							0.02
4-5'						-	-							-
5-6'														
6-7'														
Grid Total or Average (ppm)	0.49	0.77	0.38	0.04	7.24	6.74	10.10	0.02	0.09	0.51	0.78	0.02	8.05	6.15
2' Surface Average (ppm)	0.49	0.39	0.19	0.05	14.46	11.50	14.22	0.02	0.09	0.76	0.78	0.02	8.05	8.20
WEIGHTED AVERAGES														
% of Measured Sediment	0.84%	2.58%	2.70%	2.89%	4.19%	3.69%	2.75%	2.87%	1.82%	2.87%	0.99%	3.03%	2.03%	2.02%
Contribution to Sediment Concentration (ppm)	0.00	0.02	0.01	0.00	0.30	0.25	0.28	0.00	0.00	0.01	0.01	0.00	0.16	0.12
% of Sediment Surface	1.61%	1.63%	1.71%	1.83%	1.99%	2.05%	2.03%	1.82%	1.73%	1.82%	1.87%	1.92%	1.93%	1.92%
Contribution to SWAC (ppm)	0.008	0.005	0.004	0.001	0.492	0.312	0.352	0.000	0.003	0.027	0.015	0.000	0.079	0.234

Appendix B
ROD Remedy
Lower River - River Right Grid

GRID LOCATIONS	234	232	230	228	226	224	222	220	218	216	214	212	210	208
Area (square feet)	7,424	7,465	7,464	7,304	7,142	6,989	6,890	6,966	7,450	7,702	7,748	8,099	8,103	8,099
Water Depth at Profile Line (feet)	4.0	3.5	3.5	3.5	3.5	3.5	3.5	4.0	4.0	4.0	4.0	4.5	4.5	4.5
PCB Concentration in ppm (By Depth)														
0-1'	19.70	8.02	5.55	3.55	7.34	3.99	10.99	0.39	1.82	1.48	0.02	9.85	4.16	7.74
1-2'	0.01	1.05	4.39	2.89	6.04	0.19	18.49		7.15	4.00				8.01
2-3'	0.02	0.02	0.02	6.99	**66.55**	0.02	**80.08**		**111.36**	**150.06**				0.02
3-4'		0.02	-	18.00	**266.00**	0.02	**72.70**		0.29	35.80				-
4-5'		-	-		-	-	-		-	-				-
5-6'														
6-7'														
Grid Total or Average (ppm)	6.58	3.82	4.04	7.86	37.14	1.79	28.21	0.39	27.09	23.75	0.02	9.85	4.16	7.13
2' Surface Average (ppm)	9.86	4.53	5.13	3.22	6.86	2.56	14.40	0.39	4.10	2.54	0.02	9.85	4.16	7.84
WEIGHTED AVERAGES														
% of Measured Sediment	3.04%	1.61%	1.19%	3.99%	2.03%	1.83%	2.19%	0.95%	2.71%	2.10%	1.06%	1.10%	1.11%	2.03%
Contribution to Sediment Concentration (ppm)	0.20	0.06	0.05	0.31	0.75	0.03	0.62	0.00	0.73	0.50	0.00	0.11	0.05	0.14
% of Sediment Surface	1.93%	1.94%	1.94%	1.89%	1.85%	1.81%	1.79%	1.81%	1.93%	2.00%	2.01%	2.10%	2.10%	2.10%
Contribution to SWAC (ppm)	0.379	0.155	0.107	0.067	0.136	0.072	0.196	0.007	0.035	0.030	0.000	0.207	0.087	0.162

Appendix B
ROD Remedy
Lower River - River Right Grid

GRID LOCATIONS	206	204	202	200	198
Area (square feet)	8,099	8,099	8,101	8,100	8,046
Water Depth at Profile Line (feet)	4.5	4.5	4.5	4.5	4.5
PCB Concentration in ppm (By Depth)					
0-1'	2.96	2.74	3.45	3.70	1.21
1-2'		0.03	0.02	0.57	6.07
2-3'		0.01			24.72
3-4'		-			-
4-5'		-			-
5-6'					
6-7'					
Grid Total or Average (ppm)	2.96	1.46	1.73	2.13	8.48
2' Surface Average (ppm)	2.96	1.77	1.73	2.13	3.53
WEIGHTED AVERAGES					
% of Measured Sediment	1.10%	1.57%	2.21%	2.21%	2.74%
Contribution to Sediment Concentration (ppm)	0.03	0.02	0.04	0.05	0.23
% of Sediment Surface	2.10%	2.10%	2.10%	2.10%	2.09%
Contribution to SWAC (ppm)	0.062	0.057	0.072	0.078	0.025

Appendix B
ROD Remedy
Middle River Deposits

Deposits	Totals or Averages	10, 11, 12, 13	14, 15, 16	17, 18	19, 20, 21	22, 23	24	25	26	27	28	29, 30	31	32, 33	34	35, 36	37	38, 39
Area (square feet)	132,967	6,002	3,140	1,945	3,550	5,173	4,468	7,850	7,027	4,193	9,837	7,412	2,574	2,485	3,221	1,914	1,037	4,517
Average Thickness (feet)	1.25	1.25	1.21	1.36	1.08	1.38	1.50	2.15	1.54	1.03	1.03	1.17	1.00	1.30	1.17	1.06	1.17	1.32
PCB Concentration in ppm	1.69	0.54	10.10	0.61	1.06	1.32	1.68	0.88	14.20	0.21	0.64	0.53	0.76	3.95	0.58	2.29	3.66	0.94
Volume (cubic yards)	6325	242.59	121.68	92.61	137.85	259.14	248.24	625.00	400.81	159.96	375.27	319.97	95.33	124.14	139.56	84.97	44.96	220.37
Mass (pounds of PCBs)	32.32	0.37	3.43	0.16	0.41	0.95	1.16	1.54	15.88	0.09	0.67	0.47	0.20	1.37	0.22	0.54	0.46	0.58
WEIGHTED AVERAGES																		
% of Sediment Surface		4.51%	2.36%	1.46%	2.67%	3.89%	3.36%	5.90%	5.28%	3.15%	7.40%	5.57%	1.94%	1.87%	2.42%	1.44%	0.78%	3.40%
Contribution to SWAC	1.71	0.02	0.24	0.01	0.03	0.05	0.06	0.05	0.75	0.01	0.05	0.03	0.01	0.07	0.01	0.03	0.03	0.03

Appendix B
ROD Remedy
Middle River Deposits

Deposits	40	41, 42	43	44, 45	46	47, 48, 49	50, 51,52, 53	54, 55, 56	57	58, 59	60, 61	62, 63	64
Area (square feet)	10,384	5,849	2,436	2,660	2,769	4,056	6,887	7,014	5,815	2,401	3,432	1,573	1,344
Average Thickness (feet)	1.47	1.11	1.35	1.04	1.19	1.21	1.07	1.13	1.20	1.25	1.69	0.96	1.14
PCB Concentration in ppm	0.40	0.54	0.37	0.18	1.01	0.10	0.36	1.04	0.46	0.93	0.52	0.32	0.50
Volume (cubic yards)	565.34	270.21	121.80	102.88	122.06	170.80	275.54	301.63	258.46	108.67	222.57	55.84	56.75
Mass (pounds of PCBs)	0.62	0.40	0.12	0.05	0.34	0.05	0.28	0.88	0.33	0.28	0.33	0.05	0.08
WEIGHTED AVERAGES													
% of Sediment Surface	7.81%	4.40%	1.83%	2.00%	2.08%	3.05%	5.18%	5.27%	4.37%	1.81%	2.58%	1.18%	1.01%
Contribution to SWAC	0.03	0.02	0.01	0.00	0.02	0.00	0.02	0.05	0.02	0.02	0.01	0.00	0.01

Appendix C
Design Remedy

Design Remedy		Middle River Deposits	Lower River Deposits	Lower River River Left	Lower River River Right	Inner Harbor Penn to 8th River Left	Inner Harbor Penn to 8th River Right	Inner Harbor 8th to Mouth River Left	Inner Harbor 8th to Mouth River Right
Area (square feet)	2,325,414	132,967	47,543	424,754	385,656	324,279	340,052	420,907	429,766
% of Sediment Surface	100.00%	5.72%	2.04%	18.27%	16.58%	13.94%	14.62%	18.10%	18.48%
PCB Concentration after Remediation 0-1 SWAC Measured in the Localized Area (ppm)		1.71	1.03	0.60	1.03	0.55	0.57	1.08	1.25
Surface Weighted Average of All Areas (ppm)	**0.99**								
Surface Weighted Average of Middle River	**1.71**								
Surface Weighted Average of Lower River	**0.82**								
Surface Weighted Average of Inner Harbor	**0.90**								

Appendix C
Design Remedy

River Reach or Area	Post Remediation SWAC	Approximate Years to RAO Goal (k=.065)
Middle River	**1.71**	**18.89**
Lower River	0.82	7.60
Inner Harbor	0.90	9.03
Average Surface All Reaches	**0.99**	**10.49**

Post Removal Surface Concentration t(0)	Time (years) to .5 ppm SWAC from Pre Design Information k(2) = .065
0.60	2.80
0.75	6.23
0.90	9.03
0.99	**10.49**
1.05	11.40
1.20	13.45
1.35	15.26
1.50	16.88
1.65	18.34
1.71	**18.89**
1.80	19.68
1.95	20.91
2.10	22.04
2.25	23.10
2.40	24.10
2.55	25.03
2.70	25.90
2.85	26.74
3.00	27.52
3.15	28.27
3.30	28.99
3.40	29.45
3.50	29.89
3.60	30.32
3.70	30.74
3.80	31.15
3.90	31.55
4.00	31.94
4.10	32.32
4.20	32.69
4.26	32.91
4.30	33.05

Appendix C
Design Remedy

Design Remedy		Middle River Deposits	Lower River Deposits	Lower River River Left	Lower River River Right	Inner Harbor Penn to 8th River Left	Inner Harbor Penn to 8th River Right	Inner Harbor 8th to Mouth River Left	Inner Harbor 8th to Mouth River Right
Area (square feet)	2,325,414	132,967	47,543	424,754	385,656	324,279	340,052	420,907	429,766
% of Sediment Surface	100.00%	5.72%	2.04%	18.27%	16.58%	13.94%	14.62%	18.10%	18.48%
Mass Removed (pounds)	2,409.25	-	9.31	262.42	434.57	1,439.35	272.92	-	-
Volume Removed (cubic yards)	39,755	-	178	6,155	6,375	19,356	7,691	-	-
Over dredging and angle of repose volume (cubic yards)	*10,793*	-	*48*	*1,671*	*1,731*	*5,255*	*2,088*	-	-
Design Volume (cubic yards)	**50,548**	**-**	**226**	**7,826**	**8,106**	**24,611**	**9,779**	**-**	**-**
% of Volume	100.00%	0.00%	0.45%	15.48%	16.04%	48.69%	19.35%	0.00%	0.00%

Design
Table Definitions

Grid Total or Average -	This value in the fist column of each sub-table representing a different portion of the Lower River or Inner Harbor is the mean (average) PCB concentration for the grids in that portion. The values for each grid is the average PCB concentration for the grid. In grids where more than one core was collected, the grid total or average is calculated using all Core Results.
2' Surface Average-	This value is the mean (average) PCB concentration of all Grid PCB sample data collected in the Top 2 feet of surface sediment during the Pre-Design Investigation. In grids where more than one core was collected, the 2' Surface Average is calculated using all Core Results.
Shore to 4' "Area B" -	This value is the mean (average) PCB concentration of all Grid PCB sample data collected in the four feet of sediment designated as Area B. In grids where more than one core was collected, the Shore to 4' "Area B" is calculated using all Core Results.
All Grids to 4' "Area C" -	This value is the mean (average) PCB concentration of all Grid PCB sample data collected in the four feet of sediment designated as Area C. In grids where more than one core was collected, the Shore to 4' "Area C" is calculated using all Core Results.
No Rec -	Abbreviation for No Recovery. No Sediment was recovered from the sampling event(s).
Single Core Grid	Continuous Soft Sediment Grid that had only one sample core pulled during the Pre-Design Investigation
Two Core Grid	Continuous Soft Sediment Grid that had two sample cores pulled during the Pre-Design Investigation
Six Core Grid	Continuous Soft Sediment Grid that had six sample cores pulled during the Pre-Design Investigation
6 - 26 ppm	Color represents grids with PCB concentrations within the range of 6 - 26 ppm
26 -50 ppm	Color represents grids with PCB concentrations within the range of 26- 50 ppm
> 50	Color represents grids with PCB concentrations > 50 ppm

Appendix C
Design Remedy
Inner Harbor (8th Street to Mouth) - River Left

GRID LOCATIONS		109	107	105	103	101	99	97	95	93	91	89	87	85
Area (square feet)	420,907	7,274	7,224	7,332	7,850	5,931	6,799	7,401	7,612	7,835	7,626	8,357	7,985	8,146
Water Depth at Profile Line (feet)		4.5	4.5	4.5	5.5	5.5	5.5	4.5	4.5	4.5	5.0	5.5	5.5	5.5
PCB Concentration in ppm (By Depth)														
0-1'	1.08	0.42	1.29	1.50	2.01	2.44	0.27	0.19	4.44	4.83	0.23	1.80	1.90	0.74
1-2'	1.03	0.47	1.28	1.00	1.23	1.98	0.44	1.20	0.91	1.27	3.35	0.80	1.43	0.85
2-3'	1.32	0.66	0.59	0.84	1.39	2.08	1.12	1.15	1.39	2.27	1.62	0.87	1.04	0.95
3-4'	1.56	1.09	1.73	1.62	1.15	1.70	1.24	1.38	1.45	1.24		1.12	1.31	1.14
4-5'	1.88	0.63	0.74	1.94	1.42	1.49	1.15	1.50	1.23			1.14	1.68	1.77
5-6'	2.75	2.29	0.62	2.50			1.63					2.11	1.43	1.94
6-7'	6.17													
Grid Total or Average (ppm)	1.43	0.92	1.04	1.57	1.44	1.94	0.98	1.08	1.88	2.40	1.73	1.31	1.47	1.23
2' Surface Average (ppm)	1.05	0.44	1.29	1.25	1.62	2.21	0.36	0.69	2.67	3.05	1.79	1.30	1.67	0.80
Volume (cubic yards)	78,994	1,616	1,605	1,629	1,454	1,098	1,511	1,371	1,410	1,161	847	1,857	1,774	1,810
Mass (pounds PCBs)	238.04	3.12	3.48	5.31	4.35	4.43	3.06	3.09	5.52	5.80	3.05	5.04	5.40	4.64
WEIGHTED AVERAGES														
% of Measured Sediment		2.05%	2.03%	2.06%	1.84%	1.39%	1.91%	1.74%	1.78%	1.47%	1.07%	2.35%	2.25%	2.29%
Contribution to Sediment Concentration (ppm	1.45	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.03	0.04	0.02	0.03	0.03	0.03
% of Sediment Surface		1.73%	1.72%	1.74%	1.87%	1.41%	1.62%	1.76%	1.81%	1.86%	1.81%	1.99%	1.90%	1.94%
Contribution to SWAC (ppm)	1.078	0.007	0.022	0.026	0.037	0.034	0.004	0.003	0.080	0.090	0.004	0.036	0.036	0.014

Appendix C
Design Remedy
Inner Harbor (8th Street to Mouth) - River Left

GRID LOCATIONS	83	81	79	77	75	73	71	69	67	65	63	61	59	57
Area (square feet)	8,066	7,897	7,848	7,756	8,911	7,764	6,895	8,359	8,033	7,064	7,841	7,972	7,931	7,981
Water Depth at Profile Line (feet)	5.0	5.5	6.5	7.5	8.5	9.5	10.0	12.0	10.5	10.5	10.5	10.5	10.5	10.5
PCB Concentration in ppm (By Depth)														
0-1'	0.67	1.90	2.01	2.01	1.45	1.29	0.45	1.13	0.62	0.70	0.15	0.20	0.21	1.26
1-2'	0.87	0.67	1.10	1.02	1.49	1.29	0.12	0.83	0.56	0.61	0.19	0.34	0.20	1.03
2-3'	1.21	0.74	1.50	1.17	1.31	1.48	0.16	1.06	1.29	3.20	0.51		0.19	0.69
3-4'	1.10	1.27	1.22	0.96	1.30	2.00	0.39	0.33	1.72	1.00	1.40		0.24	0.84
4-5'	1.19	1.64	2.00	1.00	1.39	2.37	3.32	0.61		1.81			0.21	0.59
5-6'	1.52		1.62			4.20				1.99				
6-7'														
Grid Total or Average (ppm)	1.09	1.24	1.58	1.23	1.39	2.11	0.89	0.79	1.05	1.55	0.56	0.27	0.21	0.88
2' Surface Average (ppm)	0.77	1.28	1.56	1.52	1.47	1.29	0.28	0.98	0.59	0.65	0.17	0.27	0.21	1.15
Volume (cubic yards)	1,792	1,462	1,744	1,436	1,650	1,725	1,277	1,548	1,190	1,570	1,162	591	1,469	1,478
Mass (pounds PCBs)	4.07	3.78	5.71	3.68	4.76	7.55	2.35	2.55	2.59	5.06	1.36	0.33	0.64	2.71
WEIGHTED AVERAGES														
% of Measured Sediment	2.27%	1.85%	2.21%	1.82%	2.09%	2.18%	1.62%	1.96%	1.51%	1.99%	1.47%	0.75%	1.86%	1.87%
Contribution to Sediment Concentration (ppm	0.02	0.02	0.03	0.02	0.03	0.05	0.01	0.02	0.02	0.03	0.01	0.00	0.00	0.02
% of Sediment Surface	1.92%	1.88%	1.86%	1.84%	2.12%	1.84%	1.64%	1.99%	1.91%	1.68%	1.86%	1.89%	1.88%	1.90%
Contribution to SWAC (ppm)	0.013	0.036	0.037	0.037	0.031	0.024	0.007	0.022	0.012	0.012	0.003	0.004	0.004	0.024

Appendix C
Design Remedy
Inner Harbor (8th Street to Mouth) - River Left

GRID LOCATIONS	55	53	51	49	47	45	43	41	39	37	35	33	31	29
Area (square feet)	8,049	7,422	7,448	8,023	7,642	7,627	7,600	7,393	7,217	6,941	7,028	7,279	7,514	7,529
Water Depth at Profile Line (feet)	11.0	10.5	10.0	10.5	11.5	11.5	11.5	12.0	12.0	12.0	12.5	12.5	12.5	12.5
PCB Concentration in ppm (By Depth)														
0-1'	0.57	1.33	1.00	0.78	1.92	0.53	0.69	0.37	1.05	1.15	1.38	0.56	1.24	0.83
1-2'	0.71	1.34	0.82	1.14	0.85	2.71	0.66	1.20	2.53	2.11	0.74	2.06	1.78	0.15
2-3'	0.06	1.41	5.07	3.03	0.90	1.58	0.48	0.93	5.12	3.56	1.97	3.20	1.55	0.44
3-4'		5.08	2.48	2.69	1.19	1.96	1.28	4.07	2.93	4.06	2.05	1.57	2.21	1.94
4-5'		2.28	5.21	4.25	1.55		1.54	3.78	6.54		4.48		3.21	2.71
5-6'				7.95	3.74			6.95						3.75
6-7'					6.17									
Grid Total or Average (ppm)	0.44	2.29	2.92	3.31	2.33	1.70	0.93	2.88	3.63	2.72	2.12	1.85	2.00	1.64
2' Surface Average (ppm)	0.64	1.34	0.91	0.96	1.38	1.62	0.68	0.79	1.79	1.63	1.06	1.31	1.51	0.49
Volume (cubic yards)	894	1,374	1,379	1,783	1,981	1,130	1,407	1,643	1,336	1,028	1,301	1,078	1,391	1,673
Mass (pounds PCBs)	0.83	6.54	8.36	12.26	9.60	3.98	2.72	9.85	10.10	5.81	5.75	4.14	5.78	5.69
WEIGHTED AVERAGES														
% of Measured Sediment	1.13%	1.74%	1.75%	2.26%	2.51%	1.43%	1.78%	2.08%	1.69%	1.30%	1.65%	1.37%	1.76%	2.12%
Contribution to Sediment Concentration (ppm	0.01	0.04	0.05	0.07	0.06	0.02	0.02	0.06	0.06	0.04	0.03	0.03	0.04	0.03
% of Sediment Surface	1.91%	1.76%	1.77%	1.91%	1.82%	1.81%	1.81%	1.76%	1.71%	1.65%	1.67%	1.73%	1.79%	1.79%
Contribution to SWAC (ppm)	0.011	0.023	0.018	0.015	0.035	0.010	0.012	0.007	0.018	0.019	0.023	0.010	0.022	0.015

Appendix C
Design Remedy
Inner Harbor (8th Street to Mouth) - River Left

GRID LOCATIONS	27	25	23	21	19	17	15	13	11	9	7	5	3	1
Area (square feet)	7,541	7,534	7,544	7,644	7,748	7,741	7,623	7,813	7,853	7,922	7,628	7,593	7,970	8,351
Water Depth at Profile Line (feet)	12.5	12.5	12.5	13.0	13.0	13.0	13.0	13.0	13.5	13.5	13.5	13.5	13.5	14.0
PCB Concentration in ppm (By Depth)														
0-1'	0.22	0.44	2.35	1.05	0.91	0.49	0.90	0.49	0.93	0.36	0.69	0.54	0.23	0.28
1-2'	0.31	0.43	0.34	2.11	0.76	0.49	1.08	0.92	0.40	1.42	0.85	1.53	0.27	0.40
2-3'	0.45	0.73	0.14	1.99	1.20	0.57	1.32	1.07	0.30	0.98	1.02	0.90	0.34	0.46
3-4'	0.38	1.14	0.24	3.33	1.47	2.15	1.27	1.59	0.49	1.63	1.07	1.54	0.40	0.74
4-5'	0.82	1.57	0.26	5.15			1.16	1.69	0.44	1.03	1.06	1.04	0.38	
5-6'			0.54					2.45		1.86		3.21		
6-7'														
Grid Total or Average (ppm)	0.44	0.86	0.64	2.73	1.08	0.93	1.15	1.37	0.51	1.21	0.94	1.46	0.32	0.47
2' Surface Average (ppm)	0.27	0.44	1.34	1.58	0.83	0.49	0.99	0.70	0.67	0.89	0.77	1.03	0.25	0.34
Volume (cubic yards)	1,396	1,395	1,676	1,416	1,148	1,147	1,412	1,736	1,454	1,760	1,413	1,687	1,476	1,237
Mass (pounds PCBs)	1.27	2.50	2.25	8.02	2.59	2.21	3.36	4.94	1.55	4.44	2.75	5.12	1.00	1.21
WEIGHTED AVERAGES														
% of Measured Sediment	1.77%	1.77%	2.12%	1.79%	1.45%	1.45%	1.79%	2.20%	1.84%	2.23%	1.79%	2.14%	1.87%	1.57%
Contribution to Sediment Concentration (ppn	0.01	0.02	0.01	0.05	0.02	0.01	0.02	0.03	0.01	0.03	0.02	0.03	0.01	0.01
% of Sediment Surface	1.79%	1.79%	1.79%	1.82%	1.84%	1.84%	1.81%	1.86%	1.87%	1.88%	1.81%	1.80%	1.89%	1.98%
Contribution to SWAC (ppm)	0.004	0.008	0.042	0.019	0.017	0.009	0.016	0.009	0.017	0.007	0.012	0.010	0.004	0.006

Appendix C
Design Remedy
Inner Harbor (8th Street to Mouth) - River Right

GRID LOCATIONS		108	106	104	102	100	98	96	94	92	90	88	86	84	82	80
Area (square feet)	429,766	8,445	8,217	8,245	8,110	7,507	5,500	5,839	7,803	8,174	8,161	8,229	7,346	7,969	8,201	8,227
Water Depth at Profile Line (feet)		8.0	8.5	8.5	8.5	9.0	9.0	10.0	11.0	11.0	12.0	12.5	13.0	13.5	14.0	14.5
PCB Concentration in ppm (By Depth)																
0-1'	1.24	0.99	0.39	0.65	0.91	1.80	0.81	1.06	0.62	1.53	0.98	1.57	0.78	0.68	1.03	0.68
1-2'	1.51	0.48	0.81	0.25	0.87	1.50	0.98	1.19	0.91	2.18	0.85	1.58	1.47	0.18	1.01	1.30
2-3'	0.95	0.83	0.94	0.60	0.90	1.84		1.62	1.22	2.40	1.62	1.52	1.41	0.18	1.15	0.92
3-4'	0.97	0.40	0.81	0.23	1.33	0.64		2.14	1.23	3.08	1.23	2.23			1.13	1.77
4-5'	1.21		0.93	0.35	1.14			2.49	1.79	3.59	2.44	3.68				
5-6'	0.86							2.85								
6-7'	0.74															
Grid Total or Average (ppm)	1.16	0.67	0.78	0.42	1.03	1.44	0.89	1.89	1.15	2.56	1.43	2.12	1.22	0.34	1.08	1.17
2' Surface Average (ppm)	1.38	0.73	0.60	0.45	0.89	1.65	0.89	1.13	0.76	1.86	0.92	1.58	1.12	0.43	1.02	0.99
Volume (cubic yards)	77,713	1,251	1,522	1,527	1,502	1,112	407	1,298	1,445	1,514	1,511	1,524	816	885	1,215	1,219
Mass (pounds PCBs)	183.92	1.75	2.45	1.32	3.22	3.34	0.76	5.10	3.46	8.04	4.48	6.70	2.07	0.63	2.73	2.96
WEIGHTED AVERAGES																
% of Measured Sediment		1.61%	1.96%	1.96%	1.93%	1.43%	0.52%	1.67%	1.86%	1.95%	1.94%	1.96%	1.05%	1.14%	1.56%	1.57%
Contribution to Sediment Concentration (ppm)	1.14	0.01	0.02	0.01	0.02	0.02	0.00	0.03	0.02	0.05	0.03	0.04	0.01	0.00	0.02	0.02
% of Sediment Surface		1.97%	1.91%	1.92%	1.89%	1.75%	1.28%	1.36%	1.82%	1.90%	1.90%	1.91%	1.71%	1.85%	1.91%	1.91%
Contribution to SWAC (ppm)	1.248	0.019	0.007	0.013	0.017	0.031	0.010	0.014	0.011	0.029	0.019	0.030	0.013	0.013	0.020	0.013

Appendix C
Design Remedy
Inner Harbor (8th Street to Mouth) - River Right

GRID LOCATIONS	78	76	74	72	70	68	66	64	62	60	58	56	54	52	50	48	46	44
Area (square feet)	8,106	8,027	8,073	8,151	7,744	8,505	8,355	7,927	5,891	6,586	6,872	7,107	7,331	6,598	7,978	8,251	8,268	8,270
Water Depth at Profile Line (feet)	14.5	14.0	14.0	13.5	13.5	11.0	9.0	7.5	7.0	6.5	6.0	6.5	6.5	6.0	6.0	6.0	6.0	7.0
PCB Concentration in ppm (By Depth)																		
0-1'	0.40	0.74	0.25	1.01	0.38	0.64	0.21	1.08	1.46	0.29	1.94	0.97	1.54	1.24	0.26	3.37	2.31	1.34
1-2'	0.33	1.19	0.30	0.80	0.27	0.58	0.23	0.69	6.06	1.31	4.54	3.34	1.06	2.96	2.48	1.15	3.40	1.02
2-3'	1.14	1.39	0.52	1.46	0.36	0.69	0.23	0.53	0.84	0.48	1.63	1.10	1.16	1.75	1.39	1.38	1.44	0.51
3-4'	2.26	1.24	0.85	1.98	0.74	0.83	0.33		1.66	1.25	1.03	1.03	1.15		0.70	0.95		0.43
4-5'	2.41								0.47	1.16		1.31	1.14		1.22			0.68
5-6'												1.31						
6-7'																		
Grid Total or Average (ppm)	1.31	1.14	0.48	1.31	0.44	0.68	0.25	0.77	2.10	0.90	2.29	1.51	1.21	1.98	1.21	1.71	2.38	0.80
2' Surface Average (ppm)	0.36	0.97	0.27	0.90	0.32	0.61	0.22	0.89	3.76	0.80	3.24	2.15	1.30	2.10	1.37	2.26	2.86	1.18
Volume (cubic yards)	1,501	1,189	1,196	1,208	1,147	1,260	1,238	881	1,091	1,220	1,018	1,579	1,358	733	1,477	1,222	919	1,531
Mass (pounds PCBs)	4.08	2.82	1.19	3.29	1.04	1.79	0.64	1.40	4.76	2.27	4.84	4.96	3.42	3.02	3.72	4.35	4.55	2.54
WEIGHTED AVERAGES																		
% of Measured Sediment	1.93%	1.53%	1.54%	1.55%	1.48%	1.62%	1.59%	1.13%	1.40%	1.57%	1.31%	2.03%	1.75%	0.94%	1.90%	1.57%	1.18%	1.97%
Contribution to Sediment Concentration (ppm)	0.03	0.02	0.01	0.02	0.01	0.01	0.00	0.01	0.03	0.01	0.03	0.03	0.02	0.02	0.02	0.03	0.03	0.02
% of Sediment Surface	1.89%	1.87%	1.88%	1.90%	1.80%	1.98%	1.94%	1.84%	1.37%	1.53%	1.60%	1.65%	1.71%	1.54%	1.86%	1.92%	1.92%	1.92%
Contribution to SWAC (ppm)	0.008	0.014	0.005	0.019	0.007	0.013	0.004	0.020	0.020	0.004	0.031	0.016	0.026	0.019	0.005	0.065	0.044	0.026

Appendix C
Design Remedy
Inner Harbor (8th Street to Mouth) - River Right

GRID LOCATIONS	42	40	38	36	34	32	30	28	26	24	22	20	18	16	14	12	10
Area (square feet)	8,295	8,336	8,330	8,314	8,324	8,366	8,369	8,369	8,339	8,298	8,266	8,230	8,328	8,338	8,383	8,378	8,402
Water Depth at Profile Line (feet)	7.0	7.0	7.5	7.5	7.5	7.5	7.5	7.5	8.0	8.0	8.0	8.5	8.5	8.5	9.0	9.5	10.0
PCB Concentration in ppm (By Depth)																	
0-1'	1.18	1.88	1.40	1.09	3.97	1.70	1.27	1.09	1.65	1.96	3.66	2.33	1.84	1.65	0.99	1.96	0.78
1-2'	0.64	1.70	2.48	1.18	3.23	2.80	0.91	2.31	1.87	0.77	1.10	3.91	0.78	1.76	1.84	0.50	2.17
2-3'	0.68	0.97	0.75	0.96	1.02	1.25	0.75	0.58	0.50	0.68	1.29	1.38	0.72	0.80	0.67	0.26	0.45
3-4'	0.60	0.55		1.12	0.57	0.96	0.68	0.49	0.53	0.52	1.93	1.01	0.66	0.69	0.47	0.29	0.34
4-5'	1.18	0.71		1.16	0.84	1.27	1.30	0.31	0.39	0.58	4.00	0.94	0.32	0.47	0.48	0.69	0.32
5-6'	0.64	0.63		1.09	0.76		0.98	0.38		0.45	1.13	2.23			0.35	0.46	0.40
6-7'												1.31					
Grid Total or Average (ppm)	0.82	1.07	1.54	1.10	1.73	1.60	0.98	0.86	0.99	0.83	2.19	1.87	0.86	1.07	0.80	0.69	0.74
2' Surface Average (ppm)	0.91	1.79	1.94	1.14	3.60	2.25	1.09	1.70	1.76	1.36	2.38	3.12	1.31	1.71	1.41	1.23	1.47
Volume (cubic yards)	1,843	1,852	926	1,848	1,850	1,549	1,860	1,860	1,544	1,844	1,837	2,134	1,542	1,544	1,863	1,862	1,867
Mass (pounds PCBs)	3.13	4.13	2.97	4.23	6.66	5.14	3.79	3.32	3.17	3.17	8.34	8.31	2.77	3.45	3.09	2.69	2.89
WEIGHTED AVERAGES																	
% of Measured Sediment	2.37%	2.38%	1.19%	2.38%	2.38%	1.99%	2.39%	2.39%	1.99%	2.37%	2.36%	2.75%	1.98%	1.99%	2.40%	2.40%	2.40%
Contribution to Sediment Concentration (ppm)	0.02	0.03	0.02	0.03	0.04	0.03	0.02	0.02	0.02	0.02	0.05	0.05	0.02	0.02	0.02	0.02	0.02
% of Sediment Surface	1.93%	1.94%	1.94%	1.93%	1.94%	1.95%	1.95%	1.95%	1.94%	1.93%	1.92%	1.91%	1.94%	1.94%	1.95%	1.95%	1.96%
Contribution to SWAC (ppm)	0.023	0.036	0.027	0.021	0.077	0.033	0.025	0.021	0.032	0.038	0.070	0.045	0.036	0.032	0.019	0.038	0.015

Appendix C
Design Remedy
Inner Harbor (8th Street to Mouth) - River Right

GRID LOCATIONS	8	6	4	2
Area (square feet)	8,380	8,358	8,754	8,596
Water Depth at Profile Line (feet)	10.5	11.0	11.5	12.5
PCB Concentration in ppm (By Depth)				
0-1'	1.23	0.92	0.54	0.05
1-2'	1.34	2.54	0.48	0.17
2-3'	0.42	0.70	0.44	0.21
3-4'	0.27	0.86	0.16	0.25
4-5'	0.45	0.73	0.11	
5-6'	0.31	0.48	0.23	
6-7'		0.66	0.25	
Grid Total or Average (ppm)	0.67	0.98	0.32	0.17
2' Surface Average (ppm)	1.29	1.73	0.51	0.11
Volume (cubic yards)	1,862	2,167	2,270	1,273
Mass (pounds PCBs)	2.59	4.43	1.49	0.45
WEIGHTED AVERAGES				
% of Measured Sediment	2.40%	2.79%	2.92%	1.64%
Contribution to Sediment Concentration (ppm)	0.02	0.03	0.01	0.00
% of Sediment Surface	1.95%	1.94%	2.04%	2.00%
Contribution to SWAC (ppm)	0.024	0.018	0.011	0.001

Appendix C
Design Remedy
Inner Harbor (Between Bridges) -River Left

GRID LOCATIONS		187	185	183	181	179	177	175	173	171	169	167	165	163
Area (square feet)	324,279	6,822	7,189	7,390	7,492	8,412	8,450	8,165	8,238	7,997	8,043	8,272	9,101	9,692
Water Depth at Profile Line (feet)		6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.5	6.5	6.5	7.0	7.0	7.0
PCB Concentration in ppm (By Depth)														
0-1'	0.56	0.32	1.06	0.02	2.86	1.14	0.02	0.41	0.02	0.17	0.02	1.32	0.02	0.02
1-2'	0.78	4.03	3.42	0.02	4.99	0.32	0.02	0.19	0.02	0.01	0.02	0.32	0.02	0.02
2-3'	1.88				0.15	0.02	0.02		0.02		0.02	2.02	0.02	0.02
3-4'	2.73				0.01	0.02	0.53				0.02	-	0.02	0.02
4-5'	8.05				0.02	0.02						-		
5-6'	3.13				0.02	-						-		
6-7'	0.02					-						-		
Grid Total or Average (ppm)	1.32	2.18	2.24	0.02	1.34	0.53	0.15	0.30	0.02	0.09	0.02	1.16	0.02	0.02
2' Surface Average (ppm)	0.68	2.18	2.24	0.02	3.93	0.75	0.02	0.30	0.02	0.09	0.02	1.04	0.02	0.02
Shore to 4' "Area B" (ppm)	0.35													
All Grids to 4' "Area C" (ppm)	2.13													
Volume (cubic yards) Pre Design	47,848	600	600	600	1,800	1,064	1,200	1,500	900	600	1,200	894	1,200	1,200
Volume (cubic yards) Remaining	28,492	600	600	-	1,800	701	300	600	-	600	-	408	-	-
Volume (cubic yards) Removed in Design	**19,356**	**-**	**-**	**600**	**-**	**363**	**900**	**900**	**900**	**-**	**1,200**	**485**	**1,200**	**1,200**
Mass (pounds of PCBs) Pre Design	1,548.20	2.71	2.79	8.40	5.02	65.11	21.62	52.09	88.65	0.11	64.55	33.93	182.36	52.19
Mass (pounds of PCBs) Remaining	108.85	2.71	2.79	-	5.02	0.78	0.09	0.37	-	0.11	-	0.99	-	-
Mass (pounds of PCBs) Removed in Design	**1,439.35**	**-**	**-**	**8.40**	**-**	**64.33**	**21.53**	**51.72**	**88.65**	**-**	**64.55**	**32.94**	**182.36**	**52.19**
WEIGHTED AVERAGES														
% of Measured Sediment		2.11%	2.11%	0.00%	6.32%	2.46%	1.05%	2.11%	0.00%	2.11%	0.00%	1.43%	0.00%	0.00%
Contribution to Sediment Concentration (ppm)	1.81	0.05	0.05	-	0.08	0.01	0.00	0.01	-	0.00	-	0.02	-	-
% of Sediment Surface		2.10%	2.22%	2.28%	2.31%	2.59%	2.61%	2.52%	2.54%	2.47%	2.48%	2.55%	2.81%	2.99%
Contribution to SWAC (ppm)	0.553	0.007	0.023	0.000	0.066	0.030	0.000	0.010	0.000	0.004	0.000	0.034	0.000	0.001

Appendix C
Design Remedy
Inner Harbor (Between Bridges) -River Left

GRID LOCATIONS	161	159	157	155	153	151	149	147	145	143	141	139	137	135	133	131	129	127
Area (square feet)	9,085	9,065	9,754	9,323	9,905	9,548	9,343	8,813	8,377	8,742	8,809	8,738	8,005	8,271	7,686	7,717	8,045	8,148
Water Depth at Profile Line (feet)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	5.0	5.0	5.0	5.0	5.0	5.0	4.0	3.5	3.0	3.0	2.5
PCB Concentration in ppm (By Depth)																		
0-1'	1.21	0.49	0.54	1.22	0.46	1.30	0.27	0.15	0.58	0.45	0.02	0.86	0.10	0.26	0.72	0.58	0.02	0.29
1-2'	0.65	0.76	0.07	0.02	0.75	-	0.01	0.02	1.83	0.66	0.01	2.15	0.06	0.13	0.06	0.02	0.02	0.50
2-3'	10.40	6.88	-	0.02	2.26	-	0.01	-	8.00	1.61	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.70
3-4'	9.06	22.41	-	0.02	7.98	-	0.02	-	15.20	4.42	0.02	0.02	0.02	0.02	-	0.02	0.02	1.86
4-5'	**52.63**	28.20	-	0.02	-	-	-	-	22.20	16.66	-	0.01	0.02	0.02	-	-	0.02	7.68
5-6'	-	24.40	-	0.02	-	-	-	-	-	-	-	0.01	0.02	0.02	-	-		-
6-7'	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02	-	-		-
Grid Total or Average (ppm)	8.60	7.84	0.38	0.30	1.26	1.30	0.12	0.11	7.17	2.42	0.02	0.76	0.04	0.08	0.27	0.16	0.02	1.60
2' Surface Average (ppm)	0.95	0.62	0.38	0.62	0.59	1.30	0.19	0.11	1.21	0.55	0.02	1.50	0.08	0.19	0.39	0.30	0.02	0.39
Shore to 4' "Area B" (ppm)	1.53	0.03	0.38	0.36	0.25	3.46	0.01	0.02	0.02	0.07	0.02	0.02	0.03	0.06	0.27	0.02		0.02
All Grids to 4' "Area C" (ppm)																		
Volume (cubic yards) Pre Design	1,206	1,175	933	1,468	1,009	825	1,384	490	1,086	1,430	979	1,295	1,482	1,685	1,708	2,001	1,500	1,358
Volume (cubic yards) Remaining	925	1,091	90	489	642	88	865	490	1,086	1,133	979	1,295	939	1,685	427	572	-	1,358
Volume (cubic yards) Removed in Design	**280**	**84**	**843**	**978**	**367**	**737**	**519**	**-**	**-**	**297**	**-**	**-**	**544**	**-**	**1,281**	**1,429**	**1,500**	**-**
Mass (pounds of PCBs) Pre Design	59.33	19.39	68.33	109.85	19.48	47.05	26.89	0.11	16.26	53.01	0.03	2.05	34.92	0.29	202.06	75.88	25.51	4.53
Mass (pounds of PCBs) Remaining	16.60	17.85	0.07	0.31	1.68	0.24	0.21	0.11	16.26	5.71	0.03	2.05	0.09	0.29	0.24	0.19	-	4.53
Mass (pounds of PCBs) Removed in Design	**42.73**	**1.54**	**68.26**	**109.54**	**17.79**	**46.81**	**26.68**	**-**	**-**	**47.30**	**-**	**-**	**34.83**	**-**	**201.82**	**75.69**	**25.51**	**-**
WEIGHTED AVERAGES																		
% of Measured Sediment	3.25%	3.83%	0.32%	1.72%	2.25%	0.31%	3.04%	1.72%	3.81%	3.98%	3.44%	4.54%	3.30%	5.91%	1.50%	2.01%	0.00%	4.77%
Contribution to Sediment Concentration (ppm)	0.28	0.30	0.00	0.01	0.03	0.00	0.00	0.00	0.27	0.10	0.00	0.03	0.00	0.00	0.00	0.00	-	0.08
% of Sediment Surface	2.80%	2.80%	3.01%	2.87%	3.05%	2.94%	2.88%	2.72%	2.58%	2.70%	2.72%	2.69%	2.47%	2.55%	2.37%	2.38%	2.48%	2.51%
Contribution to SWAC (ppm)	0.034	0.014	0.016	0.035	0.014	0.038	0.008	0.004	0.015	0.012	0.000	0.023	0.002	0.007	0.017	0.014	0.000	0.007

Appendix C
Design Remedy
Inner Harbor (Between Bridges) -River Left

GRID LOCATIONS	125	123	121	119	117	115	113	111
Area (square feet)	8,075	8,125	8,077	7,663	6,873	7,231	7,954	7,644
Water Depth at Profile Line (feet)	2.5	2.5	3.0	3.5	3.5	3.5	3.5	4.0
PCB Concentration in ppm (By Depth)								
0-1'	0.56	0.15	0.38	0.55	0.26	2.10	0.39	0.53
1-2'		0.49	1.23	0.46	1.08	1.36	1.38	1.63
2-3'		0.68	1.18	0.81	1.54	0.46	0.08	19.46
3-4'		0.83	5.19	0.69	2.31	0.02	-	0.37
4-5'		0.02	5.08		3.97	0.02	-	0.27
5-6'		-	-		0.02		-	0.50
6-7'		-	-		-		-	-
Grid Total or Average (ppm)	0.56	0.48	1.98	0.63	1.67	0.79	0.73	4.09
2' Surface Average (ppm)	0.56	0.32	0.80	0.51	0.67	1.73	0.89	1.08
Shore to 4' "Area B" (ppm)		0.02	0.12					
All Grids to 4' "Area C" (ppm)					1.30	0.98	0.73	5.49
Volume (cubic yards) Pre Design	1,800	1,505	1,496	1,200	1,400	1,500	736	1,840
Volume (cubic yards) Remaining	300	1,354	1,197	851	1,400	1,500	736	1,390
Volume (cubic yards) Removed in Design	**1,500**	**150**	**299**	**349**	**-**	**-**	**-**	**450**
Mass (pounds of PCBs) Pre Design	119.99	31.54	26.36	1.57	4.87	2.47	1.12	15.79
Mass (pounds of PCBs) Remaining	0.35	1.36	4.94	1.11	4.87	2.47	1.12	13.29
Mass (pounds of PCBs) Removed in Design	**119.64**	**30.18**	**21.41**	**0.46**	**-**	**-**	**-**	**2.50**
WEIGHTED AVERAGES								
% of Measured Sediment	1.05%	4.75%	4.20%	2.99%	4.91%	5.26%	2.58%	4.88%
Contribution to Sediment Concentration (ppm)	0.01	0.02	0.08	0.02	0.08	0.04	0.02	0.20
% of Sediment Surface	2.49%	2.51%	2.49%	2.36%	2.12%	2.23%	2.45%	2.36%
Contribution to SWAC (ppm)	0.014	0.004	0.009	0.013	0.005	0.047	0.010	0.012

Appendix C
Design Remedy
Inner Harbor (Between Bridges) - River Right

GRID LOCATIONS		196	194	192	190	188	186	184	182	180	178	176	174	172	170	168
Area (square feet)	340,052	7,539	7,774	7,862	7,768	7,575	7,026	7,146	7,579	7,379	7,618	8,285	8,053	7,448	7,304	8,194
Water Depth at Profile Line (feet)		3.5	3.5	4.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	5.0	5.0	5.0	5.0	5.5
PCB Concentration in ppm (By Depth)																
0-1'	0.59	1.34	1.47	0.38	0.74	1.73	1.85	0.02	-	0.22	0.44	0.89	0.18	0.02	0.35	0.25
1-2'	1.37	2.71	1.96	2.95	3.16	3.52	6.88	-	-	2.74	0.82	1.05	1.16	0.02	1.20	0.41
2-3'	1.56	11.10	0.78	0.88	0.46	5.86	0.02	-	-	2.78	1.58	2.19	1.52	0.02	1.65	0.56
3-4'	2.65		0.17	0.02	0.53		0.57	-	-	3.96	5.16	0.94	0.86	0.02	2.39	0.50
4-5'	9.86		-	0.02	0.02		0.02	-	-	7.35	44.50	13.50	0.66	0.02	27.40	13.70
5-6'	38.10		-					-	-							
6-7'	#DIV/0!		-					-	-							
Grid Total or Average (ppm)	2.32	5.05	1.45	0.85	0.98	3.70	1.87	0.02	0.02	3.41	10.50	3.71	0.88	0.02	6.60	3.08
2' Surface Average (ppm)	0.94	2.03	1.70	1.66	1.95	2.63	4.37	0.02	0.02	1.48	0.63	0.97	0.67	0.02	0.78	0.33
Shore to 4' "Area B" (ppm)																
All Grids to 4' "Area C" (ppm)	0.72															
Volume (cubic yards) Pre Design	54,435	838	768	1,500	1,500	900	1,500	1,323	1,404	1,366	1,411	1,534	1,491	1,379	1,353	1,517
Volume (cubic yards) Remaining	46,744	838	672	1,500	1,500	900	1,500	132	-	1,366	1,411	1,534	1,491	-	1,353	1,517
Volume (cubic yards) Removed in Design	**7,691**	**-**	**96**	**-**	**-**	**-**	**-**	**1,191**	**1,404**	**-**	**-**	**-**	**-**	**1,379**	**-**	**-**
Mass (pounds of PCBs) Pre Design	547.59	8.79	9.96	2.64	3.06	6.93	5.82	39.38	60.12	9.69	30.80	11.85	2.72	34.96	18.56	9.73
Mass (pounds of PCBs) Remaining	274.67	8.79	2.04	2.64	3.06	6.93	5.82	0.01	-	9.69	30.80	11.85	2.72	-	18.56	9.73
Mass (pounds of PCBs) Removed in Design	**272.92**	**-**	**7.92**	**-**	**-**	**-**	**-**	**39.37**	**60.12**	**-**	**-**	**-**	**-**	**34.96**	**(0.00)**	**-**
WEIGHTED AVERAGES																
% of Measured Sediment		1.79%	1.44%	3.21%	3.21%	1.93%	3.21%	0.28%	0.00%	2.92%	3.02%	3.28%	3.19%	0.00%	2.89%	3.25%
Contribution to Sediment Concentration (ppm)	2.83	0.09	0.02	0.03	0.03	0.07	0.06	0.00	-	0.10	0.32	0.12	0.03	-	0.19	0.10
% of Sediment Surface		2.22%	2.29%	2.31%	2.28%	2.23%	2.07%	2.10%	2.23%	2.17%	2.24%	2.44%	2.37%	2.19%	2.15%	2.41%
Contribution to SWAC (ppm)	0.571	0.030	0.034	0.009	0.017	0.039	0.038	0.000	-	0.005	0.010	0.022	0.004	0.000	0.008	0.006

Appendix C
Design Remedy
Inner Harbor (Between Bridges) - River Right

GRID LOCATIONS	166	164	162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128
Area (square feet)	8,343	7,473	7,765	7,761	7,462	7,015	6,813	7,322	7,662	7,471	6,764	7,022	7,024	7,319	8,246	8,277	8,141	8,108	8,016	8,263
Water Depth at Profile Line (feet)	5.5	6.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
PCB Concentration in ppm (By Depth)																				
0-1'	0.02	0.17	0.28	0.69	0.81	0.19	1.09	0.31	0.20	0.16	0.62	0.47	0.56	0.34	0.02	1.21	0.99	0.13	0.87	0.19
1-2'	0.02	0.37	0.33	0.59	4.82	1.14	2.20	2.27	0.49	0.32	0.72	0.75	0.35	1.58	0.02	0.95	1.62	0.79	1.37	1.48
2-3'	0.02	1.74	0.55	2.08	1.51	1.40	1.47	3.42	1.52	0.19	0.74	1.49	0.31	1.56	0.02	1.24	1.78	1.03	1.54	1.92
3-4'	0.02	6.00		1.48	9.39	3.08	13.40	5.14		0.52	5.13		0.33	3.18	0.02	1.73	2.43	1.62	2.16	2.35
4-5'	0.02			0.62									2.23	10.90		2.01			2.78	
5-6'																38.10				
6-7'																				
Grid Total or Average (ppm)	0.02	2.07	0.39	1.09	4.13	1.45	4.54	2.79	0.74	0.30	1.80	0.90	0.76	3.51	0.02	7.54	1.71	0.89	1.74	1.49
2' Surface Average (ppm)	0.02	0.27	0.30	0.64	2.81	0.67	1.65	1.29	0.35	0.24	0.67	0.61	0.46	0.96	0.02	1.08	1.31	0.46	1.12	0.84
Shore to 4' "Area B" (ppm)																				
All Grids to 4' "Area C" (ppm)																				
Volume (cubic yards) Pre Design	1,545	1,107	863	1,437	1,105	1,039	1,009	1,085	851	1,107	1,002	780	1,301	1,355	1,222	1,839	1,206	1,201	1,484	1,224
Volume (cubic yards) Remaining	-	1,107	863	1,437	1,105	1,039	1,009	1,085	851	1,107	1,002	780	1,301	1,355	-	1,839	1,206	1,201	1,484	1,224
Volume (cubic yards) Removed in Design	**1,545**	-	-	-	-	-	-	-	-	-	-	-	-	-	**1,222**	-	-	-	-	-
Mass (pounds of PCBs) Pre Design	15.26	4.76	0.69	3.26	9.50	3.14	9.53	6.28	1.30	0.68	3.75	1.46	2.04	9.90	36.12	28.83	4.28	2.23	5.38	3.78
Mass (pounds of PCBs) Remaining	-	4.76	0.69	3.26	9.50	3.14	9.53	6.28	1.30	0.68	3.75	1.46	2.04	9.90	-	28.83	4.28	2.23	5.38	3.78
Mass (pounds of PCBs) Removed in Design	**15.26**	-	-	-	-	-	-	-	-	-	-	-	-	-	**36.12**	-	-	-	-	-
WEIGHTED AVERAGES																				
% of Measured Sediment	0.00%	2.37%	1.85%	3.07%	2.36%	2.22%	2.16%	2.32%	1.82%	2.37%	2.14%	1.67%	2.78%	2.90%	0.00%	3.93%	2.58%	2.57%	3.18%	2.62%
Contribution to Sediment Concentration (ppm)	-	0.05	0.01	0.03	0.10	0.03	0.10	0.06	0.01	0.01	0.04	0.02	0.02	0.10	-	0.30	0.04	0.02	0.06	0.04
% of Sediment Surface	2.45%	2.20%	2.28%	2.28%	2.19%	2.06%	2.00%	2.15%	2.25%	2.20%	1.99%	2.06%	2.07%	2.15%	2.42%	2.43%	2.39%	2.38%	2.36%	2.43%
Contribution to SWAC (ppm)	0.000	0.004	0.006	0.016	0.018	0.004	0.022	0.007	0.005	0.003	0.012	0.010	0.012	0.007	0.000	0.029	0.024	0.003	0.021	0.005

Appendix C
Design Remedy
Inner Harbor (Between Bridges) - River Right

GRID LOCATIONS	126	124	122	120	118	116	114	112	110
Area (square feet)	8,308	7,667	7,627	8,015	8,392	8,197	8,096	8,144	8,789
Water Depth at Profile Line (feet)	6.0	7.0	7.0	7.5	8.0	8.0	8.0	8.0	8.0
PCB Concentration in ppm (By Depth)									
0-1'	1.51	1.72	0.31	0.16	0.55	1.13	0.02	0.02	0.59
1-2'	0.18	2.39	0.17	1.43	0.43	1.25	0.02	0.02	0.97
2-3'	1.26	4.42	0.75	0.88	0.48		0.03	0.02	1.36
3-4'	2.12	10.20	1.25	1.82	0.70			0.02	3.65
4-5'		**59.10**		1.67	0.84				
5-6'					-				
6-7'					-				
Grid Total or Average (ppm)	1.27	15.57	0.62	1.19	0.56227	1.19	0.0205	0.0175	1.6428
2' Surface Average (ppm)	0.84	2.06	0.24	0.79	0.49472	1.19	0.0181	0.0165	0.7805
Shore to 4' "Area B" (ppm)									
All Grids to 4' "Area C" (ppm)						1.19	0.02	0.02	1.64
Volume (cubic yards) Pre Design	1,231	1,420	1,130	1,484	1,606	607	900	1,207	1,302
Volume (cubic yards) Remaining	1,231	1,420	1,130	1,484	751	607	900	1,207	1,302
Volume (cubic yards) Removed in Design	-	-	-	-	**855**	-	-	-	-
Mass (pounds of PCBs) Pre Design	3.24	45.95	1.45	3.68	80.06	1.50	0.04	0.04	4.45
Mass (pounds of PCBs) Remaining	3.24	45.95	1.45	3.68	0.88	1.50	0.04	0.04	4.45
Mass (pounds of PCBs) Removed in Design	-	-	-	-	**79.18**	-	-	-	-
WEIGHTED AVERAGES									
% of Measured Sediment	2.63%	3.04%	2.42%	3.18%	1.61%	1.30%	1.92%	2.58%	2.79%
Contribution to Sediment Concentration (ppm)	0.03	0.47	0.01	0.04	0.01	0.02	0.00	0.00	0.05
% of Sediment Surface	2.44%	2.25%	2.24%	2.36%	2.47%	2.41%	2.38%	2.39%	2.58%
Contribution to SWAC (ppm)	0.037	0.039	0.007	0.004	0.014	0.027	0.000	0.000	0.015

Appendix C
Design Remedy
Lower River Deposits

Deposits	Totals or Averages	1	2	3	4	5	7	8	9
Area (square feet)	47,543	2,703	8,632	7,212	7,837	2,031	12,053	4,617	2,459
Average Thickness (feet)	1.58	1.00	1.92	2.72	1.17	1.33	1.00	1.00	2.50
PCB Concentration in ppm (By Depth)									
0-1'	1.04	3.02	0.46	0.18	3.55	0.37	0.48	0.22	0.02
1-2'	0.54	0.01		2.13	0.02				0.02
2-3'	0.02	0.02		0.03	0.01				0.01
3-4'	0.19			0.00	0.37				
Deposit Total or Average (ppm)	0.45	1.02	0.46	0.58	0.99	0.37	0.48	0.22	0.02
Volume (cubic yards) Pre Design	2,688.67	100.10	613.85	690.04	339.61	100.03	446.39	171.00	227.66
Volume (cubic yards) Remaining	2,510.60	100.10	613.85	511.96	339.61	100.03	446.39	171.00	227.66
Volume (cubic yards) Removed in Design	**178**	-	-	**178**	-	-	-	-	-
Mass (pounds of PCBs) Pre Design	16.33	0.85	0.79	10.11	3.74	0.10	0.60	0.10	0.03
Mass (pounds of PCBs) Remaining	7.02	0.85	0.79	0.80	3.74	0.10	0.60	0.10	0.03
Mass (pounds of PCBs) Removed in Design	**9.31**			**9.31**					
WEIGHTED AVERAGES									
% of Measured Sediment		3.99%	24.45%	20.39%	13.53%	3.98%	17.78%	6.81%	9.07%
Contribution to Sediment Concentration (ppm)	0.52	0.0405	0.1125	0.1190	0.1336	0.0147	0.0853	0.0150	0.0015
% of Sediment Surface		5.68%	18.16%	15.17%	16.48%	4.27%	25.35%	9.71%	5.17%
Contribution to SWAC (ppm)	1.03	0.172	0.084	0.027	0.585	0.016	0.122	0.021	0.001

Appendix C
Design Remedy
Lower River - River Left Grid

GRID LOCATIONS		317	315	313	311	309	307	305	303	301	299	297	295	293	291	289	287
Area (square feet)	424,754	7,497	6,959	7,193	6,554	6,748	8,099	8,068	7,832	5,400	8,109	7,321	6,668	No Rec	7,726	5,068	7,664
Water Depth at Profile Line (feet)		2.5	3.0	3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
PCB Concentration in ppm (By Depth)																	
0-1'	0.60	0.23	3.16	2.06	0.56	0.39	0.49	0.06	0.46	0.11	0.08	0.50	0.24		0.02	0.01	0.25
1-2'	0.98	0.02	0.20	4.10	2.02	0.10	0.02		0.02	0.03	0.43	0.16			0.02	0.01	0.21
2-3'	0.24		0.03		-	0.06			0.02	-		0.18					
3-4'	1.88		0.02		-	-			-	-		-					
4-5'			-		-	-			-	-		-					
5-6'			-		-	-			-	-		-					
6-7'			-		-	-			-	-		-					
Grid Total or Average (ppm)	0.66	0.12	1.52	3.08	1.19	0.26	0.25	0.06	0.25	0.08	0.25	0.40	0.24		0.02	0.01	0.23
2' Surface Average (ppm)	0.67	0.12	1.97	3.08	1.19	0.29	0.25	0.06	0.33	0.08	0.25	0.44	0.24		0.02	0.01	0.23
Volume (cubic yards) Pre Design	29,854	555	473	533	405	458	600	299	508	317	601	407	247		572	375	568
Volume (cubic yards) Remaining	23,699	555	279	533	283	333	600	299	411	217	601	316	247		572	375	568
Volume (cubic yards) Removed In Design	**6,155**	**-**	**193**	**-**	**121**	**125**	**-**	**-**	**97**	**100**	**-**	**91**	**-**	**-**	**-**	**-**	**-**
Mass (pounds PCBs) Pre Design	294.83	0.14	19.29	3.41	13.67	12.70	0.31	0.03	12.00	4.41	0.32	8.84	0.12		0.02	0.01	0.27
Mass (pounds PCBs) Remaining	32.41	0.14	0.89	3.41	0.70	0.18	0.31	0.03	0.22	0.04	0.32	0.27	0.12		0.02	0.01	0.27
Mass (pounds PCBs) Removed In Design	**262.42**	**-**	**18.41**	**-**	**12.97**	**12.52**	**-**	**-**	**11.78**	**4.37**	**-**	**8.58**	**-**	**-**	**-**	**-**	**-**
WEIGHTED AVERAGES																	
% of Measured Sediment		2.34%	1.18%	2.25%	1.19%	1.41%	2.53%	1.26%	1.73%	0.91%	2.53%	1.33%	1.04%		2.41%	1.58%	2.40%
Contribution to Sediment Concentration (ppm)	0.66	0.00	0.02	0.07	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.00		0.00	0.00	0.01
% of Sediment Surface		1.77%	1.64%	1.69%	1.54%	1.59%	1.91%	1.90%	1.84%	1.27%	1.91%	1.72%	1.57%		1.82%	1.19%	1.80%
Contribution to SWAC (ppm)	0.600	0.004	0.052	0.035	0.009	0.006	0.009	0.001	0.009	0.001	0.001	0.009	0.004		0.000	0.000	0.005

Appendix C
Design Remedy
Lower River - River Left Grid

GRID LOCATIONS	285	283	281	279	277	275	273	271	269	267	265	263	261	259	257	255	253
Area (square feet)	7,992	8,092	8,132	8,026	8,211	2,250	No Rec	8,113	8,120	No Rec	No Rec	No Rec	No Rec	No Rec	No Rec	8,087	8,094
Water Depth at Profile Line (feet)	3.0	4.0	5.0	5.0	6.0	6.0	7.0	7.0	5.0	5.0	5.0	5.0	5.0	5.5	5.5	7.0	7.0
PCB Concentration in ppm (By Depth)																	
0-1'	0.13	3.96	0.32	0.41	0.02	0.66		0.24	0.02							0.17	0.57
1-2'	0.02	0.34				15.50											
2-3'	0.01	-				-											
3-4'	-	-				-											
4-5'	-	-				-											
5-6'	-	-				-											
6-7'	-	-				-											
Grid Total or Average (ppm)	0.09	3.63	0.32	0.41	0.02	5.61		0.24	0.02							0.17	0.57
2' Surface Average (ppm)	0.10	3.63	0.32	0.41	0.02	5.61		0.24	0.02							0.17	0.57
Volume (cubic yards) Pre Design	469	375	301	297	304	56		300	301							300	300
Volume (cubic yards) Remaining	222	275	301	297	-	42		300	301							300	300
Volume (cubic yards) Removed In Design	**247**	**100**	**-**	**-**	**304**	**14**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Mass (pounds PCBs) Pre Design	7.25	9.43	0.20	0.25	4.82	1.49		0.15	0.01							0.11	0.36
Mass (pounds PCBs) Remaining	0.04	2.08	0.20	0.25	-	0.49		0.15	0.01							0.11	0.36
Mass (pounds PCBs) Removed In Design	**7.21**	**7.35**	**-**	**-**	**4.82**	**1.00**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
WEIGHTED AVERAGES																	
% of Measured Sediment	0.94%	1.16%	1.27%	1.25%	0.00%	0.18%		1.27%	1.27%							1.26%	1.26%
Contribution to Sediment Concentration (ppm)	0.00	0.04	0.00	0.01	-	0.01		0.00	0.00							0.00	0.01
% of Sediment Surface	1.88%	1.91%	1.91%	1.89%	1.93%	0.53%		1.91%	1.91%							1.90%	1.91%
Contribution to SWAC (ppm)	0.002	0.075	0.006	0.008	0.000	0.004		0.005	0.000							0.003	0.011

Appendix C
Design Remedy
Lower River - River Left Grid

GRID LOCATIONS	251	249	247	245	243	241	239	237	235	233	231	229	227	225	223	221	219	217	215
Area (square feet)	8,099	8,100	No Rec	8,100	8,098	8,095	8,097	8,098	6,749	8,098	8,108	8,099	8,101	8,099	8,099	8,099	8,100	8,098	8,098
Water Depth at Profile Line (feet)	7.0	7.0	7.0	6.5	6.5	6.0	5.0	4.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0
PCB Concentration in ppm (By Depth)																			
0-1'	0.22	0.57		0.26	0.19	0.11	0.62	0.35	0.86	0.02	0.02	4.74	0.55	0.14	0.77	0.55	0.81	0.08	0.62
1-2'									0.45		0.02	2.16	0.02	0.02	0.02	0.64	0.32	0.02	1.05
2-3'									0.02			0.20		0.02	0.02		-	0.02	0.59
3-4'									0.03			0.05		-			-		-
4-5'									-					-			-		-
5-6'									-					-			-		-
6-7'									-					-			-		-
Grid Total or Average (ppm)	0.22	0.57		0.26	0.19	0.11	0.62	0.35	0.56	0.02	0.02	1.79	0.28	0.08	0.27	0.60	0.62	0.04	0.80
2' Surface Average (ppm)	0.22	0.57		0.26	0.19	0.11	0.62	0.35	0.69	0.02	0.02	3.45	0.28	0.09	0.39	0.60	0.62	0.05	0.83
Volume (cubic yards) Pre Design	300	300		300	300	300	300	300	396	300	601	1,200	600	800	1,200	600	675	1,200	875
Volume (cubic yards) Remaining	300	300		300	300	300	300	300	312	-	-	1,200	600	400	900	600	325	900	525
Volume (cubic yards) Removed In Design	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**83**	**300**	**601**	**-**	**-**	**400**	**300**	**-**	**350**	**300**	**350**
Mass (pounds PCBs) Pre Design	0.14	0.36		0.16	0.12	0.07	0.39	0.22	3.51	10.79	6.68	4.46	0.35	9.15	4.63	0.74	15.03	8.62	20.78
Mass (pounds PCBs) Remaining	0.14	0.36		0.16	0.12	0.07	0.39	0.22	0.36	-	-	4.46	0.35	0.07	0.50	0.74	0.42	0.07	0.88
Mass (pounds PCBs) Removed In Design	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3.15**	**10.79**	**6.68**	**-**	**-**	**9.08**	**4.13**	**-**	**14.60**	**8.54**	**19.90**
WEIGHTED AVERAGES																			
% of Measured Sediment	1.27%	1.27%		1.27%	1.27%	1.27%	1.27%	1.27%	1.32%	0.00%	0.00%	5.06%	2.53%	1.69%	3.80%	2.53%	1.37%	3.80%	2.22%
Contribution to Sediment Concentration (ppm)	0.00	0.01		0.00	0.00	0.00	0.01	0.00	0.01	-	-	0.09	0.01	0.00	0.01	0.02	0.01	0.00	0.02
% of Sediment Surface	1.91%	1.91%		1.91%	1.91%	1.91%	1.91%	1.91%	1.59%	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%
Contribution to SWAC (ppm)	0.004	0.011		0.005	0.004	0.002	0.012	0.007	0.014	0.000	0.000	0.090	0.010	0.003	0.015	0.011	0.015	0.002	0.012

Appendix C
Design Remedy
Lower River - River Left Grid

GRID LOCATIONS	213	211	209	207	205	203	201	199	197	195	193	191	189
Area (square feet)	8,098	8,100	8,101	8,099	8,099	7,841	7,329	6,780	6,510	6,881	7,225	7,203	8,030
Water Depth at Profile Line (feet)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	4.0	4.5	5.0
PCB Concentration in ppm (By Depth)													
0-1'	0.27	0.83	0.35	0.41	0.44	0.73	0.85	0.62	0.02	0.05	0.58	1.17	0.64
1-2'	0.82	0.88	1.71	0.02	0.53	0.61	0.01	0.50	0.02	0.02	0.23	4.37	0.54
2-3'	0.02	-			1.34	0.24	0.02	0.39			0.44		0.74
3-4'		-			3.84	0.02	0.01	0.02			0.47		12.47
4-5'		-			-	-		-					-
5-6'		-			-	-		-					-
6-7'		-			-	-		-					-
Grid Total or Average (ppm)	0.37	0.84	1.03	0.21	0.89	0.55	0.22	0.52	0.02	0.03	0.44	2.77	2.46
2' Surface Average (ppm)	0.55	0.84	1.03	0.21	0.48	0.67	0.43	0.58	0.02	0.03	0.42	2.77	0.61
Volume (cubic yards) Pre Design	900	725	600	600	950	799	1,086	628	482	510	736	534	843
Volume (cubic yards) Remaining	900	125	600	600	825	557	1,086	419	-	510	513	534	644
Volume (cubic yards) Removed In Design	**-**	**600**	**-**	**-**	**125**	**242**	**-**	**209**	**482**	**-**	**223**	**-**	**198**
Mass (pounds PCBs) Pre Design	0.69	26.65	1.29	0.26	16.72	22.17	0.50	13.77	3.56	0.04	10.62	3.07	9.67
Mass (pounds PCBs) Remaining	0.69	0.22	1.29	0.26	1.54	0.64	0.50	0.45	-	0.04	0.47	3.07	3.31
Mass (pounds PCBs) Removed In Design	**-**	**26.43**	**-**	**-**	**15.18**	**21.53**	**-**	**13.32**	**3.56**	**-**	**10.15**	**-**	**6.36**
WEIGHTED AVERAGES													
% of Measured Sediment	3.80%	0.53%	2.53%	2.53%	3.48%	2.35%	4.58%	1.77%	0.00%	2.15%	2.16%	2.25%	2.72%
Contribution to Sediment Concentration (ppm)	0.01	0.00	0.03	0.01	0.03	0.01	0.01	0.01	-	0.00	0.01	0.06	0.07
% of Sediment Surface	1.91%	1.91%	1.91%	1.91%	1.91%	1.85%	1.73%	1.60%	1.53%	1.62%	1.70%	1.70%	1.89%
Contribution to SWAC (ppm)	0.005	0.016	0.007	0.008	0.008	0.013	0.015	0.010	0.000	0.001	0.010	0.020	0.012

Appendix C
Design Remedy
Lower River - River Right Grid

GRID LOCATIONS		316	314	312	310	308	306	304	302	300	298	296	294	292	290	288	286
Area (square feet)	385,656	No Rec	No Rec	No Rec	No Rec	7,749	7,656	No Rec	8,100	No Rec	8,098	8,093	8,109	8,099	8,111	No Rec	No Rec
Water Depth at Profile Line (feet)		3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	2.5	2.5	2.5	2.5	2.5	3.0	3.0
PCB Concentration in ppm (By Depth)																	
0-1'	1.00					0.21	0.02		0.13		0.02	0.17	0.02	0.02	0.32		
1-2'	0.62						0.02				0.02	0.27	0.04	0.02			
2-3'	0.41										0.10			0.02			
3-4'	0.02																
4-5'																	
5-6'																	
6-7'																	
Grid Total or Average (ppm)	0.87					0.21	0.02		0.13		0.05	0.22	0.03	0.02	0.32		
2' Surface Average (ppm)	0.91					0.21	0.02		0.13		0.02	0.22	0.03	0.02	0.32		
Volume (cubic yards) Pre Design	28,172					287	567		300		900	599	601	900	300		
Volume (cubic yards) Remaining	21,796					287	567		300		900	599	601	900	300		
Volume (cubic yards) Removed In Design	**6,375**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mass (pounds PCBs) Pre Design	472.26					0.12	0.02		0.08		0.09	0.27	0.03	0.03	0.20		
Mass (pounds PCBs) Remaining	37.69					0.12	0.02		0.08		0.09	0.27	0.03	0.03	0.20		
Mass (pounds PCBs) Removed In Design	**434.57**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WEIGHTED AVERAGES																	
% of Measured Sediment						1.32%	2.60%		1.38%		4.13%	2.75%	2.76%	4.13%	1.38%		
Contribution to Sediment Concentration (ppm)	0.83					0.00	0.00		0.00		0.00	0.01	0.00	0.00	0.00		
% of Sediment Surface						2.01%	1.99%		2.10%		2.10%	2.10%	2.10%	2.10%	2.10%		
Contribution to SWAC (ppm)	1.033					0.004	0.000		0.003		0.000	0.004	0.000	0.000	0.007		

Appendix C
Design Remedy
Lower River - River Right Grid

GRID LOCATIONS	284	282	280	278	276	274	272	270	268	266	264	262	260	258	256	254	252	250	248
Area (square feet)	5,866	8,141	8,138	8,168	8,108	8,099	8,080	6,631	No Rec	7,263	8,105	6,194	6,297	6,599	7,070	7,687	7,915	7,811	7,009
Water Depth at Profile Line (feet)	3.0	3.0	4.0	4.0	5.0	5.0	5.0	6.0	6.0	6.0	6.0	6.0	5.5	5.5	5.0	5.0	4.5	4.5	4.5
PCB Concentration in ppm (By Depth)																			
0-1'	0.13	2.61	5.34	0.02	0.21	0.27	1.00	0.24		1.43	0.33	0.49	0.28	0.26	0.08	4.21	0.90	0.47	0.02
1-2'							0.25						0.51	0.13	0.02	0.01	0.39	0.07	0.02
2-3'													1.53	0.74	0.01	0.02	0.02	0.02	0.02
3-4'																	-	-	
4-5'																	-	-	
5-6'																			
6-7'																			
Grid Total or Average (ppm)	0.13	2.61	5.34	0.02	0.21	0.27	0.62	0.24		1.43	0.33	0.49	0.77	0.38	0.04	1.42	0.50	0.22	0.02
2' Surface Average (ppm)	0.13	2.61	5.34	0.02	0.21	0.27	0.62	0.24		1.43	0.33	0.49	0.39	0.19	0.05	2.11	0.65	0.28	0.02
Volume (cubic yards) Pre Design	217	302	301	303	300	300	599	246		269	300	229	700	733	786	1,139	1,002	747	779
Volume (cubic yards) Remaining	217	302	301	-	300	300	599	246		269	300	229	700	733	786	854	757	530	779
Volume (cubic yards) Removed In Design	-	-	-	**303**	-	-	-	-	-	-	-	-	-	-	-	**285**	**244**	**217**	-
Mass (pounds PCBs) Pre Design	0.06	1.64	3.35	15.79	0.13	0.17	0.77	0.12		0.80	0.21	0.23	1.12	0.57	0.06	17.13	14.09	15.75	0.03
Mass (pounds PCBs) Remaining	0.06	1.64	3.35	-	0.13	0.17	0.77	0.12		0.80	0.21	0.23	1.12	0.57	0.06	2.51	0.80	0.25	0.03
Mass (pounds PCBs) Removed In Design	-	-	-	**15.79**	-	-	-	-	-	-	-	-	-	-	-	**14.62**	**13.29**	**15.50**	-
WEIGHTED AVERAGES																			
% of Measured Sediment	1.00%	1.38%	1.38%	0.00%	1.38%	1.38%	2.75%	1.13%		1.23%	1.38%	1.05%	3.21%	3.36%	3.60%	3.92%	3.47%	2.43%	3.57%
Contribution to Sediment Concentration (ppm)	0.00	0.04	0.07	-	0.00	0.00	0.02	0.00		0.02	0.00	0.01	0.02	0.01	0.00	0.06	0.02	0.01	0.00
% of Sediment Surface	1.52%	2.11%	2.11%	2.12%	2.10%	2.10%	2.10%	1.72%		1.88%	2.10%	1.61%	1.63%	1.71%	1.83%	1.99%	2.05%	2.03%	1.82%
Contribution to SWAC (ppm)	0.002	0.055	0.113	0.000	0.004	0.006	0.021	0.004		0.027	0.007	0.008	0.005	0.004	0.001	0.084	0.019	0.010	0.000

Appendix C
Design Remedy
Lower River - River Right Grid

GRID LOCATIONS	246	244	242	240	238	236	234	232	230	228	226	224	222	220	218	216	214
Area (square feet)	6,653	7,007	7,228	7,414	7,446	7,422	7,424	7,465	7,464	7,304	7,142	6,989	6,890	6,966	7,450	7,702	7,748
Water Depth at Profile Line (feet)	4.5	4.5	4.5	4.5	4.5	4.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	4.0	4.0	4.0	4.0
PCB Concentration in ppm (By Depth)																	
0-1'	0.16	1.51	0.78	0.01	0.02	0.51	0.01	1.38	1.18	0.02	0.49	1.68	0.97	0.39	3.01	0.96	0.02
1-2'	0.02	0.01		0.02	0.02	0.02	0.02	0.12	0.02	0.02	0.10	0.19	0.02		0.30	3.98	
2-3'		0.01		0.02		0.02		0.02	0.02	0.02	-	0.02	-		0.02	0.17	
3-4'						0.02		0.02	-	0.02	-	0.02	-		0.02	-	
4-5'						-		-	-		-	-	-		-	-	
5-6'																	
6-7'																	
Grid Total or Average (ppm)	0.09	0.51	0.78	0.02	0.02	0.23	0.02	0.77	0.60	0.02	0.38	0.74	0.85	0.39	1.74	2.04	0.02
2' Surface Average (ppm)	0.09	0.76	0.78	0.02	0.02	0.34	0.02	0.96	0.79	0.02	0.38	1.08	0.85	0.39	2.23	2.17	0.02
Volume (cubic yards) Pre Design	493	779	268	824	552	550	825	530	507	1,082	816	777	595	258	736	571	287
Volume (cubic yards) Remaining	493	779	268	824	-	412	550	346	184	-	154	475	170	258	414	380	287
Volume (cubic yards) Removed In Design	-	-	-	-	**552**	**137**	**275**	**184**	**323**	**1,082**	**661**	**302**	**425**	-	**322**	**190**	-
Mass (pounds PCBs) Pre Design	0.09	0.83	0.44	0.03	9.23	7.06	11.28	24.15	23.48	17.68	85.37	60.78	35.06	0.21	41.60	28.28	0.01
Mass (pounds PCBs) Remaining	0.09	0.83	0.44	0.03	-	0.20	0.02	0.55	0.23	-	0.12	0.74	0.30	0.21	1.50	1.62	0.01
Mass (pounds PCBs) Removed In Design	-	-	-	-	-	**6.86**	**11.26**	**23.60**	**23.25**	**17.68**	**85.25**	**60.05**	**34.75**	-	**40.10**	**26.66**	-
WEIGHTED AVERAGES																	
% of Measured Sediment	2.26%	3.57%	1.23%	3.78%	0.00%	1.89%	2.52%	1.59%	0.85%	0.00%	0.71%	2.18%	0.78%	1.18%	1.90%	1.75%	1.32%
Contribution to Sediment Concentration (ppm)	0.00	0.02	0.01	0.00	-	0.00	0.00	0.01	0.01	-	0.00	0.02	0.01	0.00	0.03	0.04	0.00
% of Sediment Surface	1.73%	1.82%	1.87%	1.92%	1.93%	1.92%	1.93%	1.94%	1.94%	1.89%	1.85%	1.81%	1.79%	1.81%	1.93%	2.00%	2.01%
Contribution to SWAC (ppm)	0.003	0.027	0.015	0.000	0.000	0.010	0.000	0.027	0.023	0.000	0.009	0.030	0.017	0.007	0.058	0.019	0.000

Appendix C
Design Remedy
Lower River - River Right Grid

GRID LOCATIONS	212	210	208	206	204	202	200	198
Area (square feet)	8,099	8,103	8,099	8,099	8,099	8,101	8,100	8,046
Water Depth at Profile Line (feet)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
PCB Concentration in ppm (By Depth)								
0-1'	0.02	4.16	2.32	2.96	1.14	3.45	3.70	1.23
1-2'			8.10		0.03	0.02	0.57	4.46
2-3'			0.02		0.01			5.76
3-4'			-		-			-
4-5'			-		-			-
5-6'								
6-7'								
Grid Total or Average (ppm)	0.02	4.16	4.43	2.96	0.58	1.73	2.13	3.17
2' Surface Average (ppm)	0.02	4.16	5.01	2.96	0.71	1.73	2.13	2.56
Volume (cubic yards) Pre Design	300	300	550	300	625	600	600	745
Volume (cubic yards) Remaining	-	300	425	300	400	600	600	522
Volume (cubic yards) Removed In Design	**300**	**-**	**125**	**-**	**225**	**-**	**-**	**224**
Mass (pounds PCBs) Pre Design	6.14	2.60	8.19	1.85	17.05	2.16	2.66	13.18
Mass (pounds PCBs) Remaining	-	2.60	3.93	1.85	0.49	2.16	2.66	3.45
Mass (pounds PCBs) Removed In Design	**6.14**	**-**	**4.26**	**-**	**16.56**	**-**	**-**	**9.73**
WEIGHTED AVERAGES								
% of Measured Sediment	0.00%	1.38%	1.95%	1.38%	1.83%	2.75%	2.75%	2.39%
Contribution to Sediment Concentration (ppm)	-	0.06	0.09	0.04	0.01	0.05	0.06	0.08
% of Sediment Surface	2.10%	2.10%	2.10%	2.10%	2.10%	2.10%	2.10%	2.09%
Contribution to SWAC (ppm)	0.000	0.087	0.049	0.062	0.024	0.072	0.078	0.026

Appendix C
Design Remedy
Middle River Deposits

Deposits	Totals or Averages	10, 11, 12, 13	14, 15, 16	17, 18	19, 20, 21	22, 23	24	25	26	27	28	29, 30	31	32, 33	34	35, 36	37	38, 39
Area (square feet)	132,967.00	6,001.92	3,140.42	1,944.67	3,549.99	5,172.86	4,468.38	7,850.20	7,027.15	4,193.17	9,837.17	7,411.88	2,573.97	2,485.04	3,220.58	1,914.21	1,037.44	4,516.54
Average Thickness (feet)	1.25	1.25	1.21	1.36	1.08	1.38	1.50	2.15	1.54	1.03	1.03	1.17	1.00	1.30	1.17	1.06	1.17	1.32
PCB Concentration in ppm	1.69	0.54	10.10	0.61	1.06	1.32	1.68	0.88	14.20	0.21	0.64	0.53	0.76	3.95	0.58	2.29	3.66	0.94
Volume (cubic yards)	6325.00	242.59	121.68	92.61	137.85	259.14	248.24	625.00	400.81	159.96	375.27	319.97	95.33	124.14	139.56	84.97	44.96	220.37
Mass (pounds of PCBs)	32.32	0.37	3.43	0.16	0.41	0.95	1.16	1.54	15.88	0.09	0.67	0.47	0.20	1.37	0.22	0.54	0.46	0.58
WEIGHTED AVERAGES																		
% of Sediment Surface		4.51%	2.36%	1.46%	2.67%	3.89%	3.36%	5.90%	5.28%	3.15%	7.40%	5.57%	1.94%	1.87%	2.42%	1.44%	0.78%	3.40%
Contribution to SWAC	1.71	0.02	0.24	0.01	0.03	0.05	0.06	0.05	0.75	0.01	0.05	0.03	0.01	0.07	0.01	0.03	0.03	0.03

Appendix C
Design Remedy
Middle River Deposits

Deposits	40	41, 42	43	44, 45	46	47, 48, 49	50, 51,52, 53	54, 55, 56	57	58, 59	60, 61	62, 63	64
Area (square feet)	10,383.82	5,848.75	2,436.08	2,659.71	2,769.41	4,056.31	6,887.40	7,013.64	5,815.35	2,401.45	3,432.25	1,573.11	1,344.13
Average Thickness (feet)	1.47	1.11	1.35	1.04	1.19	1.21	1.07	1.13	1.20	1.25	1.69	0.96	1.14
PCB Concentration in ppm	0.40	0.54	0.37	0.18	1.01	0.10	0.36	1.04	0.46	0.93	0.52	0.32	0.50
Volume (cubic yards)	565.34	270.21	121.80	102.88	122.06	170.80	275.54	301.63	258.46	108.67	222.57	55.84	56.75
Mass (pounds of PCBs)	0.62	0.40	0.12	0.05	0.34	0.05	0.28	0.88	0.33	0.28	0.33	0.05	0.08
WEIGHTED AVERAGES													
% of Sediment Surface	7.81%	4.40%	1.83%	2.00%	2.08%	3.05%	5.18%	5.27%	4.37%	1.81%	2.58%	1.18%	1.01%
Contribution to SWAC	0.03	0.02	0.01	0.00	0.02	0.00	0.02	0.05	0.02	0.02	0.01	0.00	0.01

ENGINEERING CALCULATION #1

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River	BY: KDA DATE: 03/10	BY: ________ DATE: ________	

SUBJECT:

Calculate the kinematical rate constant based on the following:

1)	5.60	ppm	t(0)	ROD Table 2, Page 9, indicating the Inner Harbor's surface average concentration at the time of the RI. This value is a compilation of several data sets from prior investigations.
2)	1.63	ppm	t(1)	Pre Design Investigation SWAC
3)	1990	Yr		This is the date of the most recent data set from prior investigations.
4)	2009	Yr		Pre-Design Year

DESIGN BASIS CALCULATION:

1)	**19**	Yr	t	*Formula: Pre-Design Year, t(1) – Remedial Investigation Year, t(0)* t = 2009-1990 = 19 years
2)	**0.065**		k	*Formula: k = - LN [t(1)/t(0)] * 1/ t* k = -LN(1.63/5.60) * 1/19 = 0.065

ENGINEERING CALCULATION #2

____ SHEET ___1___ OF___2____

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River	BY: KDA DATE: 12/09	BY: __________ DATE: __________	

SUBJECT:

Calculate the attenuation schedule based on the following:

1)	0.065	ppm	k	Kinematical Rate Constant
2)	0.50	ppm	t(0)	Remedial Action Objective SWAC
3)	Varies, See below	ppm	t(1)	Projected SWAC after Sediment Removal

DESIGN BASIS CALCULATION:

1) *Formula: t = - LN [t(1)/t(0)] * 1/ k*

Post Removal Surface Concentration (ppm) t(1)	Time (years) to .5 ppm SWAC t
0.55	**1.46**
0.65	**4.03**
0.75	**6.23**
0.85	**8.15**
0.95	**9.86**
1.05	**11.40**
1.15	**12.79**
1.25	**14.08**
1.35	**15.26**
1.45	**16.36**
1.55	**17.38**
1.65	**18.34**
1.75	**19.24**
1.85	**20.10**
1.95	**20.91**
2.05	**21.67**
2.15	**22.41**
2.25	**23.10**
2.35	**23.77**
2.45	**24.41**
2.55	**25.03**
2.65	**25.62**
2.75	**26.19**
2.85	**26.74**
2.95	**27.27**
3.05	**27.78**

ENGINEERING CALCULATION #2

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River	BY: KDA DATE: 12/09	BY: ________ DATE: ________	

3.15	**28.27**
3.25	**28.75**
3.35	**29.22**
3.45	**29.67**
3.55	**30.11**
3.65	**30.54**
3.75	**30.95**
3.85	**31.36**
3.95	**31.75**
4.05	**32.13**
4.15	**32.51**
4.25	**32.87**
4.35	**33.23**
4.45	**33.58**
4.55	**33.92**
4.65	**34.26**
4.75	**34.58**
4.85	**34.90**
4.95	**35.22**
5.05	**35.52**
5.15	**35.82**
5.25	**36.12**
5.35	**36.41**
5.45	**36.69**
5.55	**36.97**
5.65	**37.25**
5.75	**37.52**
5.85	**37.78**
5.95	**38.04**
6.05	**38.30**

ENGINEERING CALCULATION #3

____ SHEET ____1___ OF____1______

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River	BY: KDA DATE: 12/09	BY: __________ DATE: __________	

SUBJECT:

Calculate the daily sediment removal volume based on the following:

1)	2,100	gpm	Flow rate	Dredge pump volume with an operating point of 3,000 gpm @ 150' of head, 1132 rpm, and 70% efficiency
2)	12	%	Percent solids	Average percent solids experienced dredging the Upper River
3)	6	hrs	Uptime hours	Uptime hours in a 7.5 run day and 80% run efficiency

DESIGN BASIS CALCULATION:

1)	**448**	cy	Daily sediment volume	*Formula: (flow rate x 1 ft^3/7.48 gal x 1 cy/27 ft^3) x (percent solids/100) x (operation hours x 60 min/1 hr)* Volume = (2,100 gpm x 1 ft^3/7.5 gal x 1 cy/27 ft^3) x (12/100) x (6 hr x 60 min/hr) = 448 cy

ENGINEERING CALCULATION #4

____ SHEET ___1___ OF___1____

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River	BY: KDA DATE: 12/09	BY: ________ DATE: ________	

SUBJECT:

Calculate the daily water removal volume based on the following:

1)	2,100	gpm	Flow rate	Dredge pump volume with an operating point of 3,000 gpm @ 150’ of head, 1132 rpm, and 70% efficiency
2)	88	%	Percent water	Percent water = 100 – Percent solids (12%)
3)	6	hrs	Uptime hours	Uptime hours in a 7.5 run day and 80% run efficiency

DESIGN BASIS CALCULATION:

1)	**665,000**	gal	Daily water volume	*Formula: (flow rate) x (percent water/100) x (operation hours x 60 min/1 hr)* Volume = (2,100 gpm) x (88/100) x (6 hr x 60 min/hr) = 665,000

ENGINEERING CALCULATION #5

____ SHEET ___1___ OF___1_____

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River	BY: KDA DATE: 3/10	BY: __________ DATE: __________	

SUBJECT:

Calculate the dewatering area volume capacity based on the following:

1)	1,100	CY	Dewatering capacity of each geotextile tube	Each geotextile tube (200ft by 60 ft circumference) can hold approximately 6.0 CY per lineal foot. Therefore, each 200 foot long tube can dewater approximately 200 ft x 6.0 CY/ft = 1,200 CY.

CALCULATION:

1)	14,400	CY	Dewatering capacity of first layer of geotextile tube	The first layer of geotextile tubes will consist of two rows of 6 tubes per row or 12 geotextile tubes. Each tube can dewater approximately 1,200 CY therefore the first layer of geotextile tubes will has a capacity of approximately = 12 tubes x 1,200 CY/tube = 14,400 CY.
2)	12,000	CY	Dewatering capacity of second layer of geotextile tube	The second layer of geotextile tubes will consist of two rows of 5 tubes per row or 10 geotextile tubes. Each tube can dewater approximately 1,200 CY therefore the first layer of geotextile tubes will has a capacity of approximately = 10 tubes x 1,200 CY/tube = 12,000 CY.
4)	26,400	CY	Total capacity of two layers of geotextile tubes	The total capacity of the two layers of tubes is the first layer plus the second layer capacity = 14,400CY + 12,000 CY = 26,400 CY.

Therefore, geotextile tubes will need to be either loaded out/changed out twice if two layers are used or four times if a single layer is used to meet the Design quantity of 50,548 CY.

ENGINEERING CALCULATION #6

SHEET ____1____ OF ___1______

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River	BY: KDA DATE: 3/10	BY: __________ DATE: __________	

SUBJECT:

Calculate the dewatering area berm height based on the following:

1)	2.2	Inches	Precipitation	Rainfall amount for a 1-yr, 24-hr storm event in Sheboygan County. Acquired from WDNR publication on sediment basin design.
2)	76,857	Ft^2	Area of dewatering pad	Area of dewatering pad.
3)	66,000	Ft^2	Area displaced by geotextile tubes	The geotextile tubes will be placed in two columns with eight rows in each column. The geotextile tubes will be approximately 200 feet long and 30 feet wide. Area = 2 columns x 6 rows/column x 27.5 feet wide x 200 feet long/unit = 66,000 square feet.
4)	1.5		Safety Factor	Conservative safety factor.

CALCULATION:

1)	10,857	Ft^2	Area available for containment	Area = Area of dewatering pad – Area displaced by geotextile tubes Area = 76,857 – 66,000 = 10,857 square feet.
2)	21,135	Ft^3	Volume of rain event on dewatering pad	2.2 inches x 1 ft/12 inches x 76,857 ft^2 = 14,090 ft^3 x 1.50 = 21,135 ft^3
3)	2.00	Ft	Berm height	Minimum berm height = 21,135 ft^3/10,857 ft^2 = 1.95 ft = 2.00 ft

ENGINEERING CALCULATION #7

____ SHEET ___1___ OF____1____

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NUMBER
Sheboygan River	BY: KDA DATE: 3/10	BY: __________ DATE: __________	

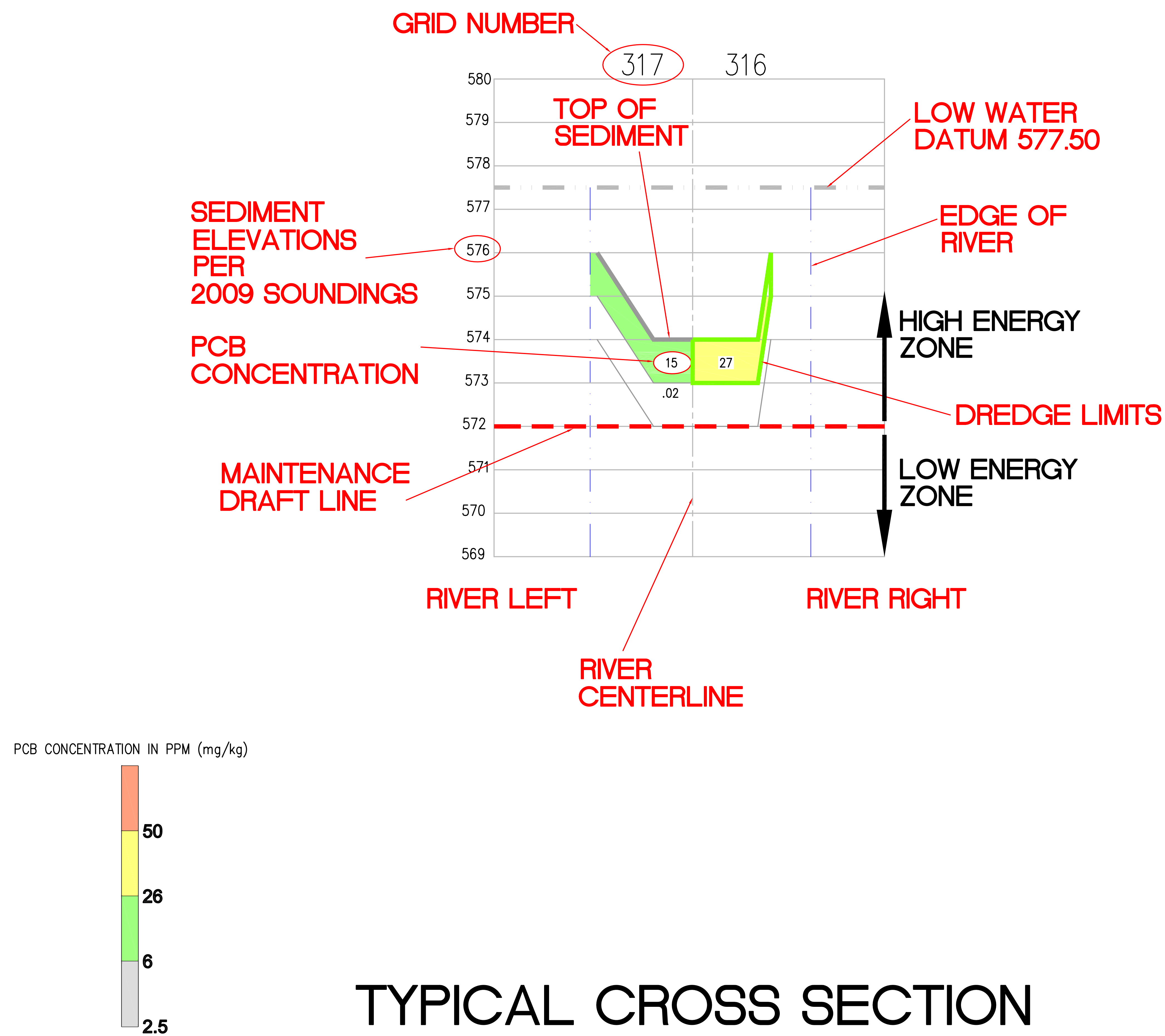
SUBJECT:

Calculate the WWTP capacity based on the following:

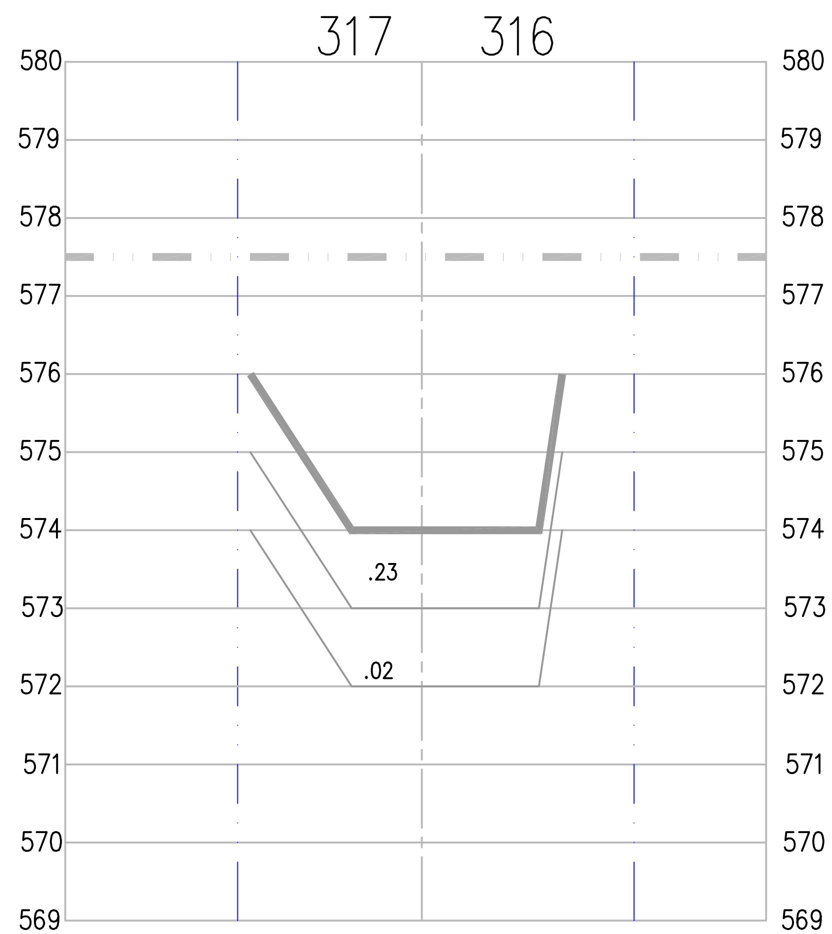
1)	1,848	gpm	Dredge flow rate	Dredge flow rate using operating point of 2,100 gpm with 88% water
2)	73	gpm	Precipitation flow rate	Precipitation flow rate using a 1-yr, 24-hr rainfall event (2.2. inches) on a 76,857 square foot dewatering pad (Calculation #5) Flow rate = (2.2 inches) x (ft / 12 in) x (76,857 sq f) x (7.5 gal/ft3) x (day / 1440 min.) = 73 gpm.
3)	133	gpm	Backwash flow rate	Backwash flow rate using a flow rate of 1,000 gpm through 3 multi-media filters and 600 gpm through 3 GAC filters once an operation day for 20 minutes. Operational day = 12 hours x 60 min/1 hour = 720 min Flow rate = 1,000 gpm x ((3 x 20 min)/720 min)) + 600 gpm x ((3 x 20 min)/720 min)) = 133 gpm.

CALCULATION:

1)	**2,054**	gpm	WWTP capacity	Total flow rate = 1,848 gpm + 73 gpm + 133 gpm = 2,054 gpm.



TYPICAL CROSS SECTION



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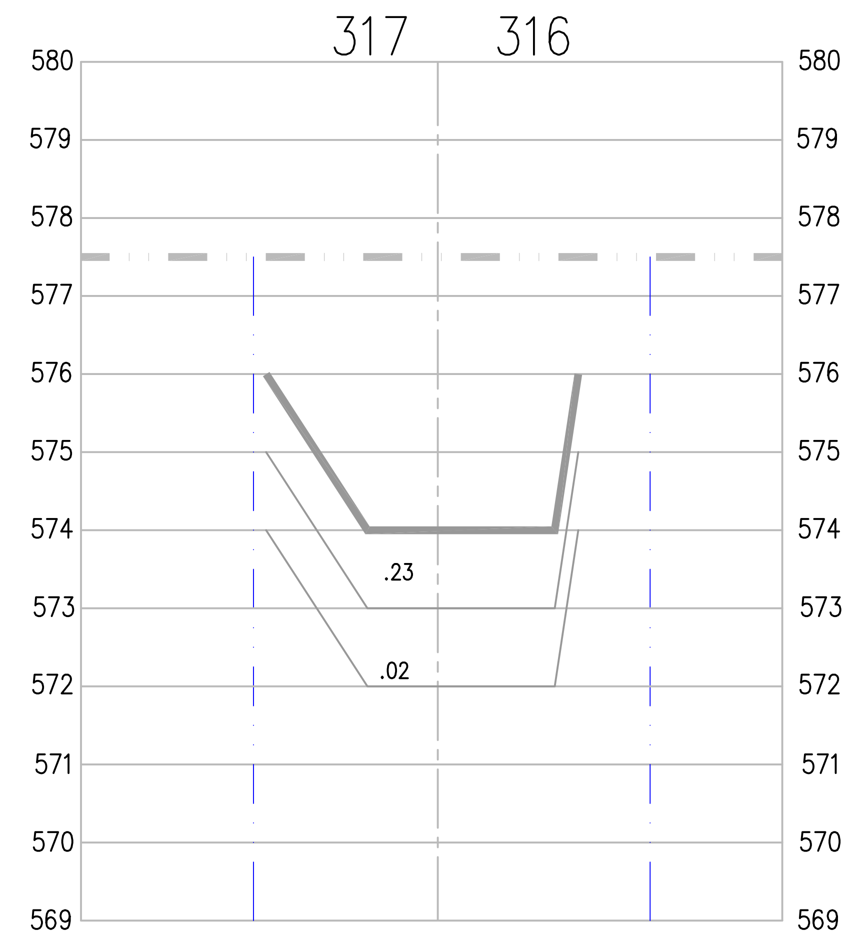

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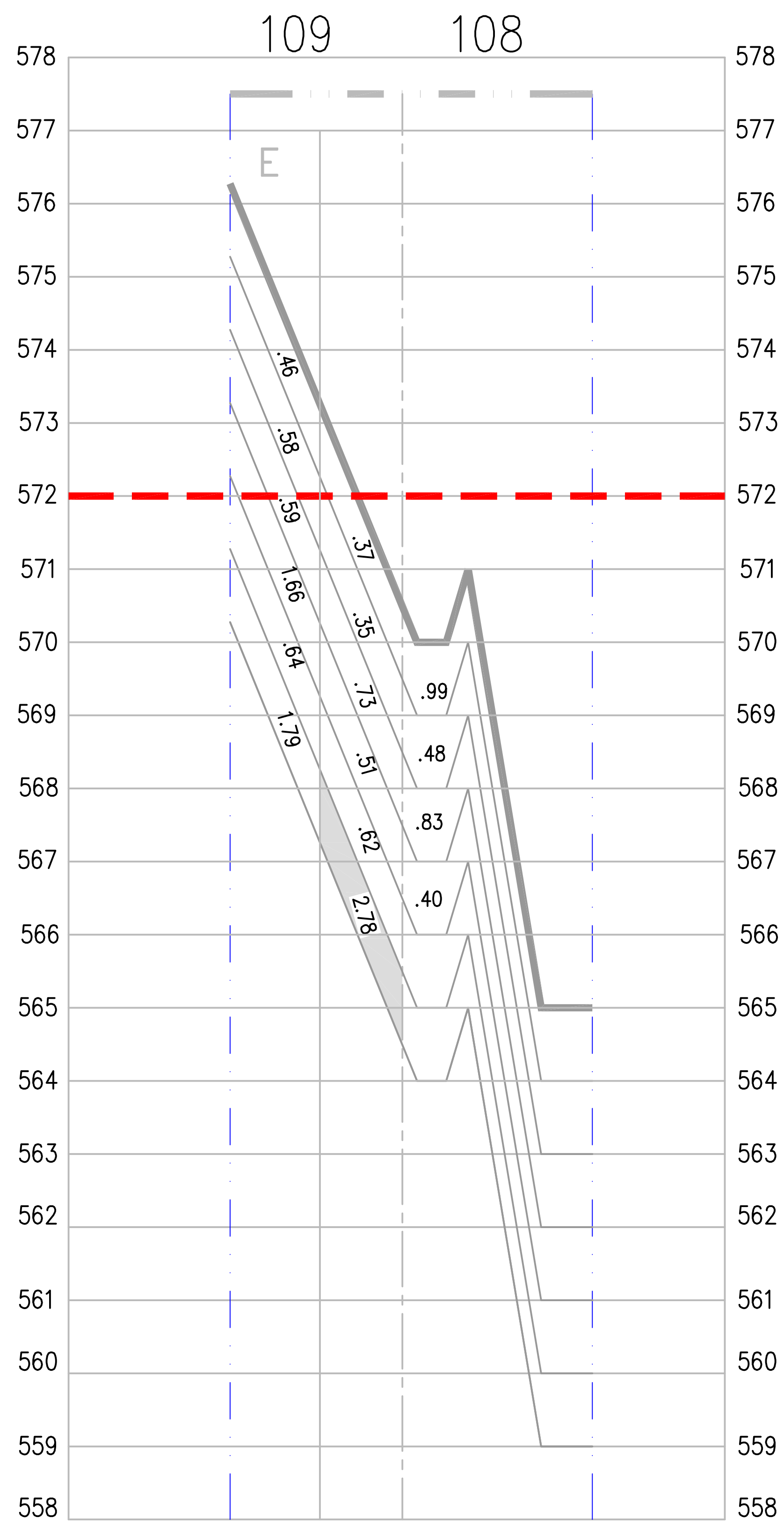

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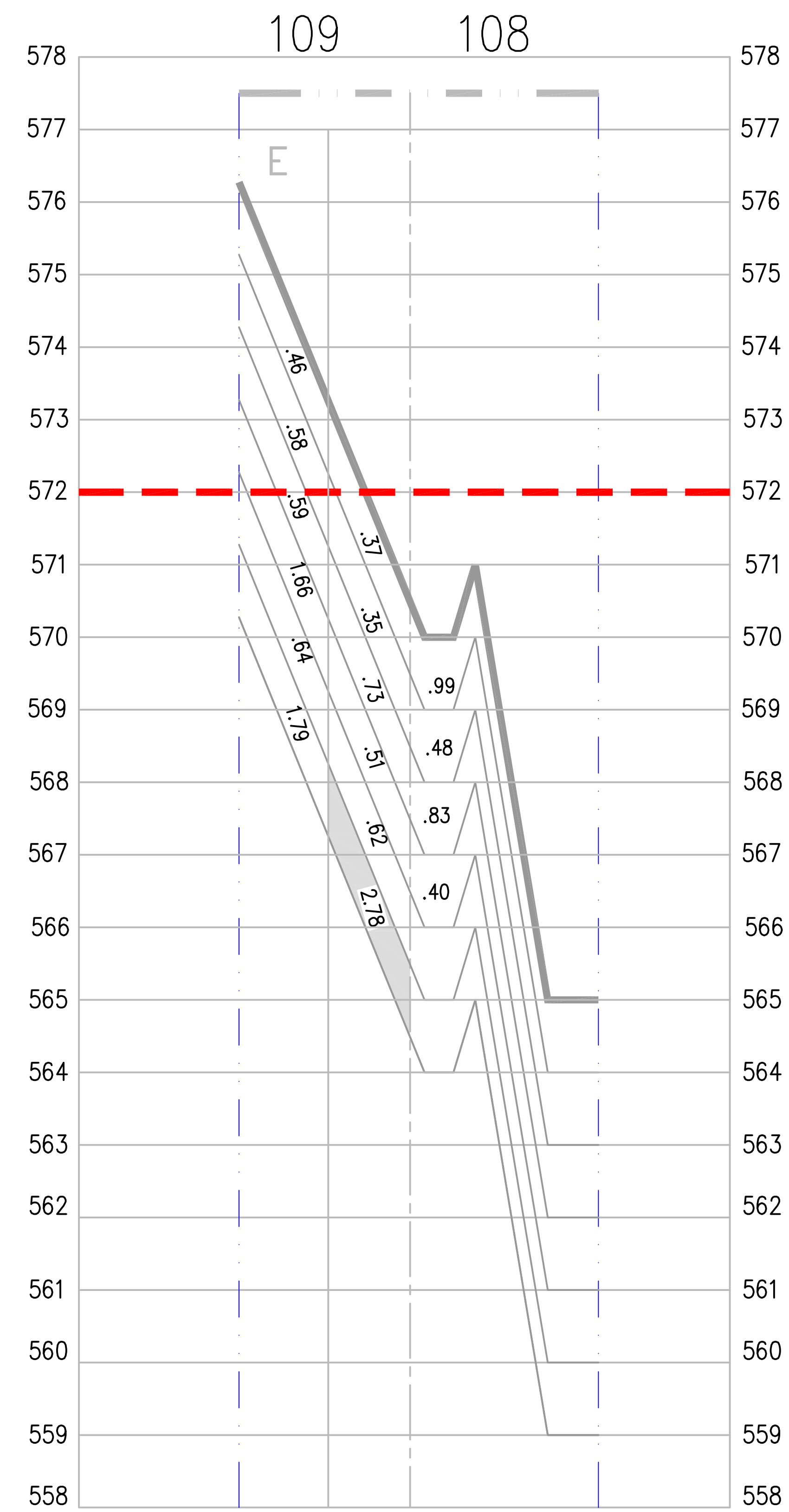

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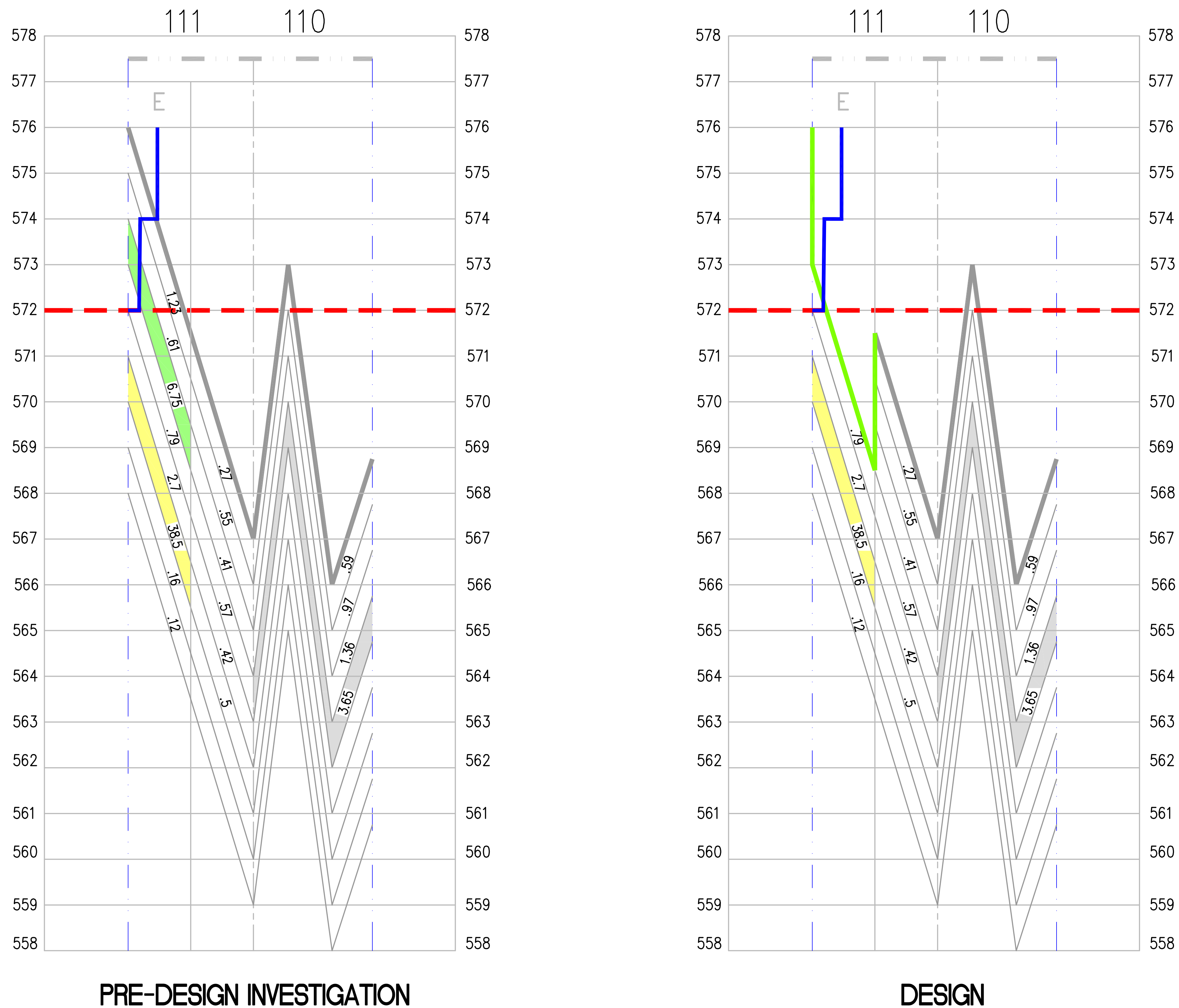

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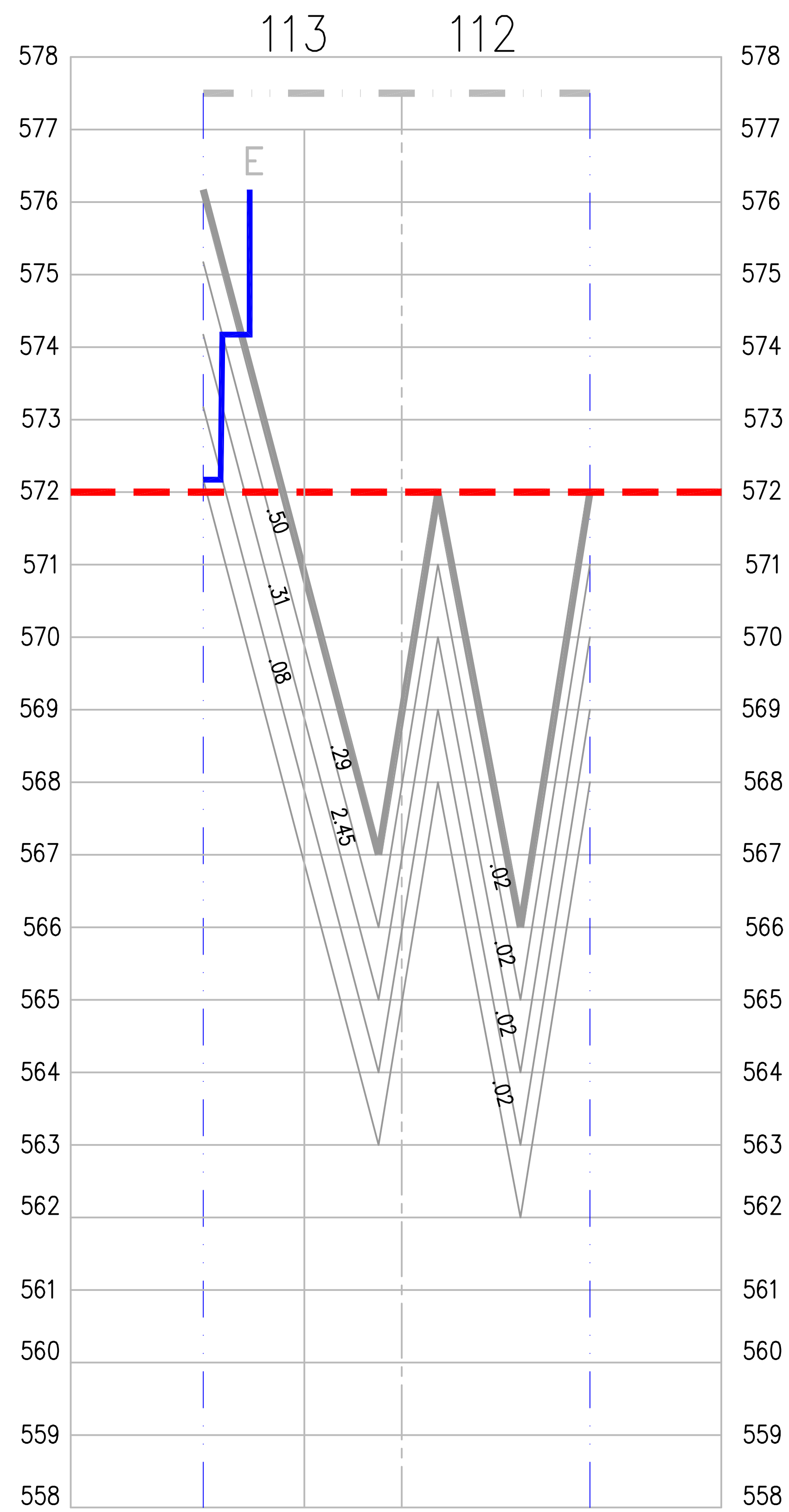

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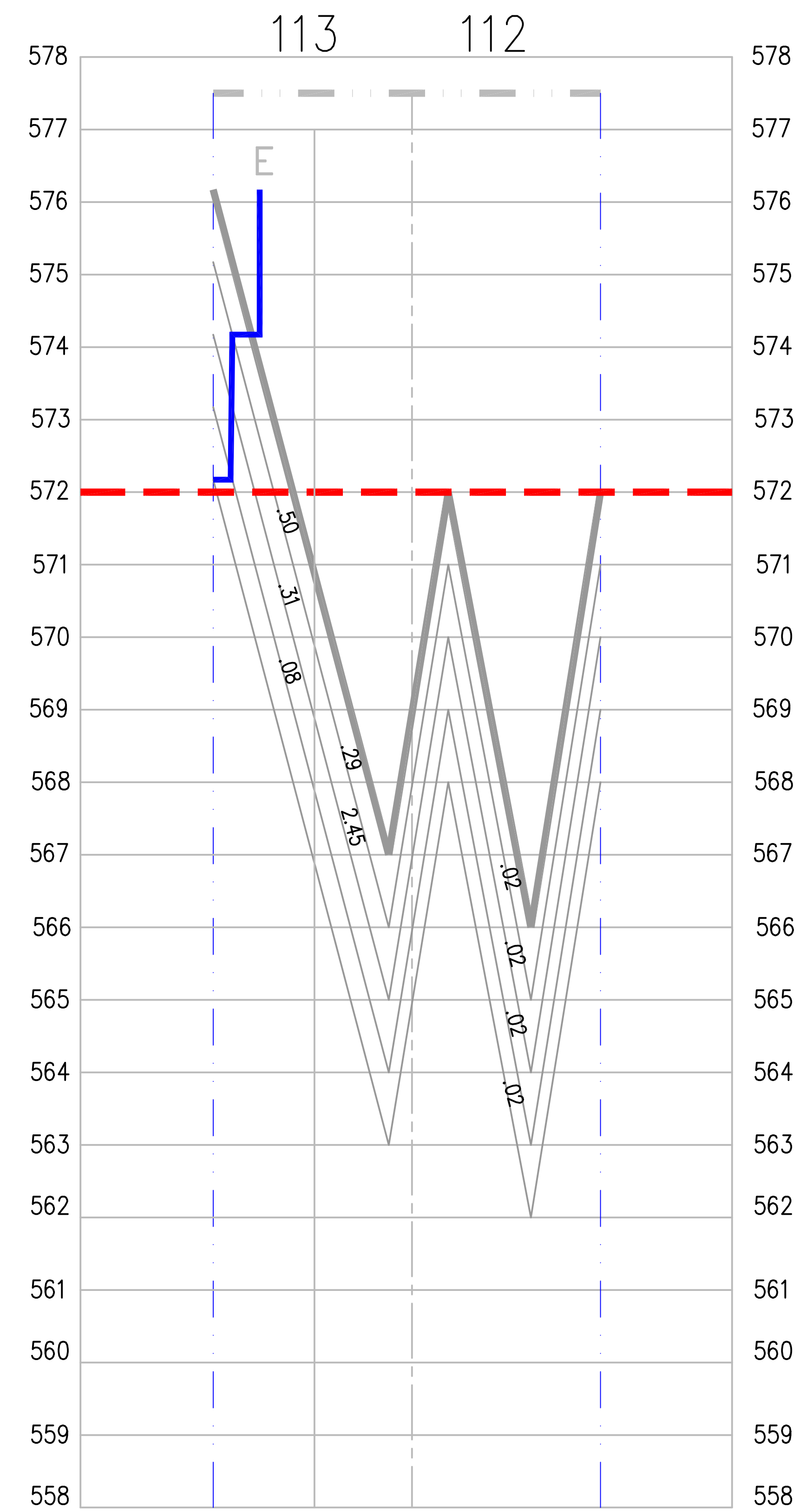

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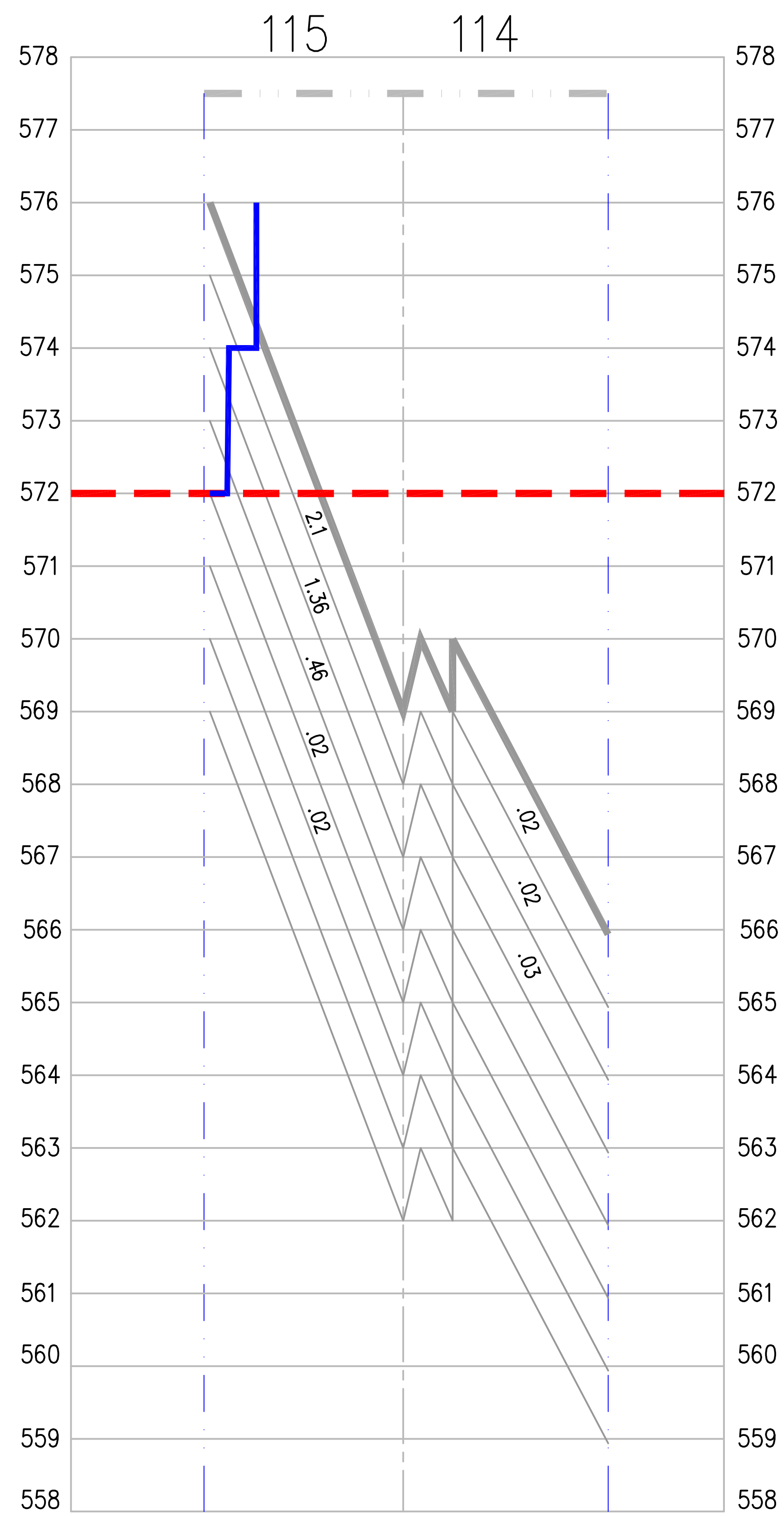

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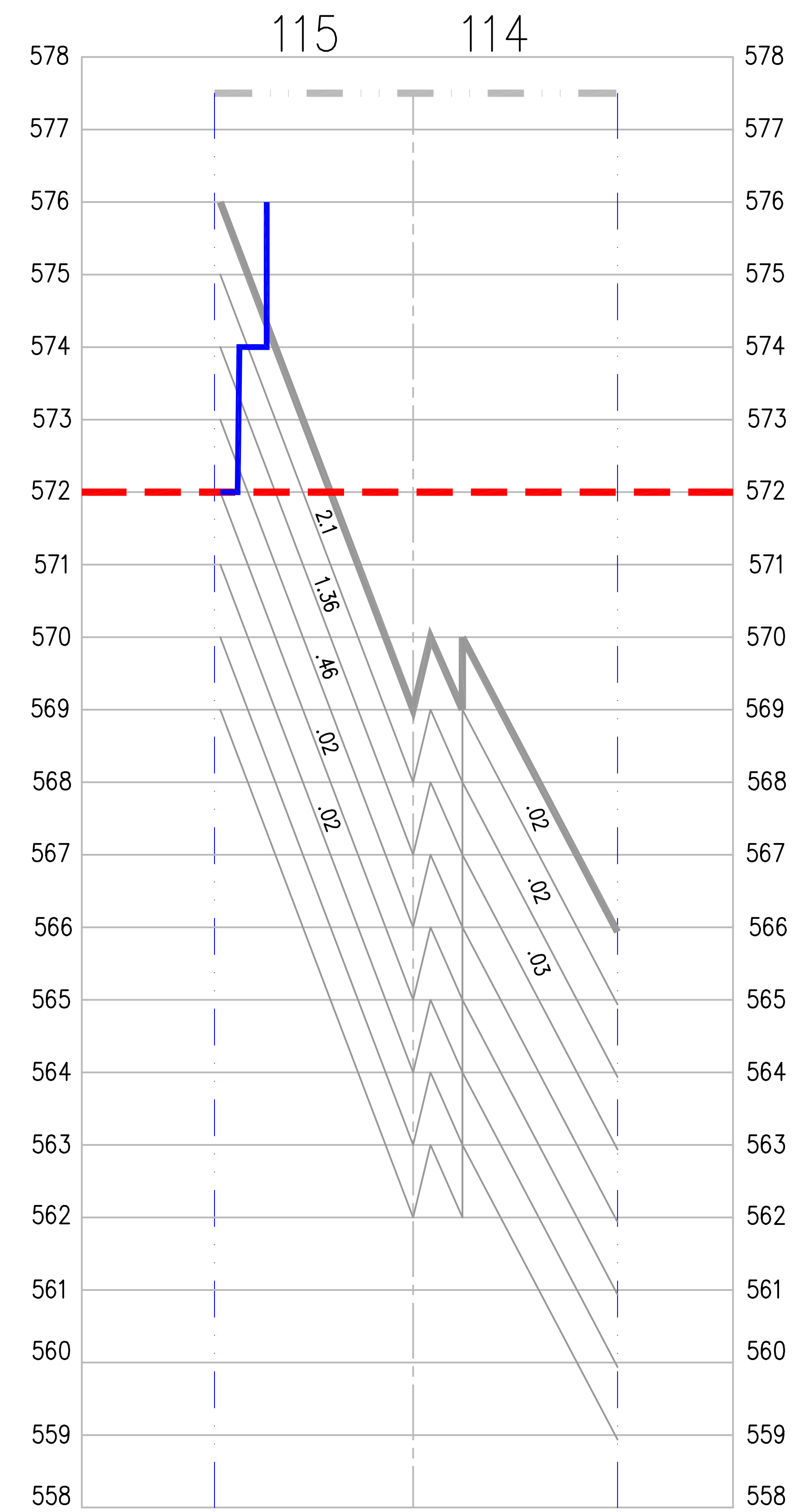

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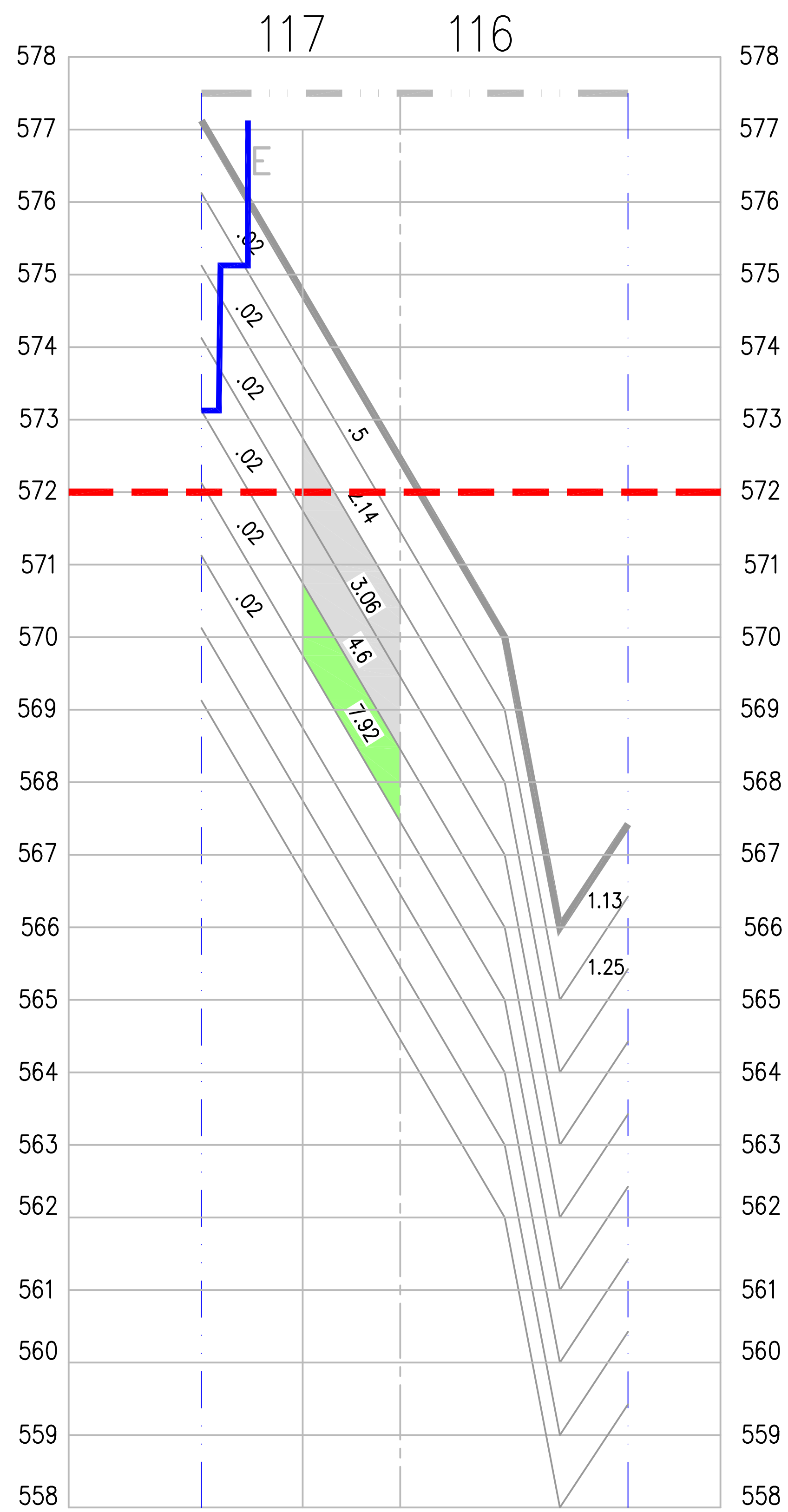

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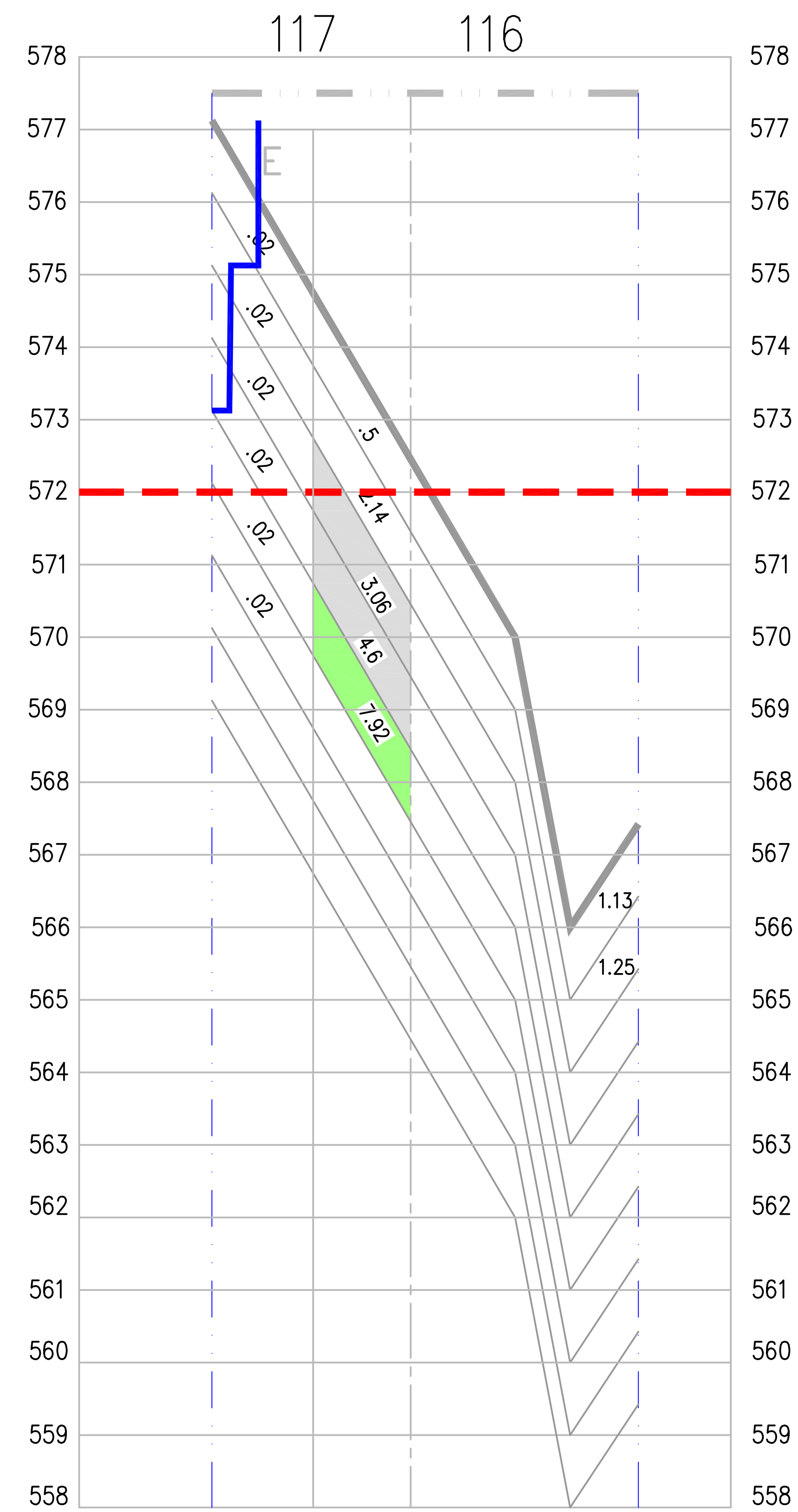

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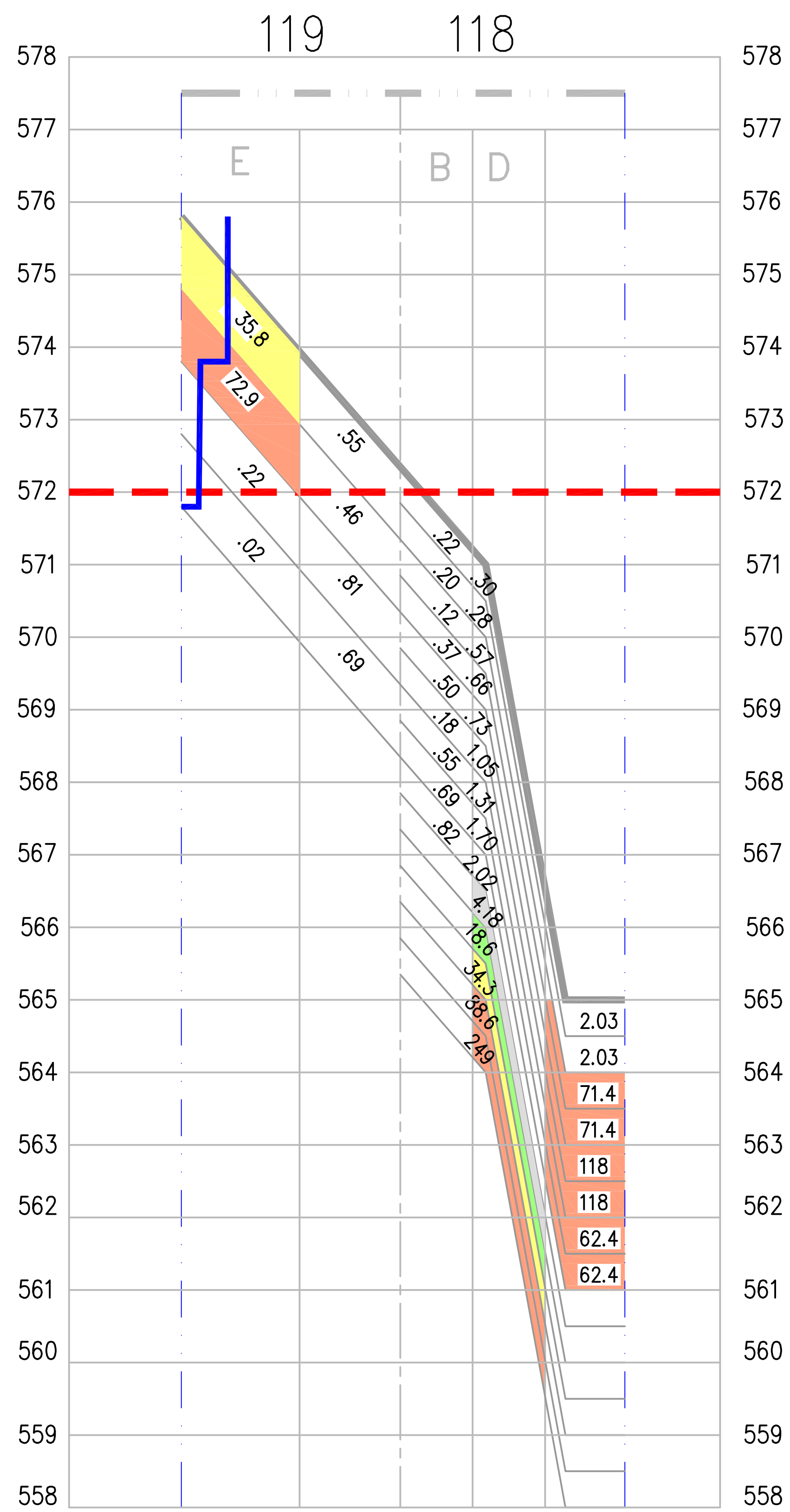

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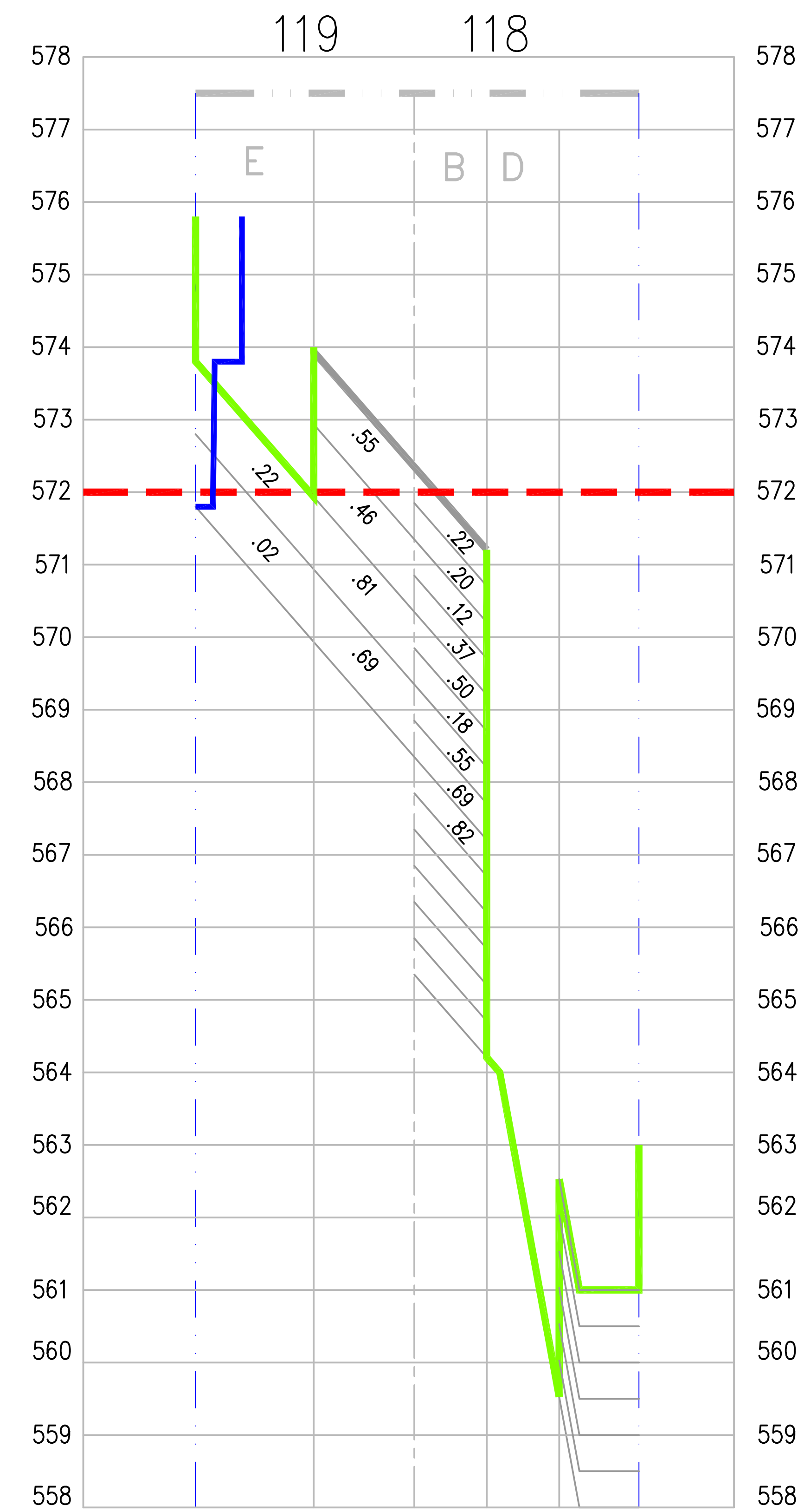

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GRID 119 - 118 DOWNRIVER

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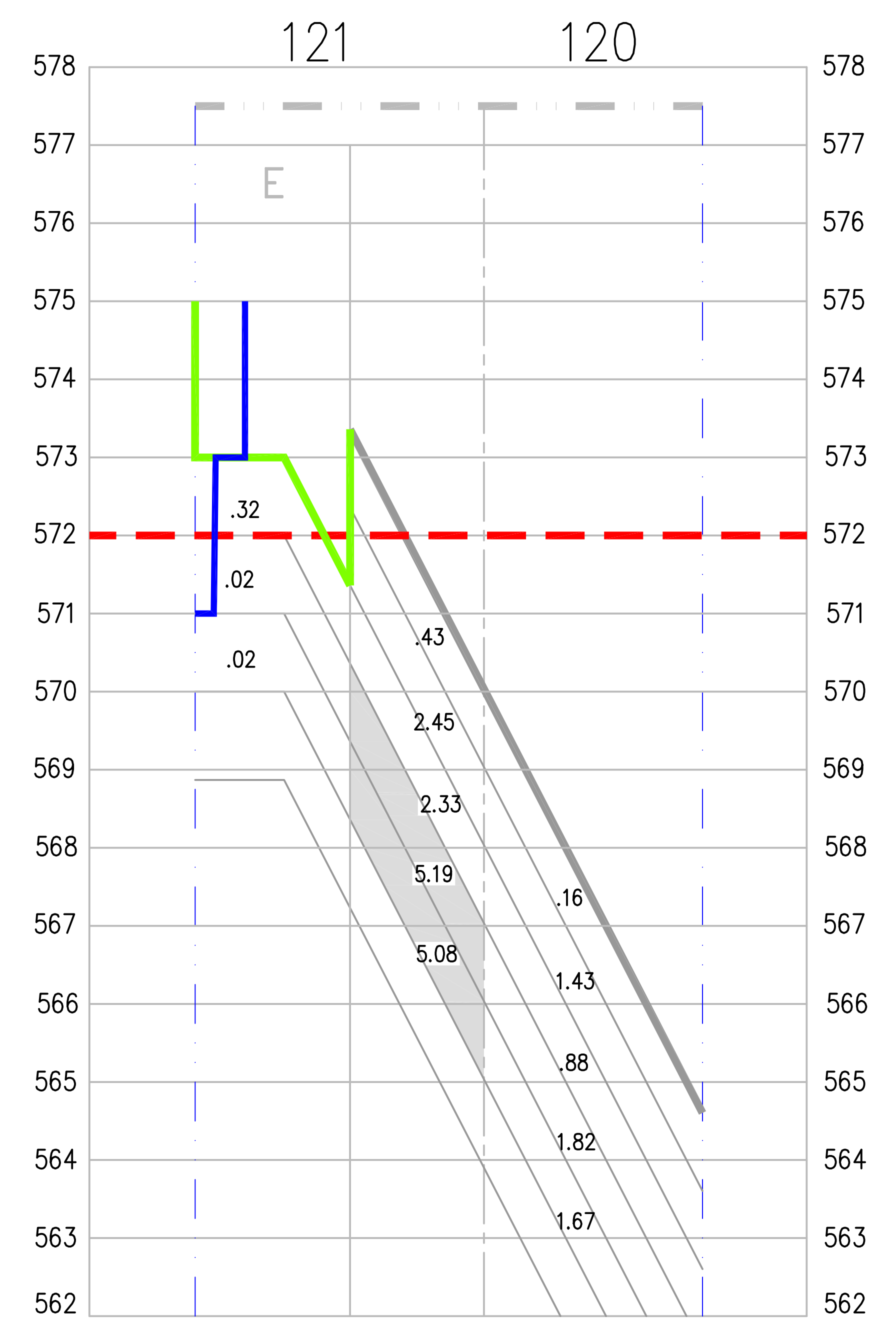

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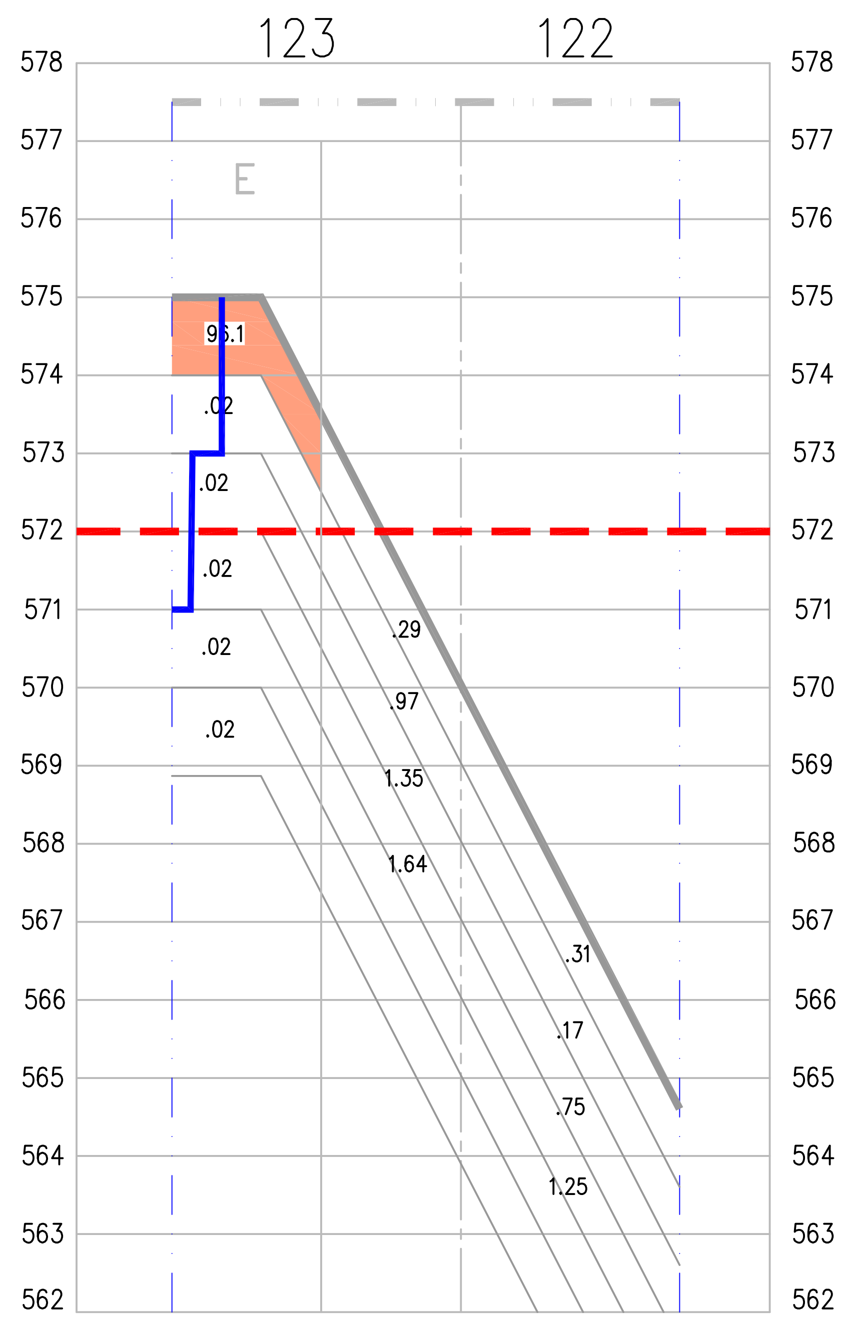

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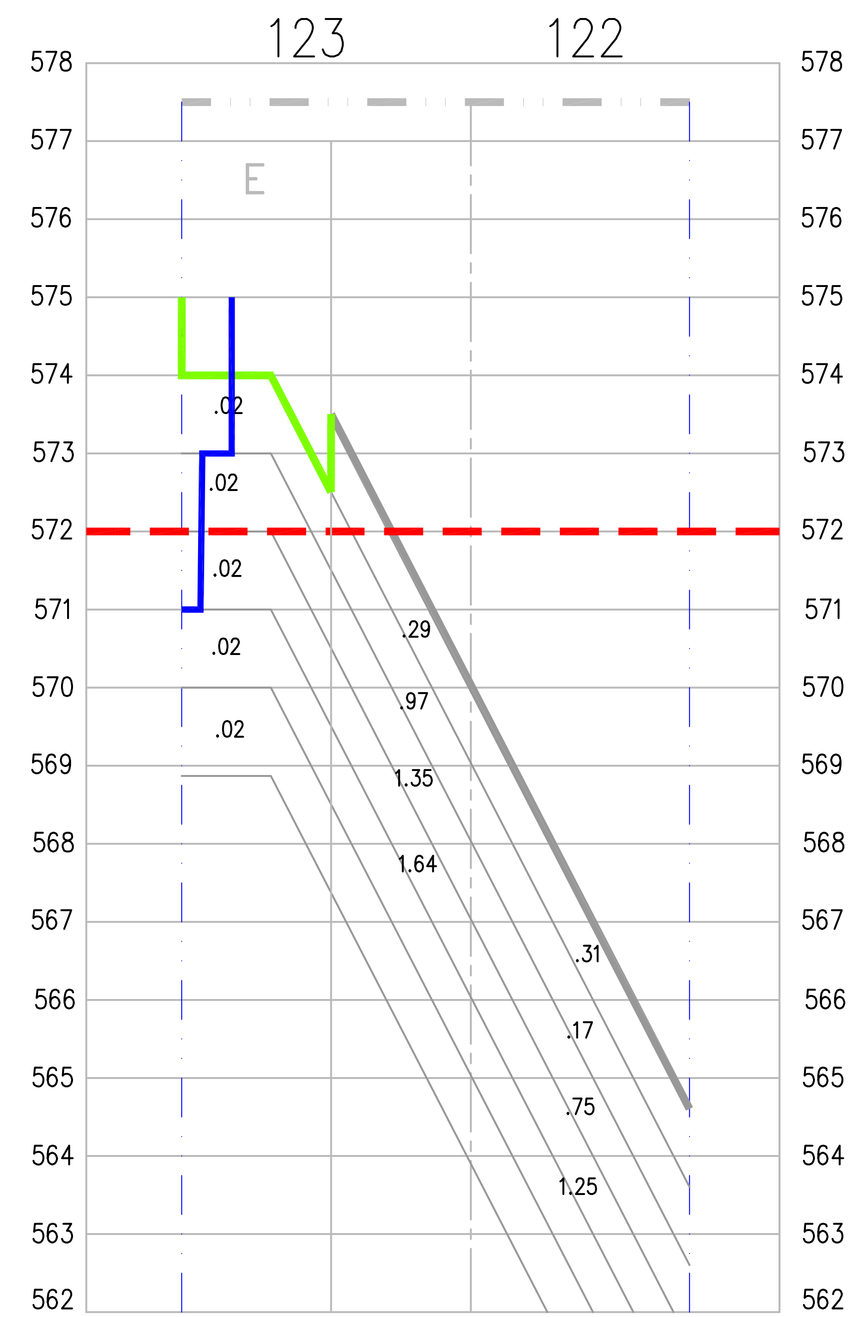

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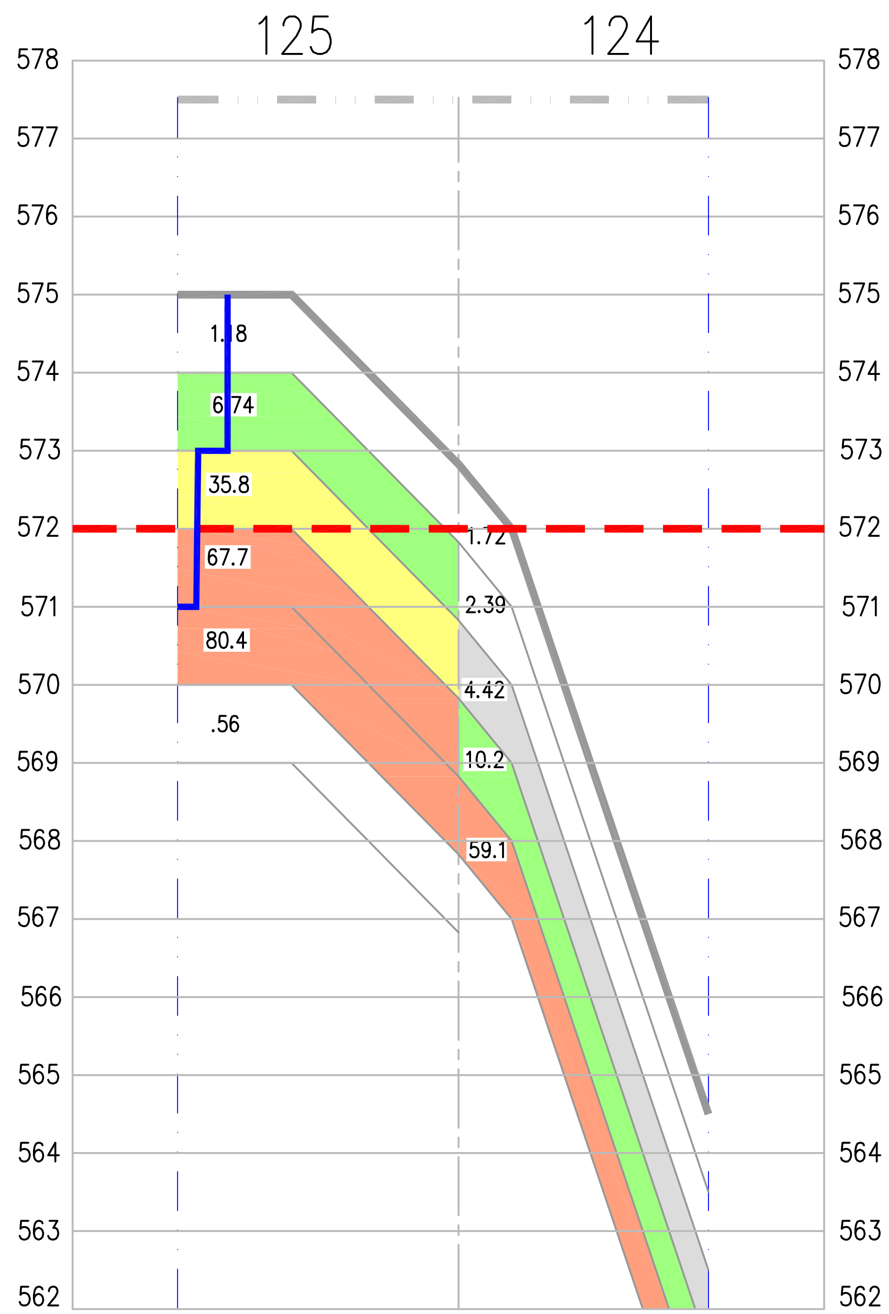

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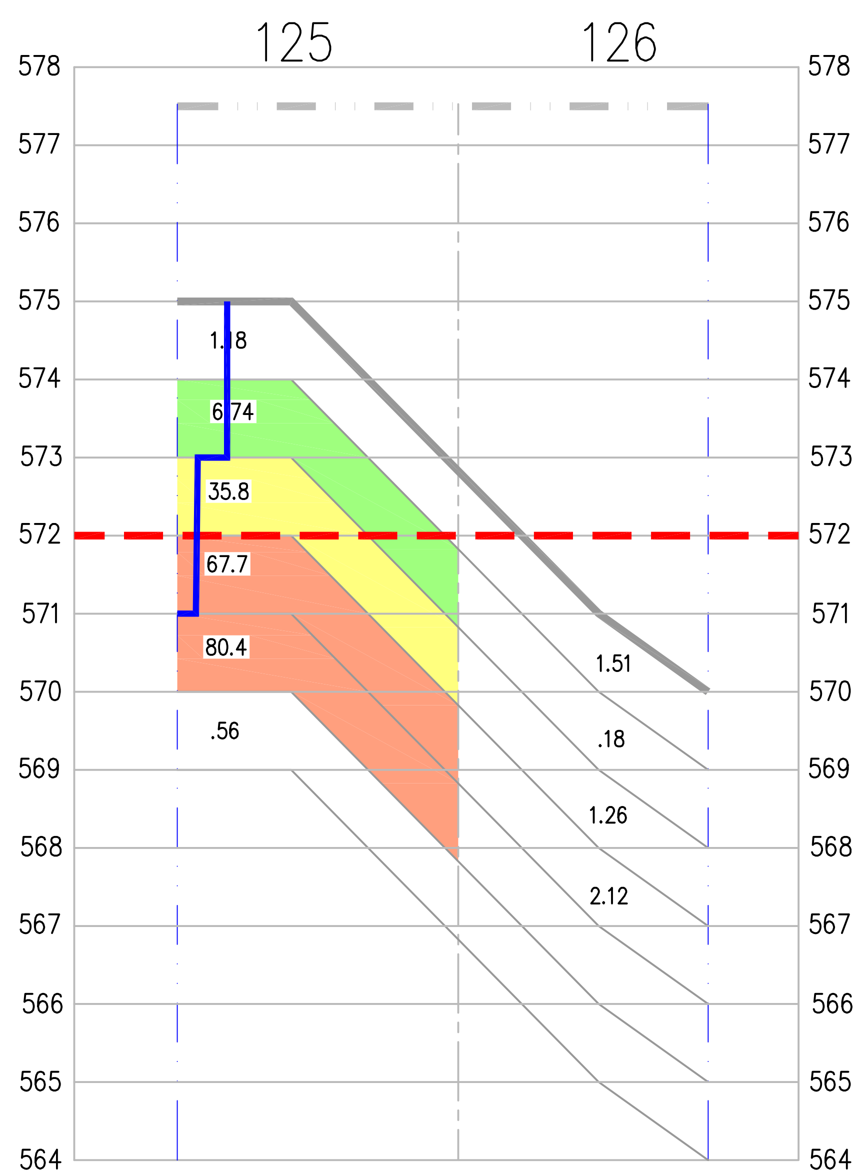

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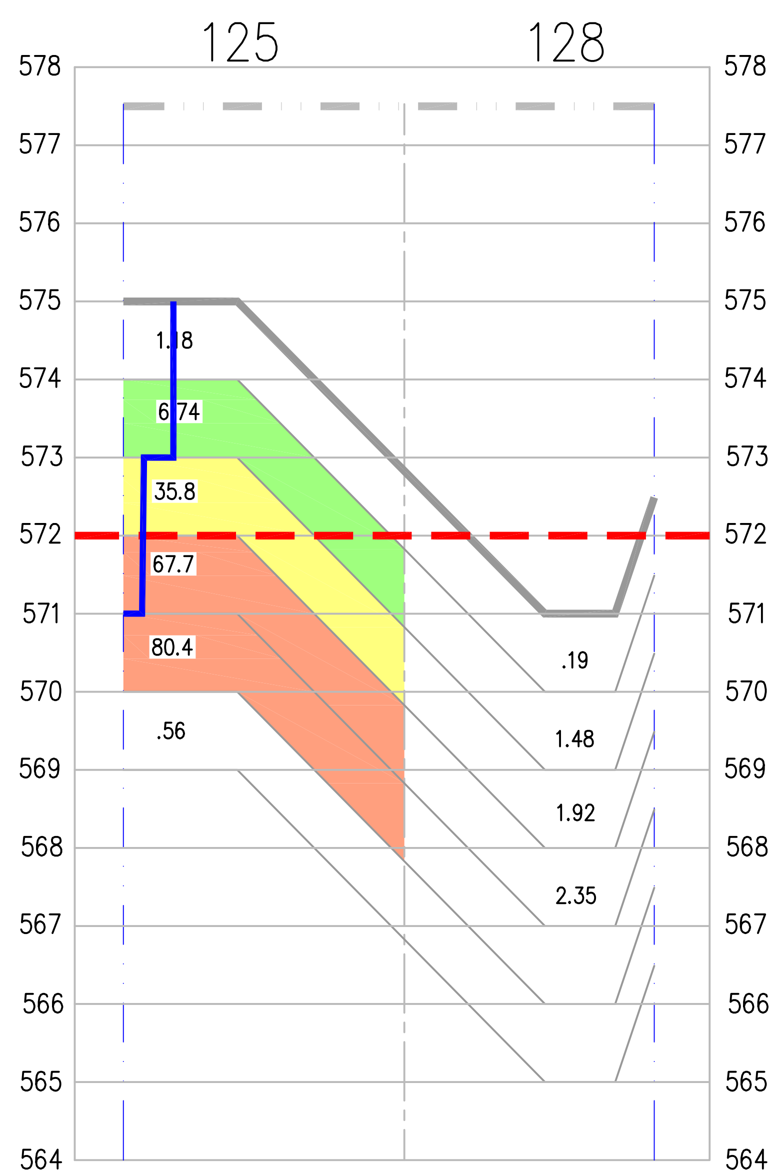

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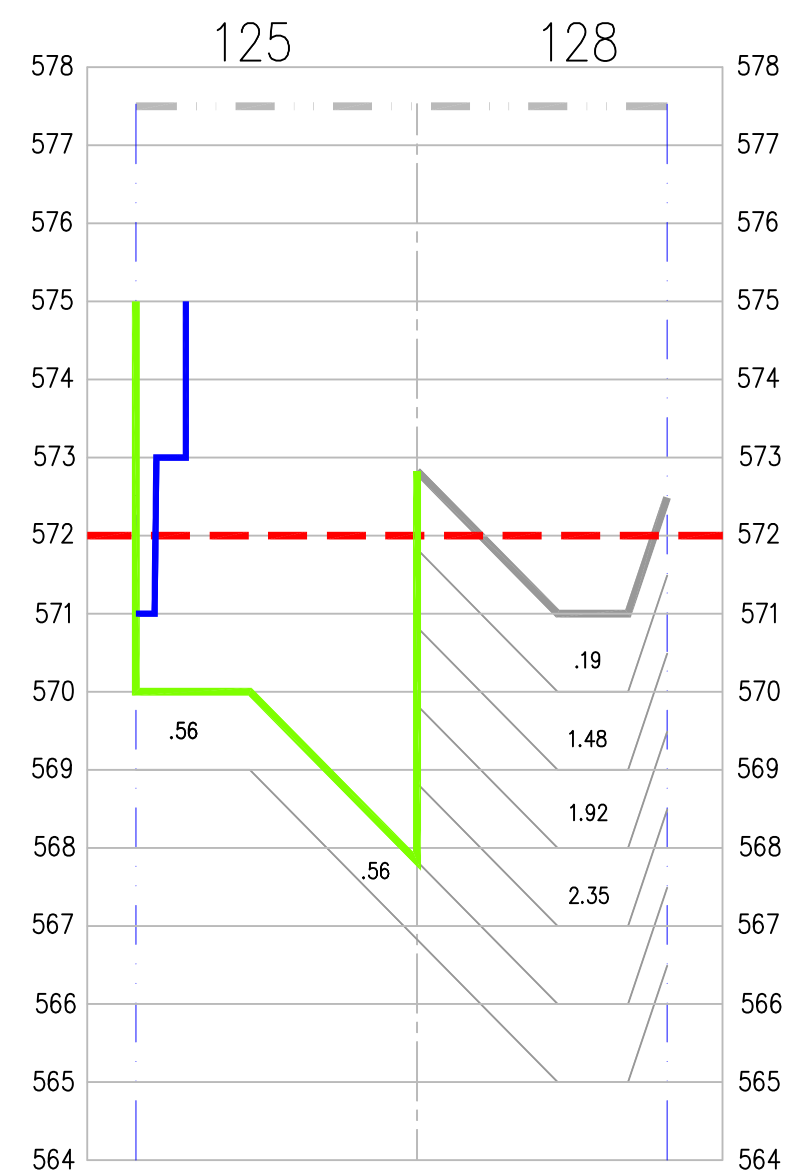

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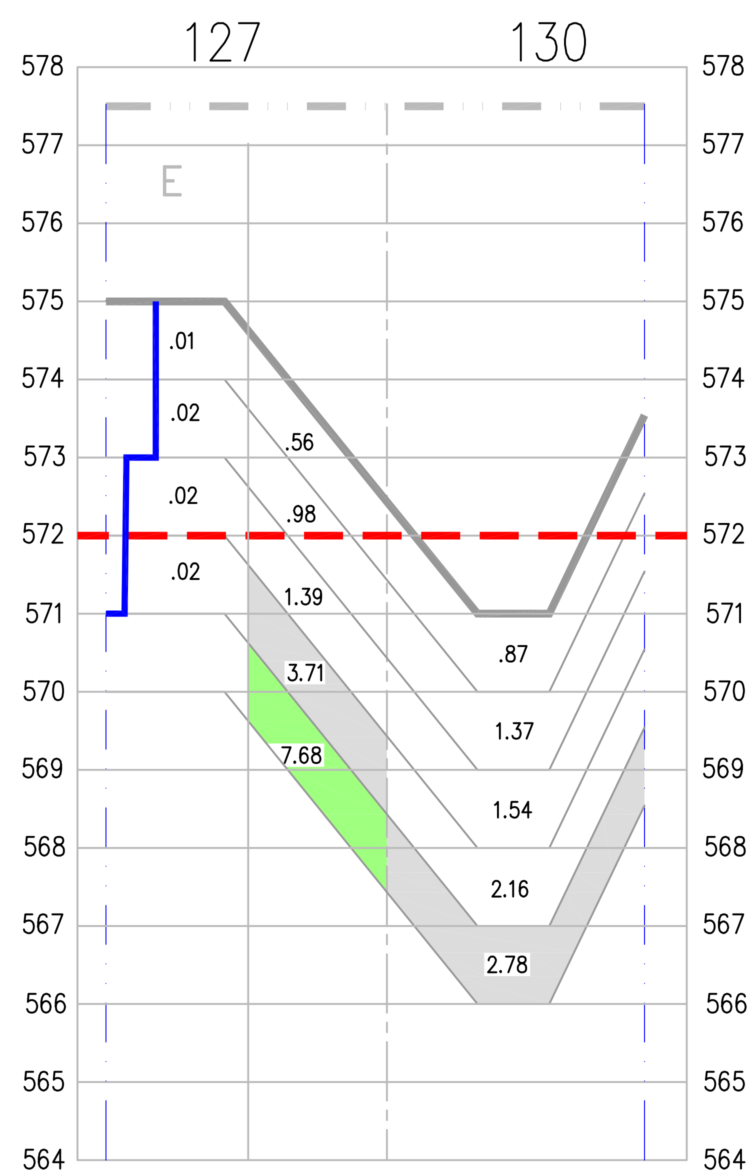

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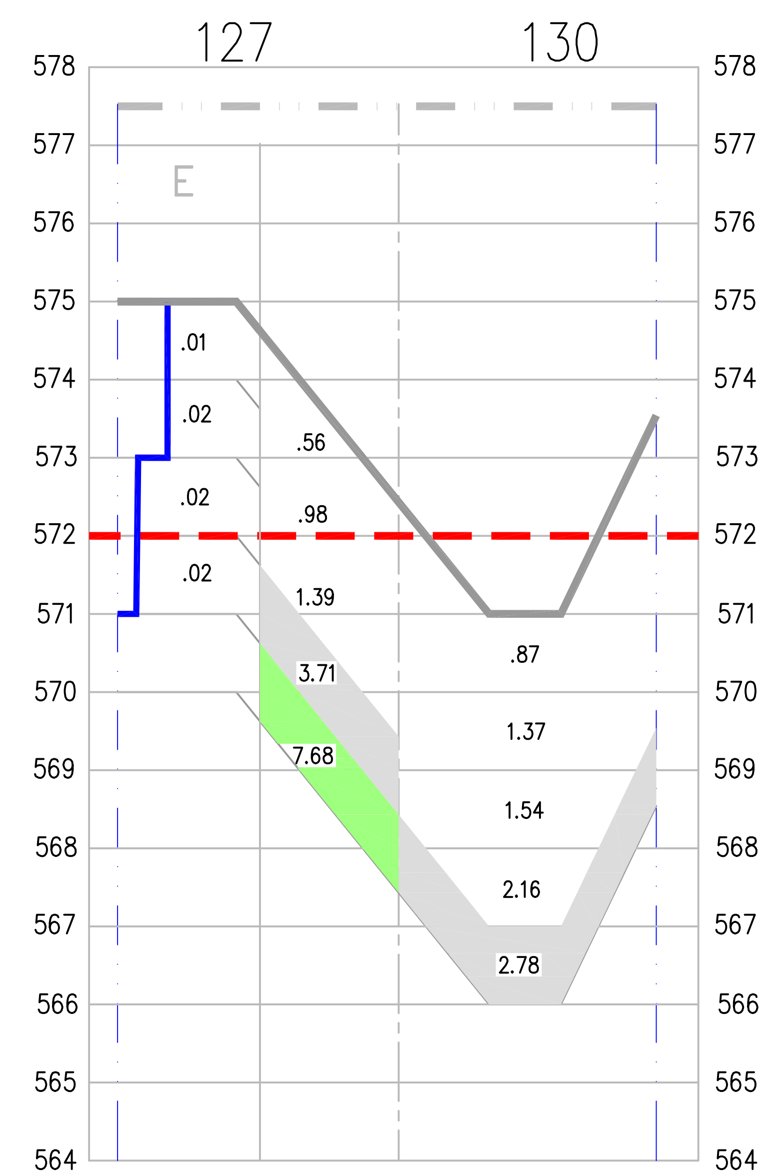

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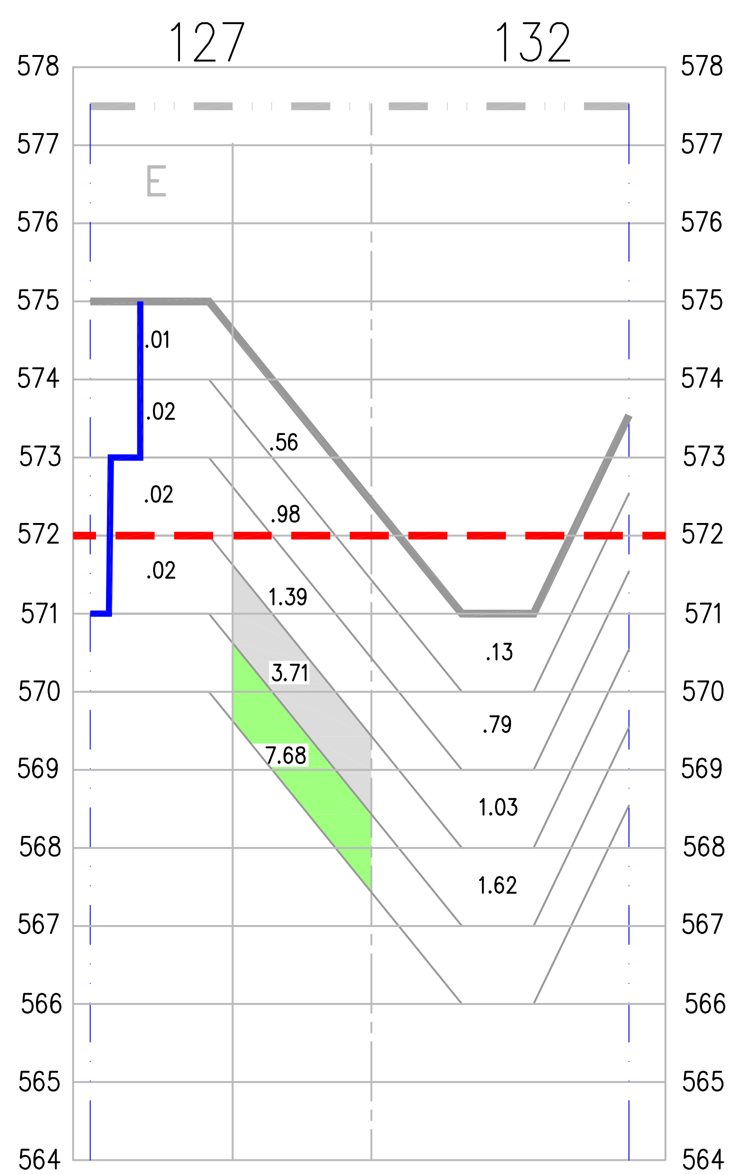

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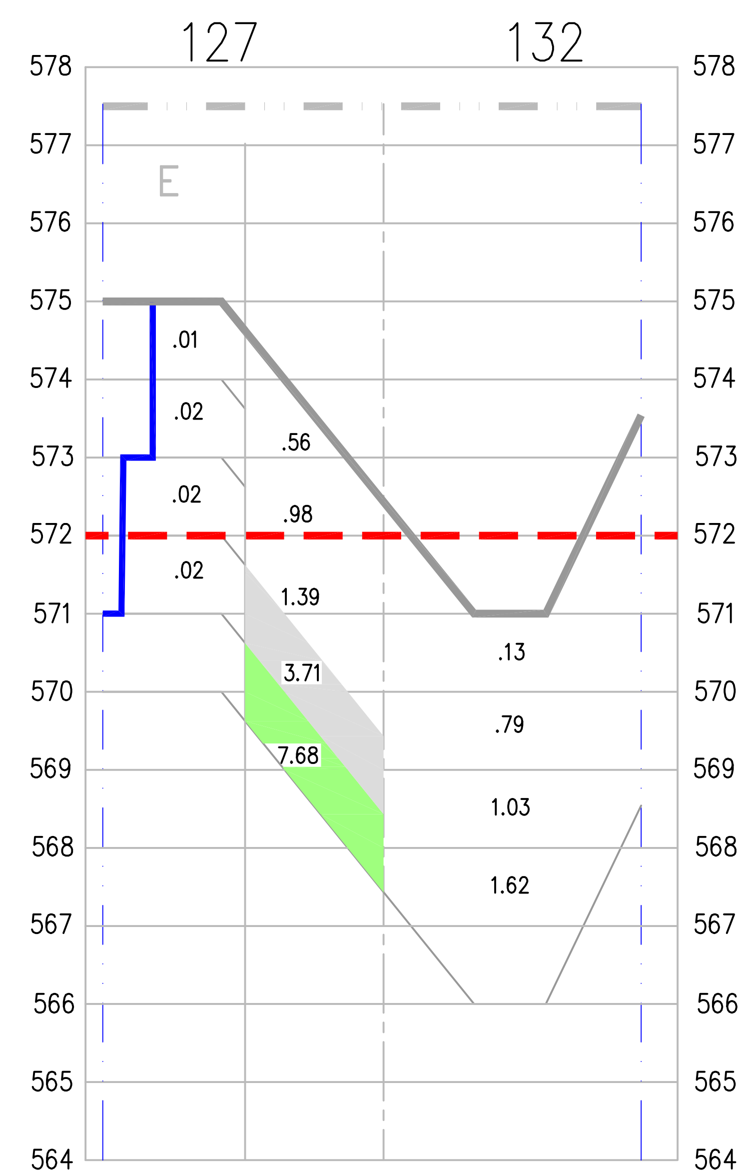

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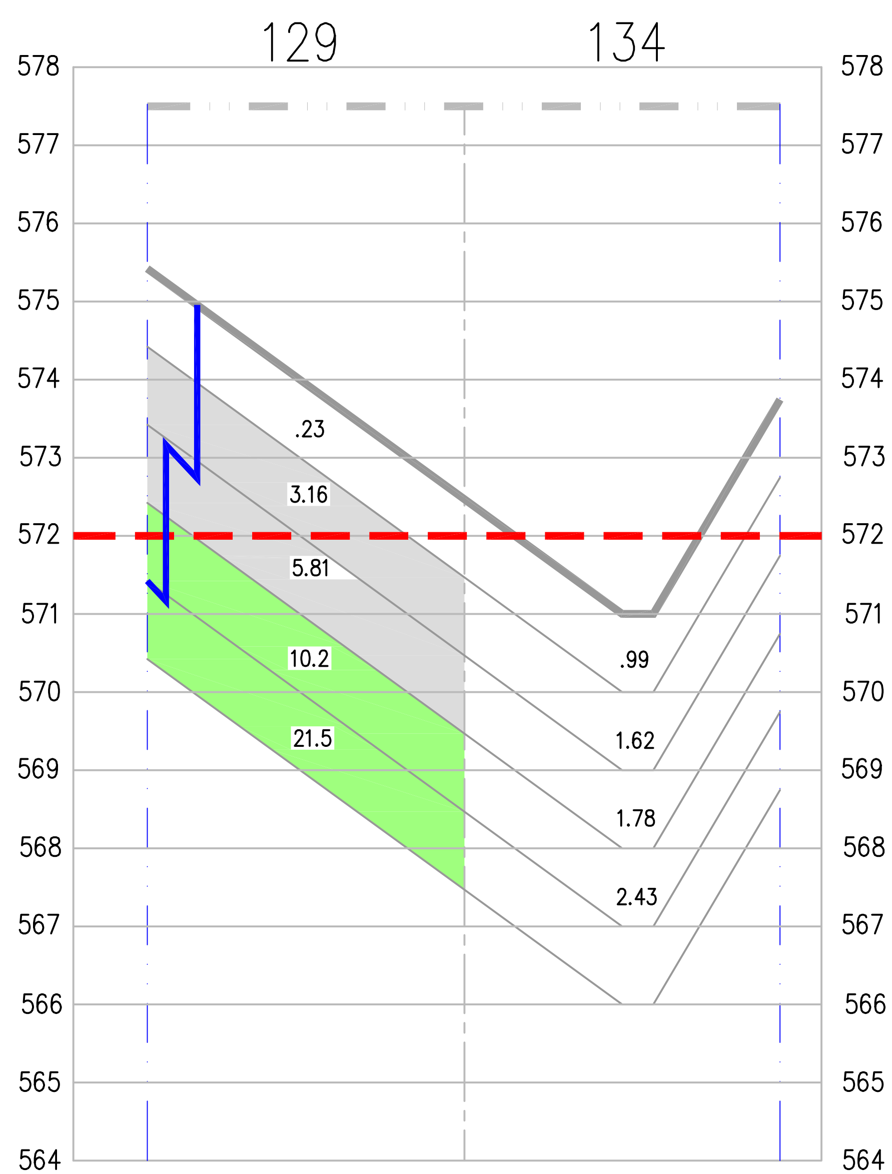

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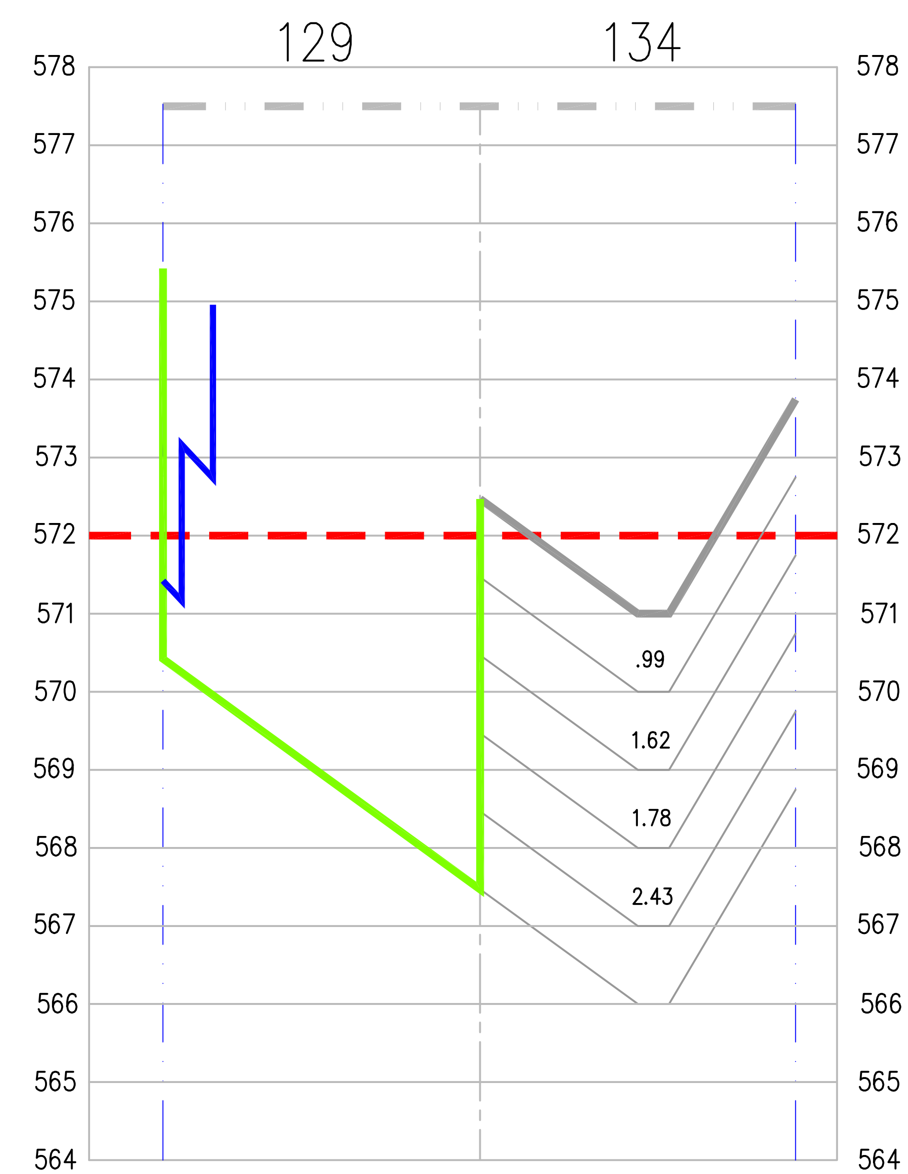

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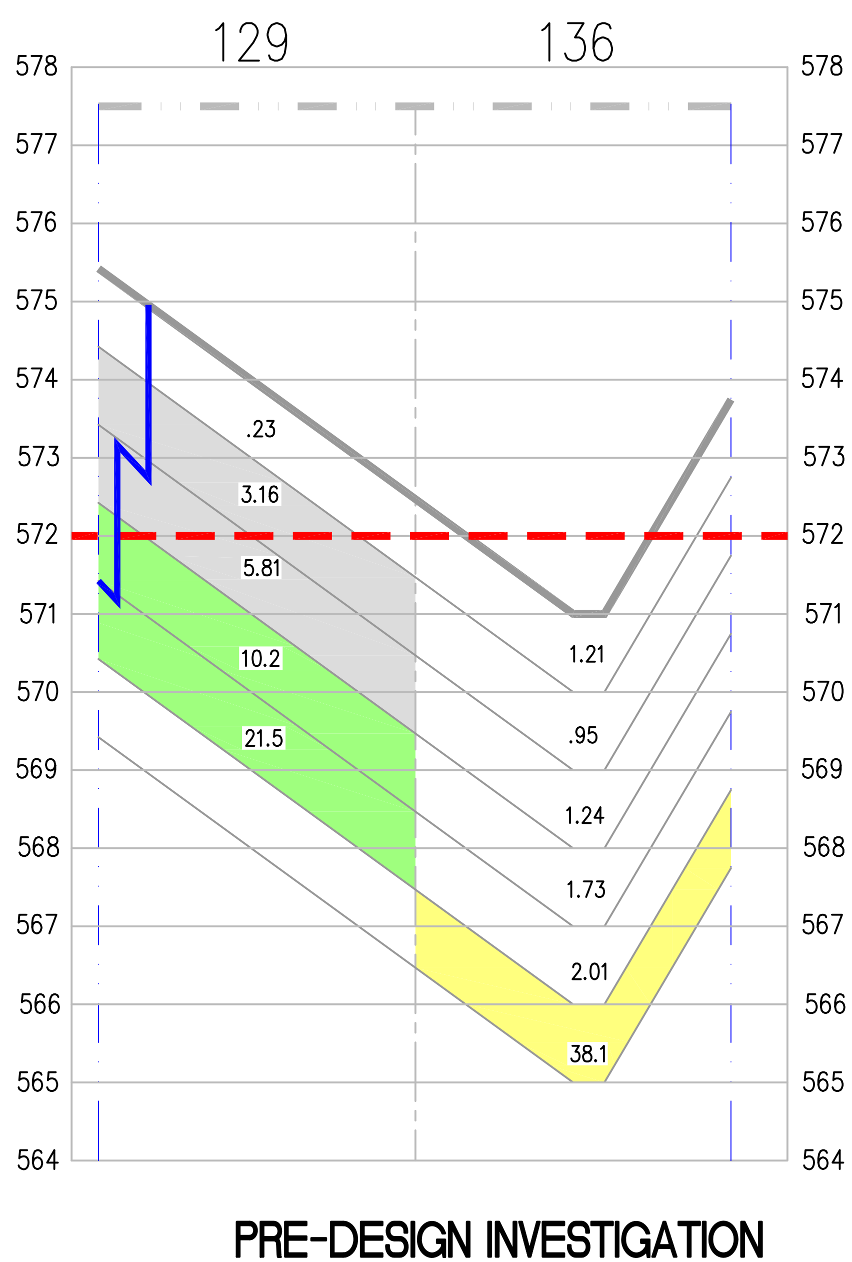
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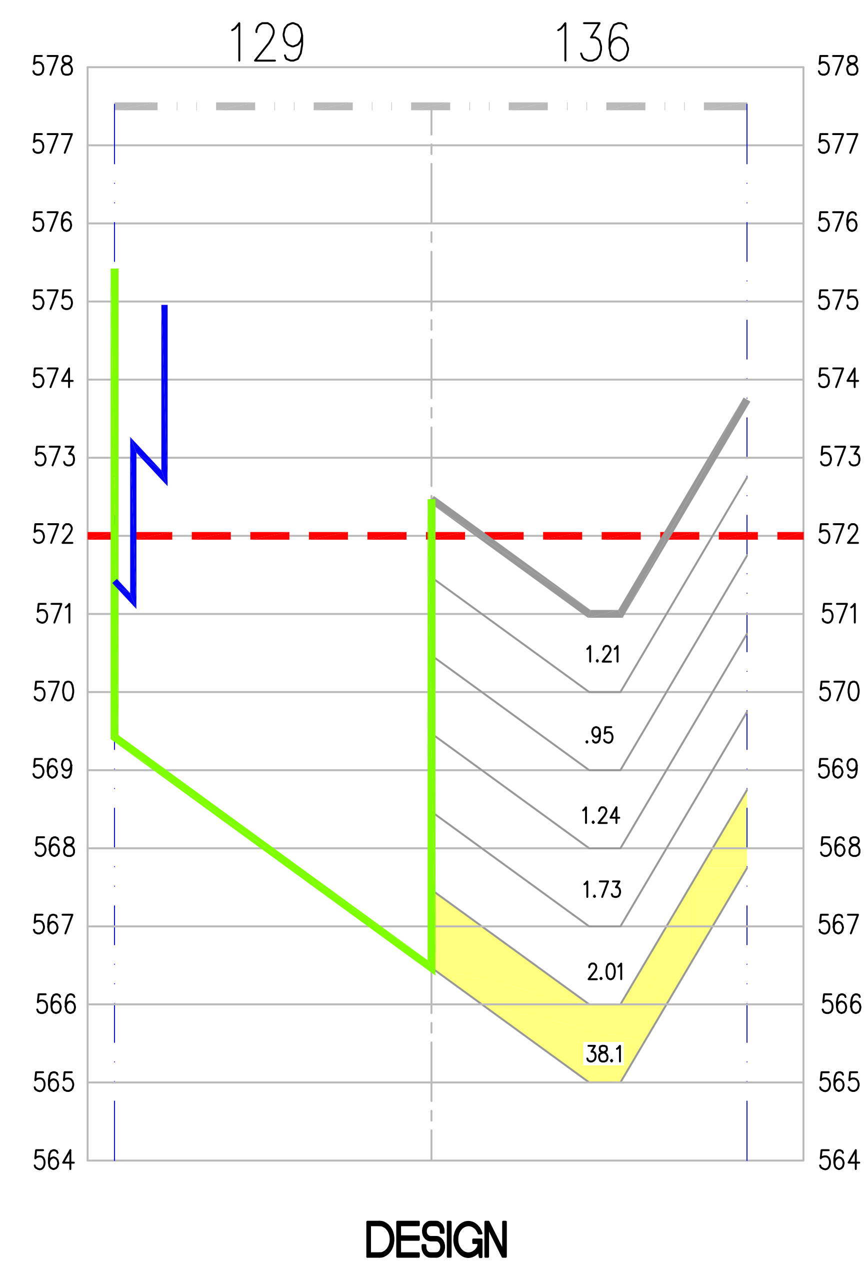
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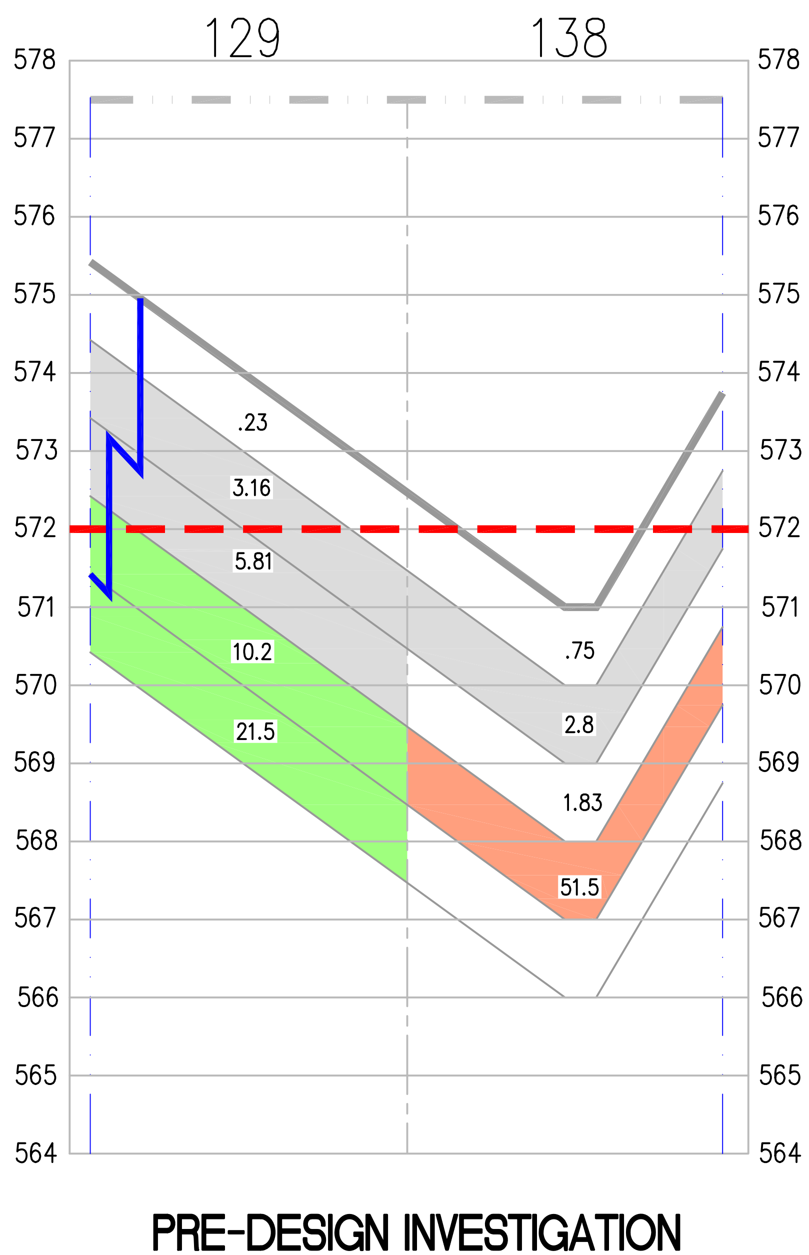
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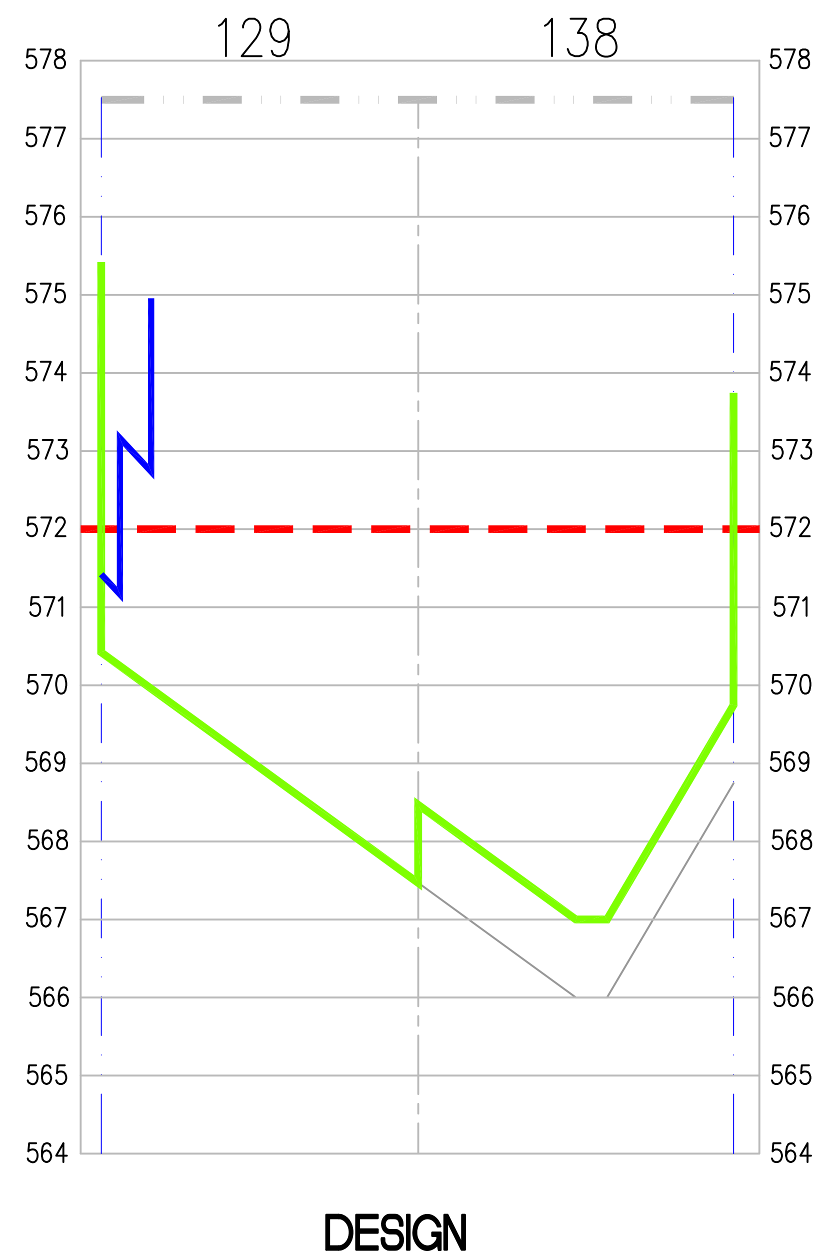
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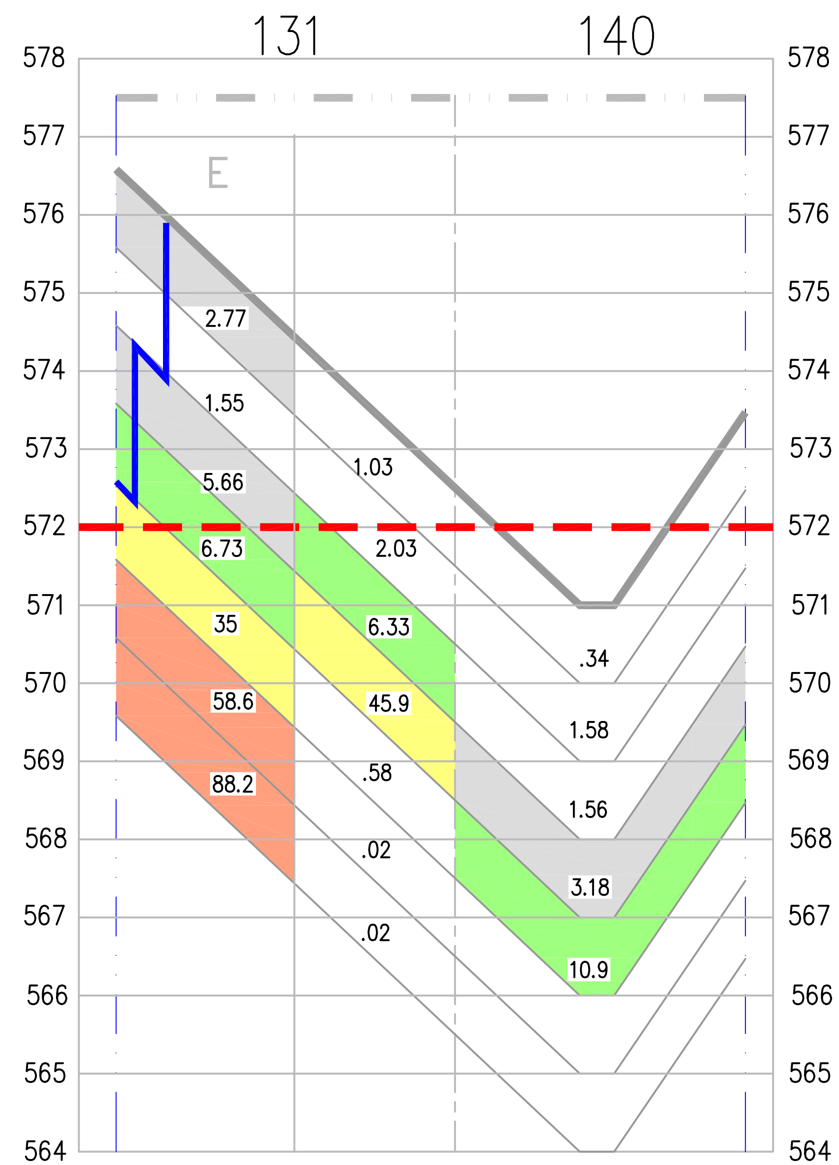

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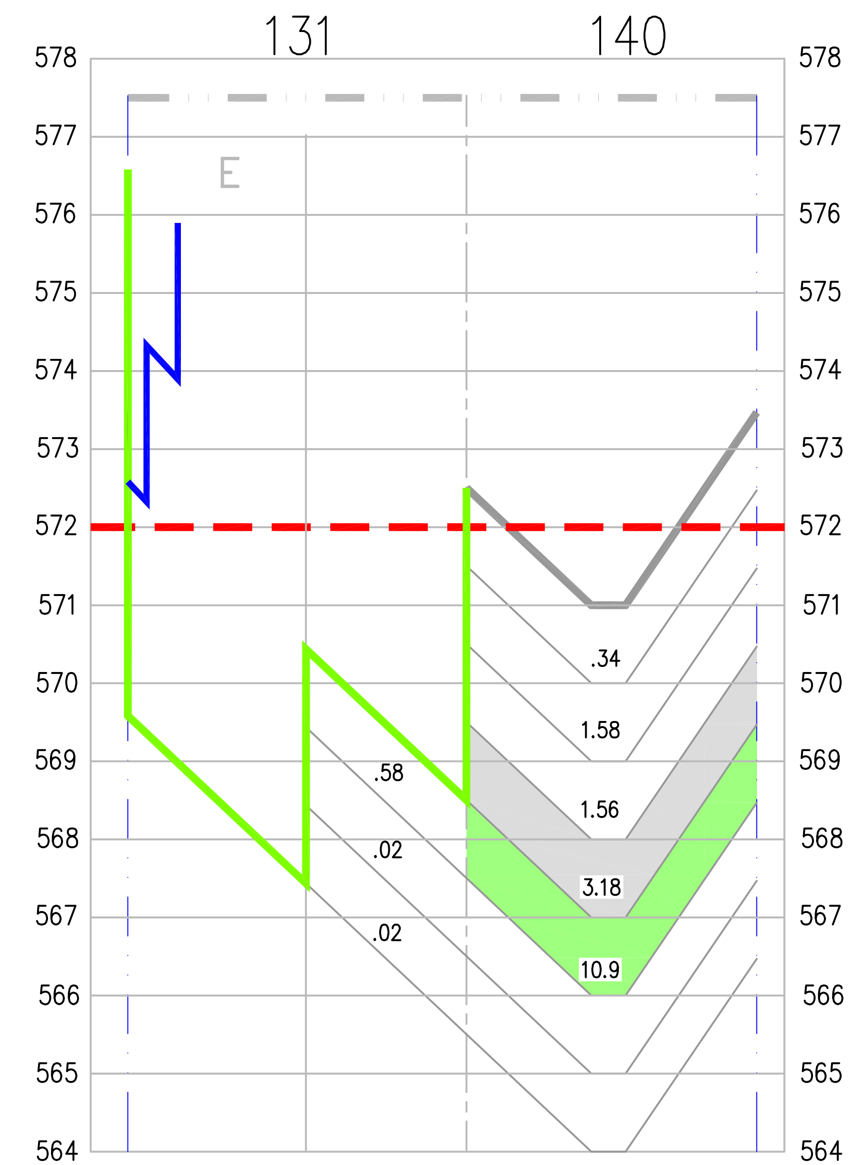

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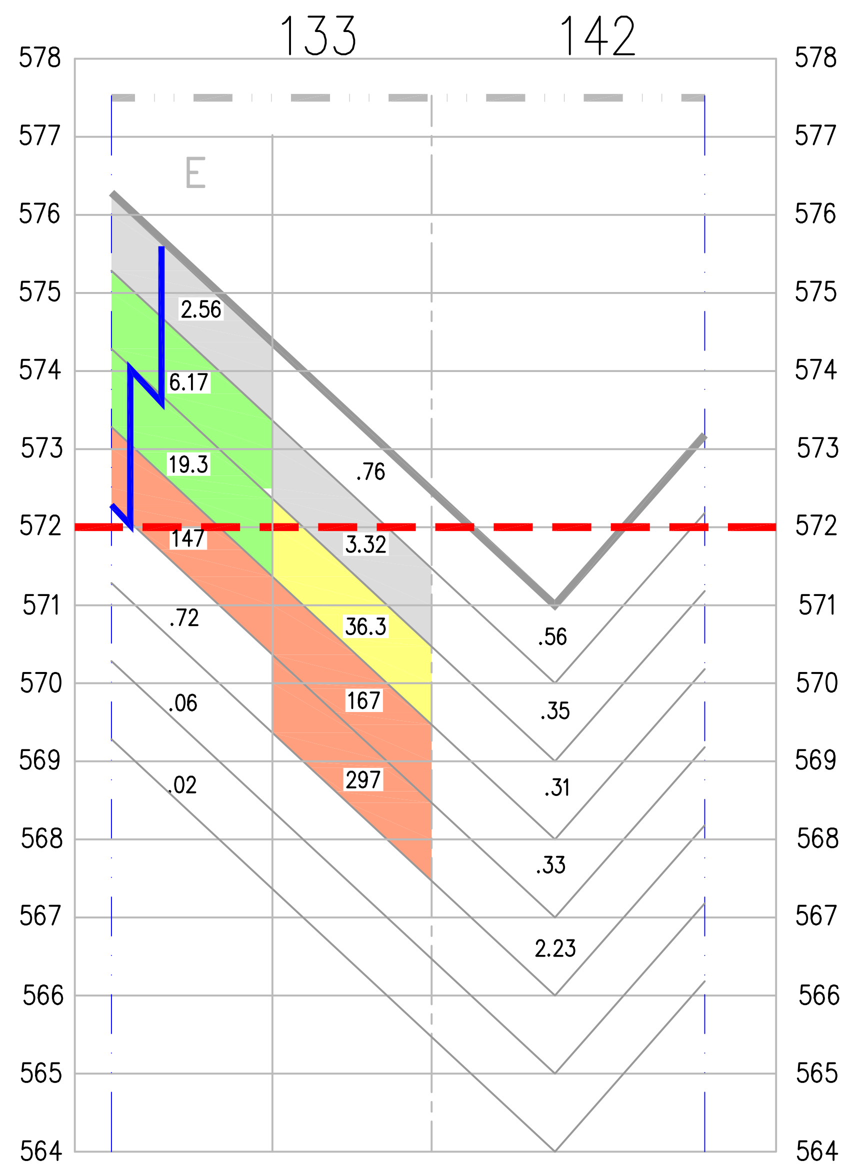

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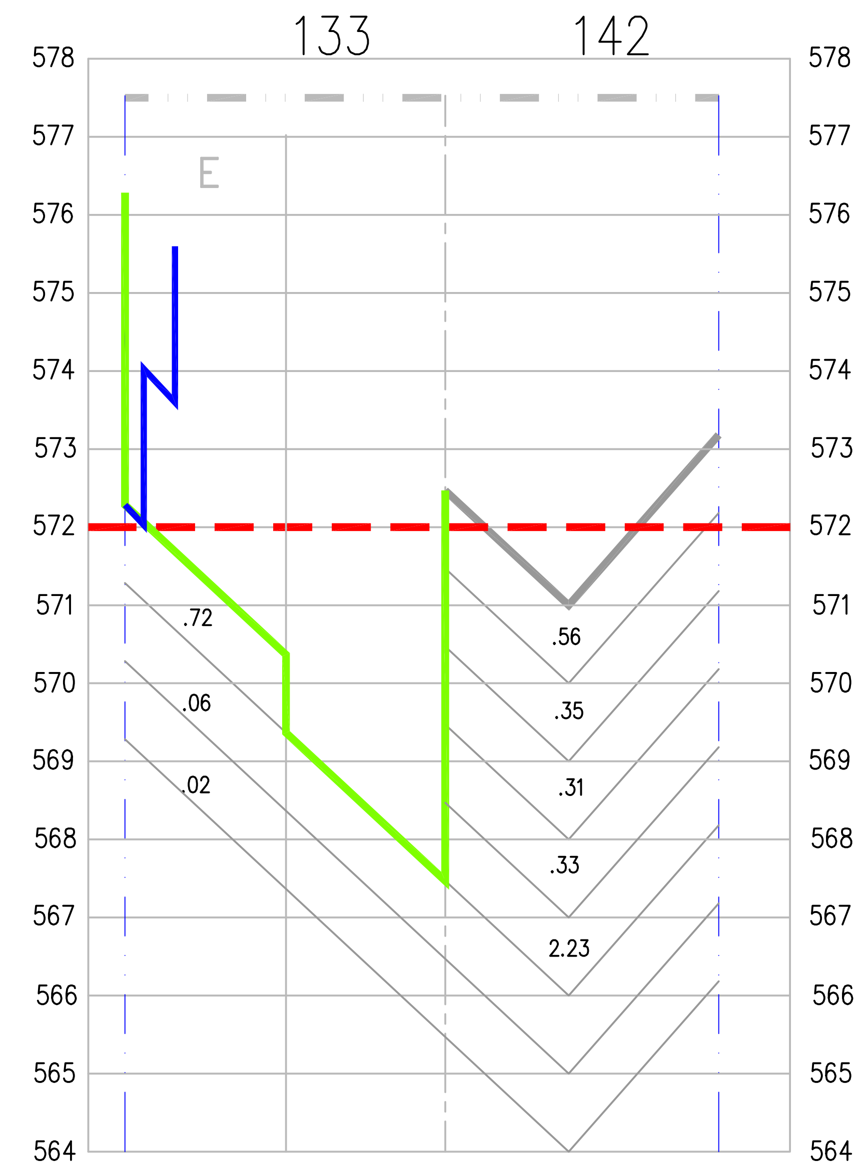

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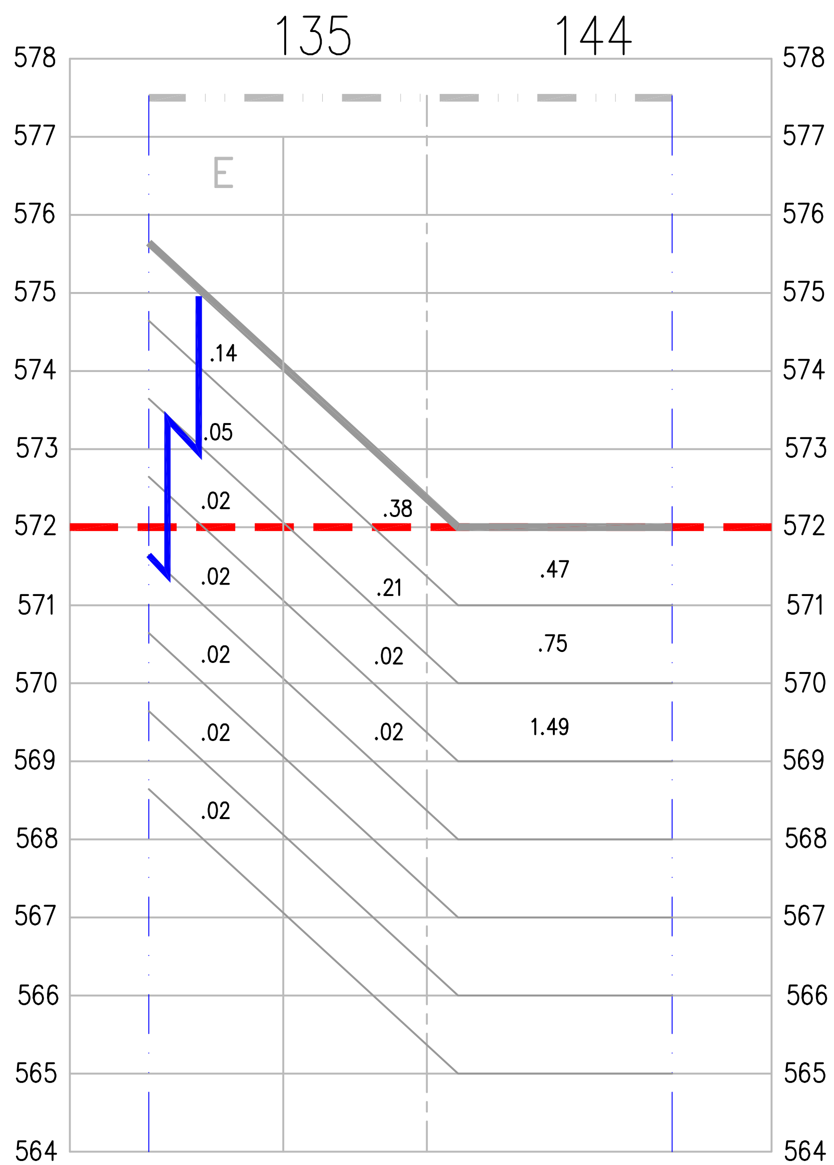

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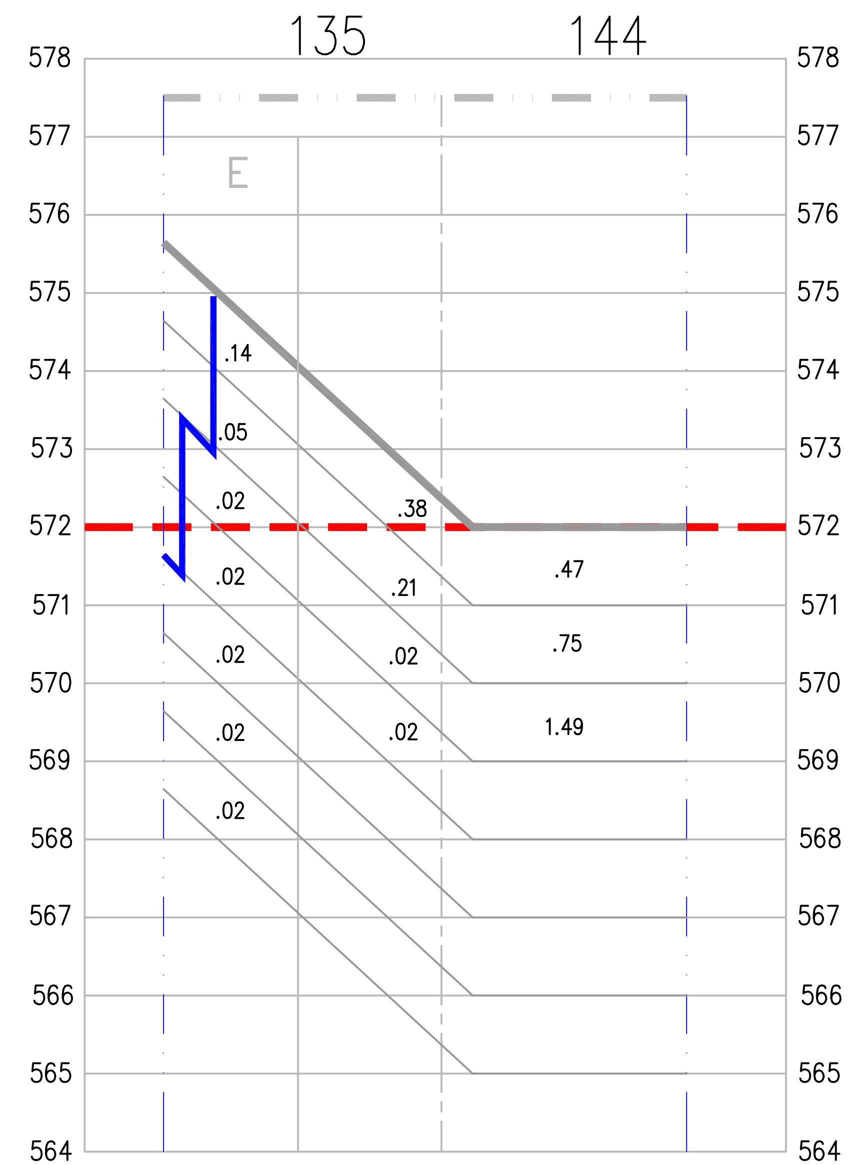

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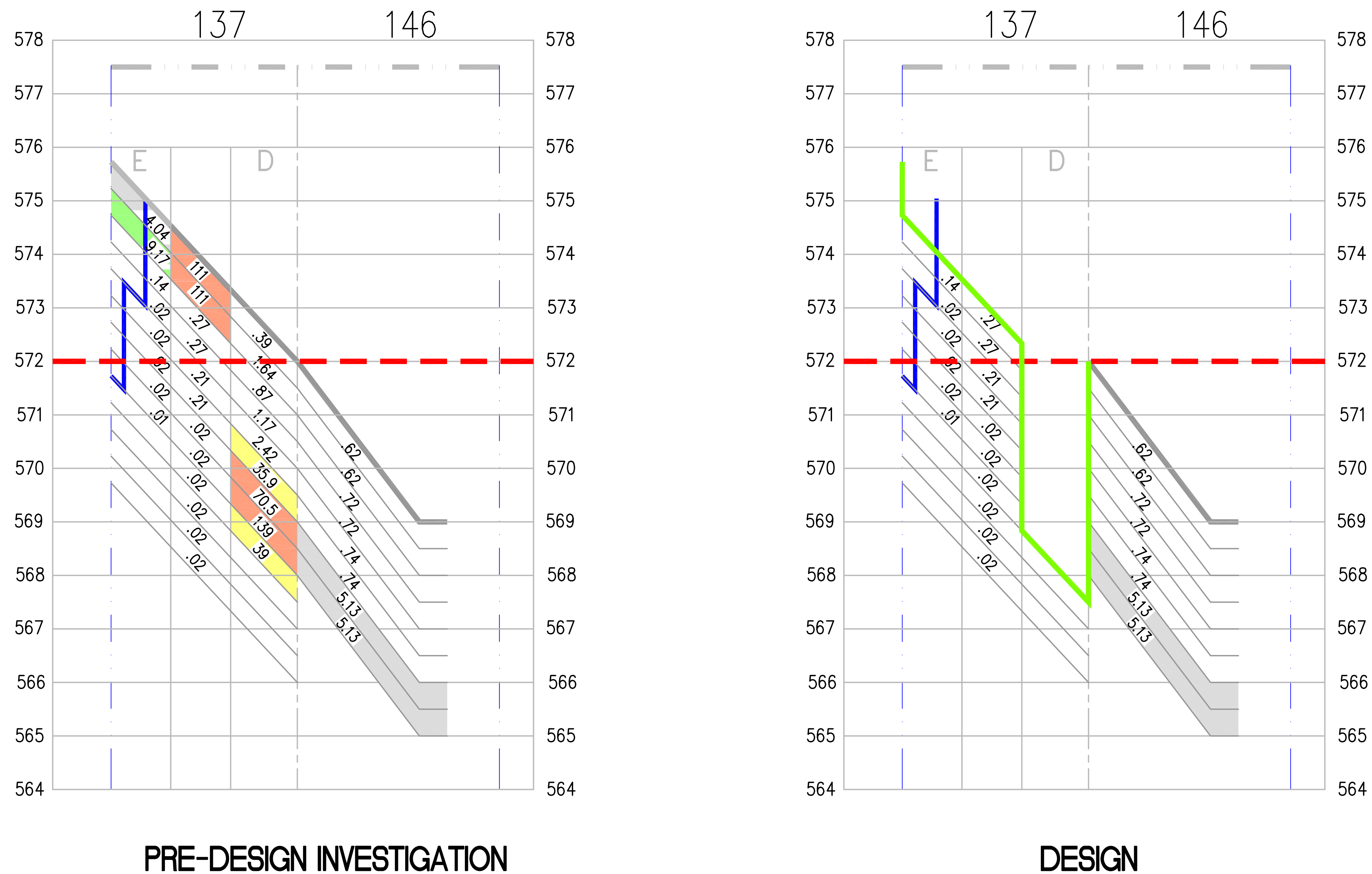

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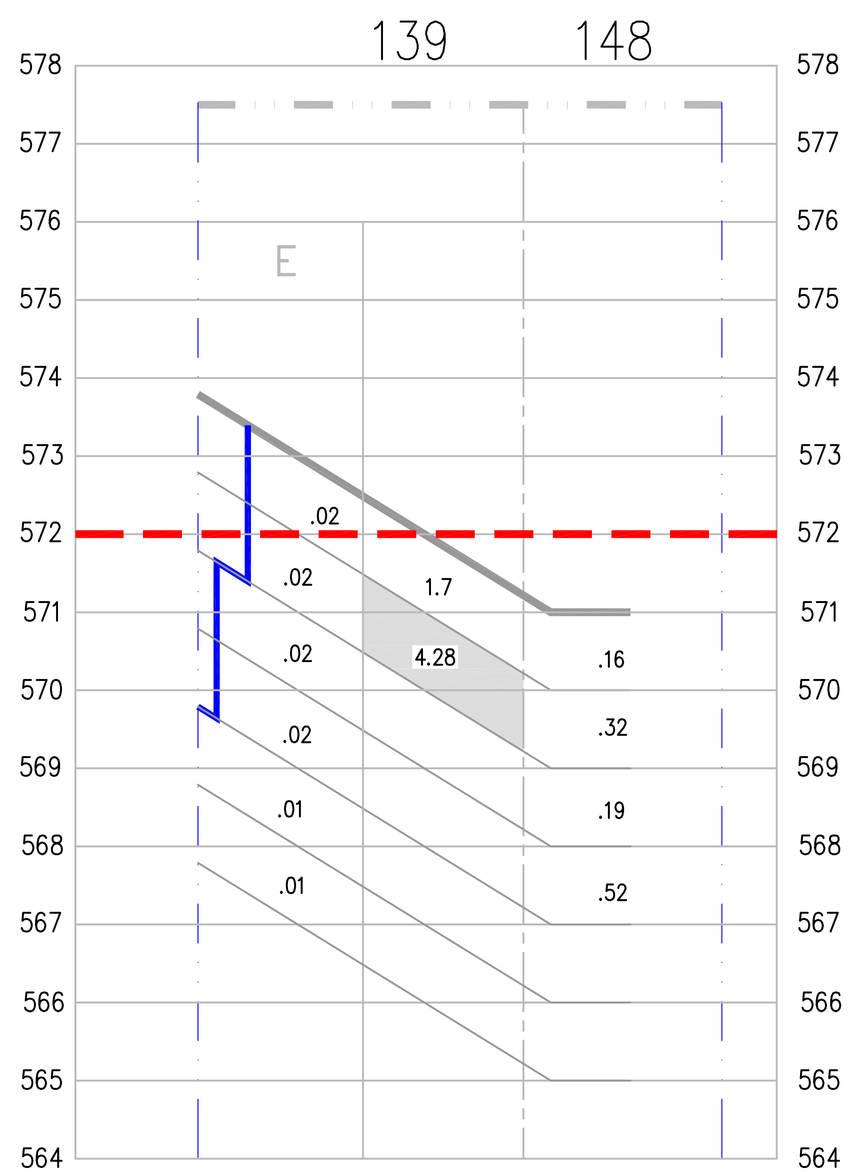

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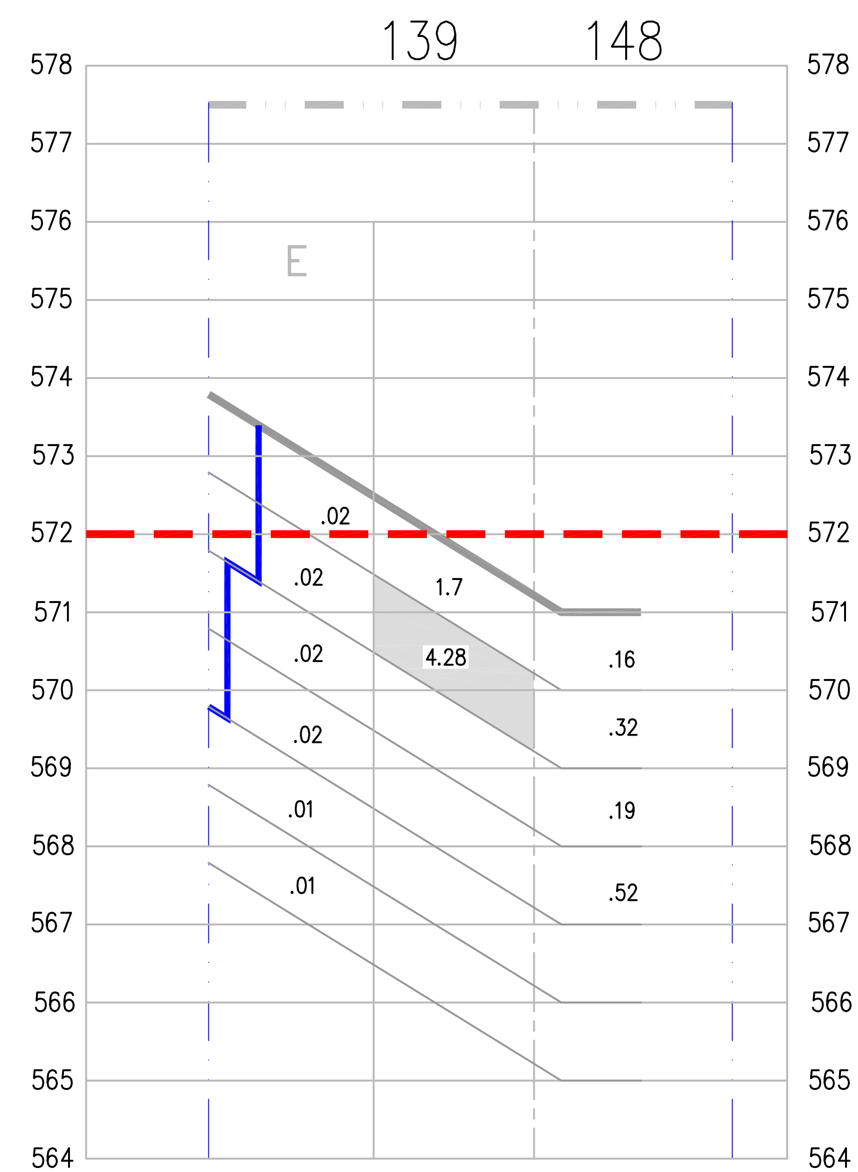

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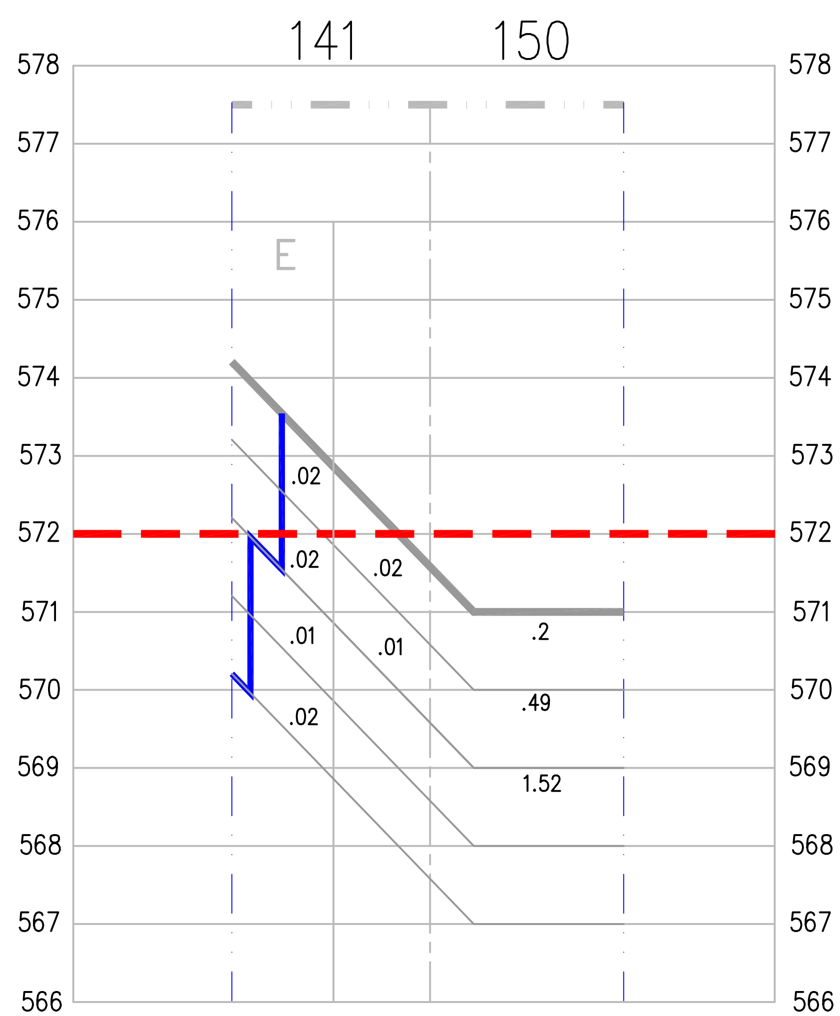

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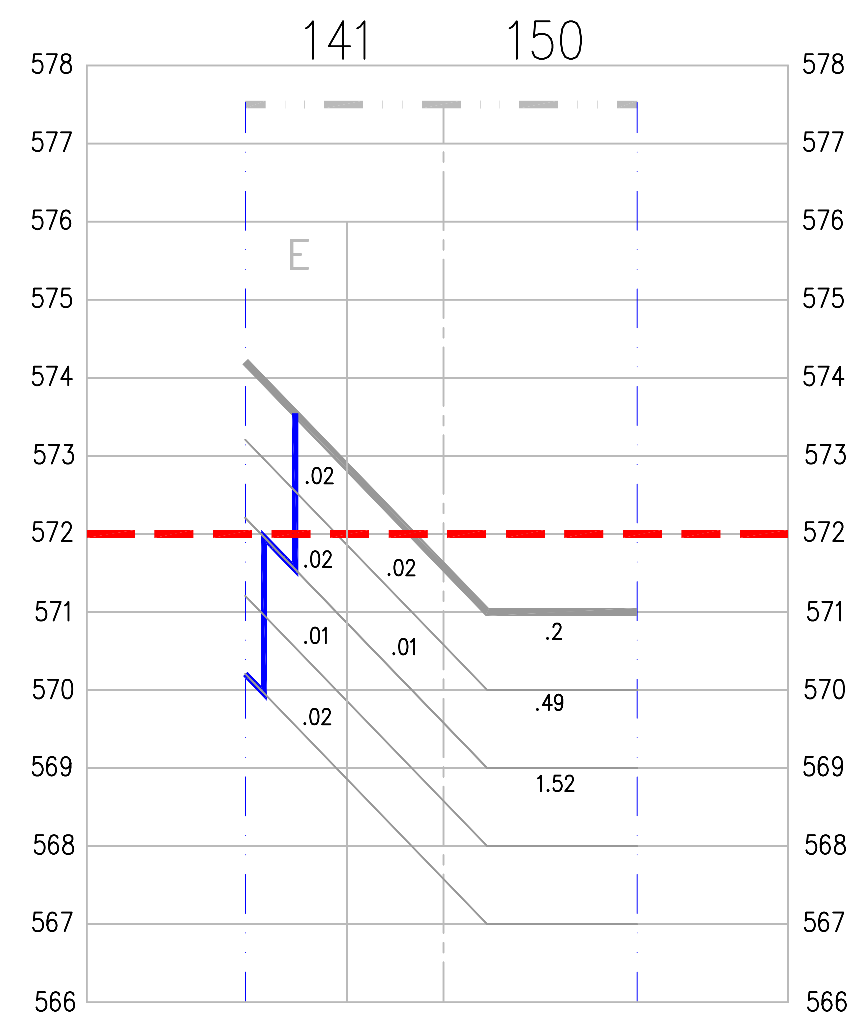

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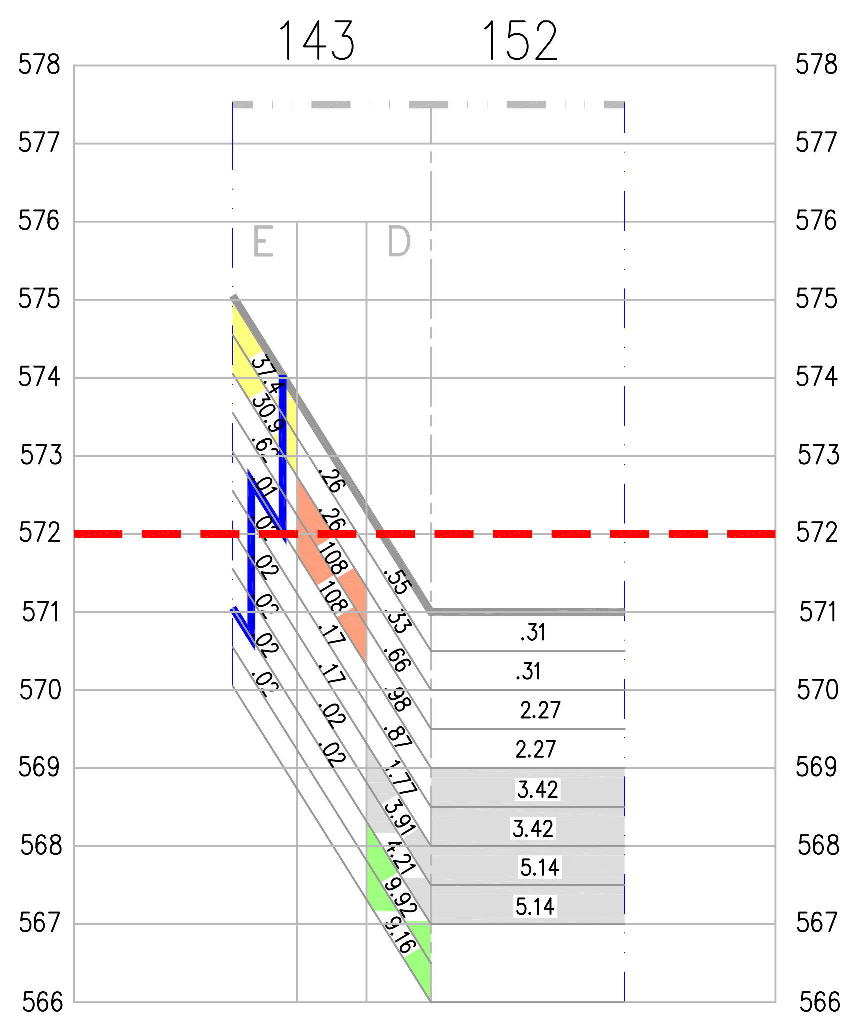

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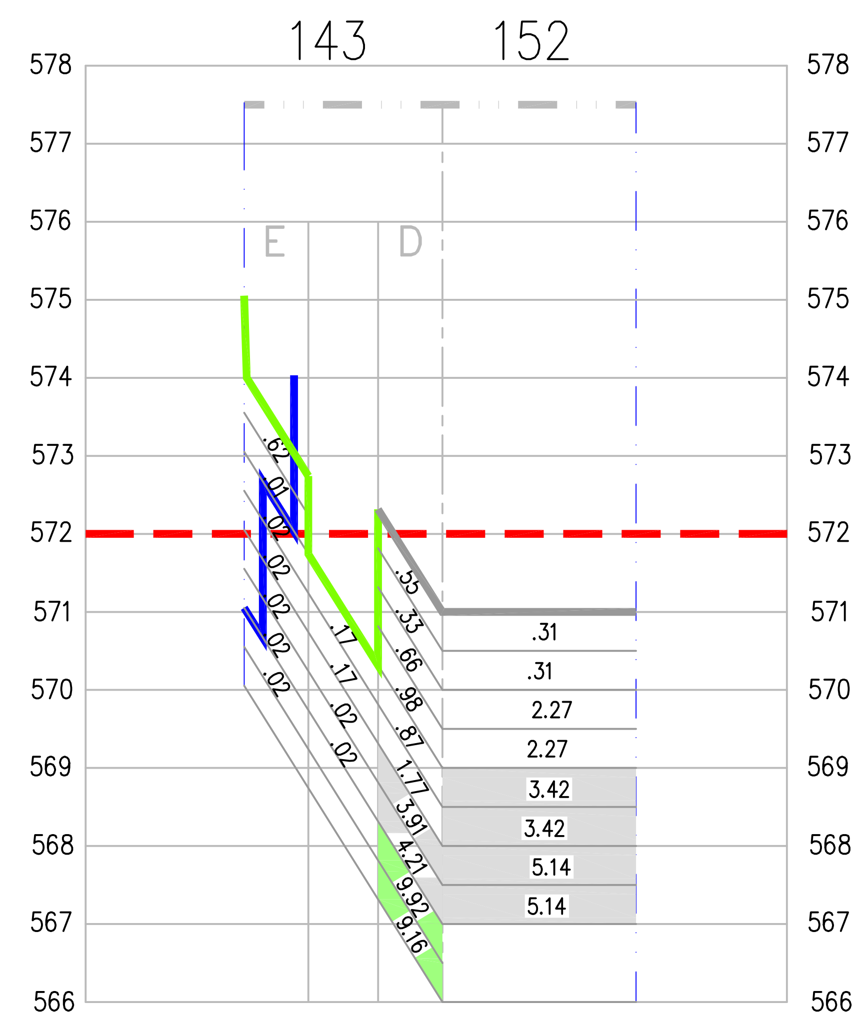

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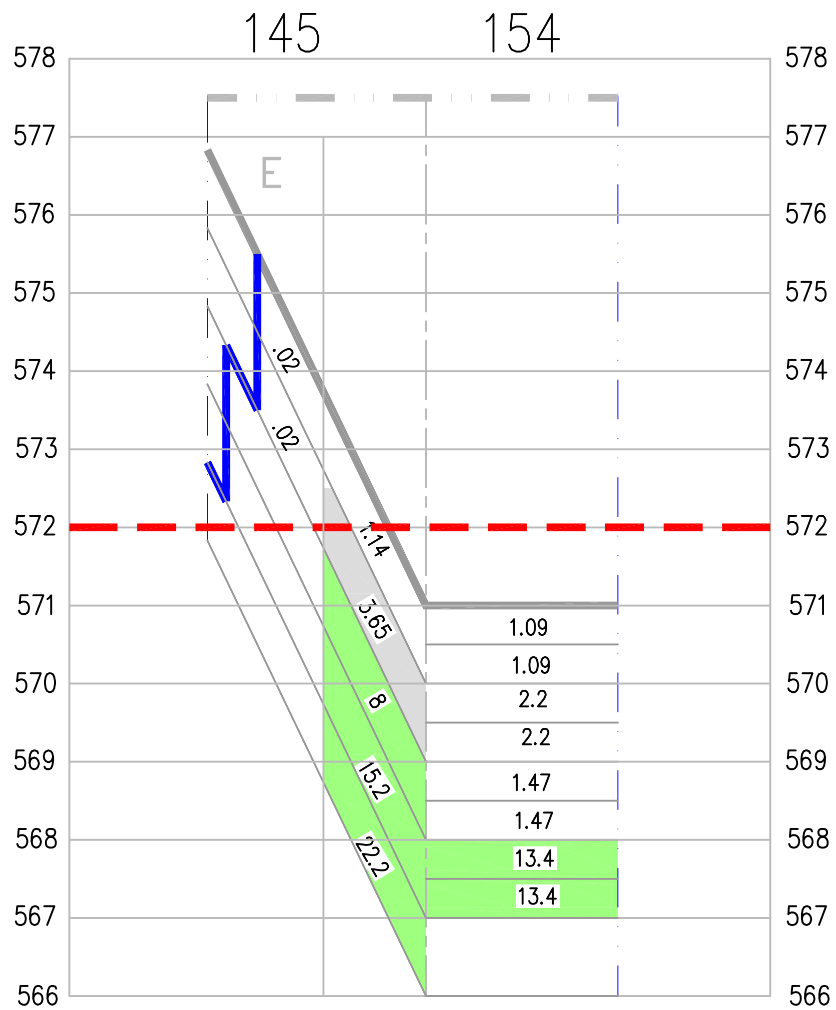

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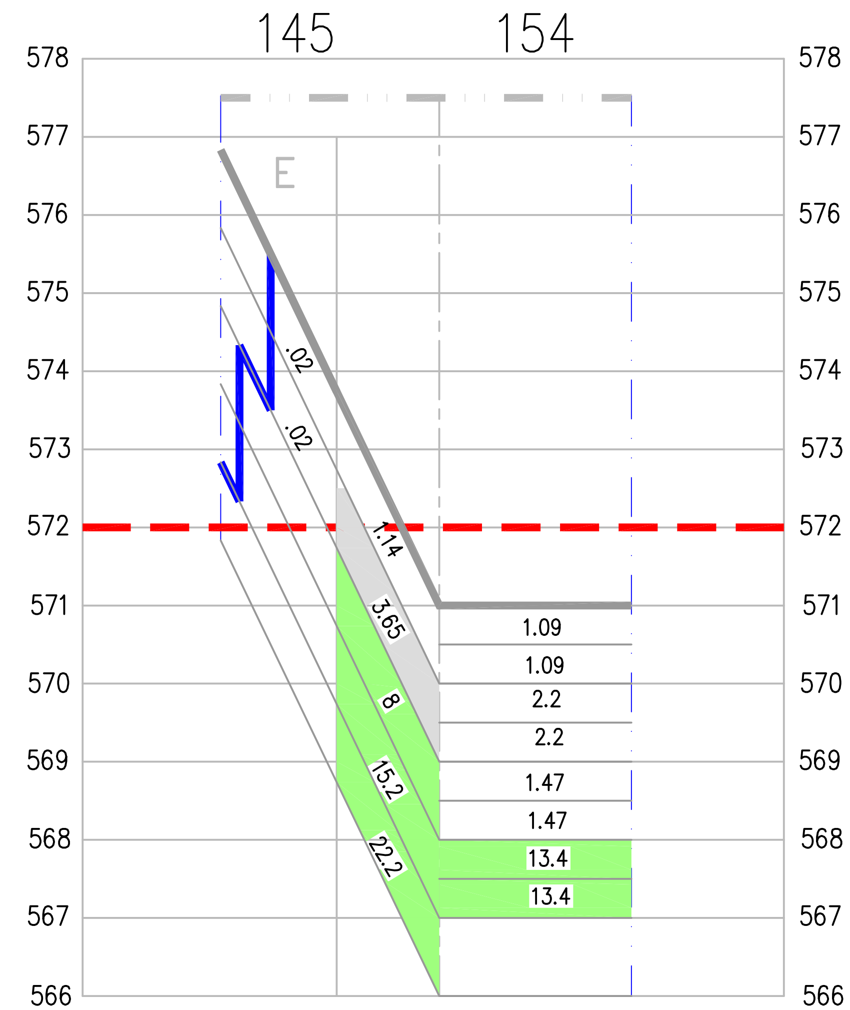

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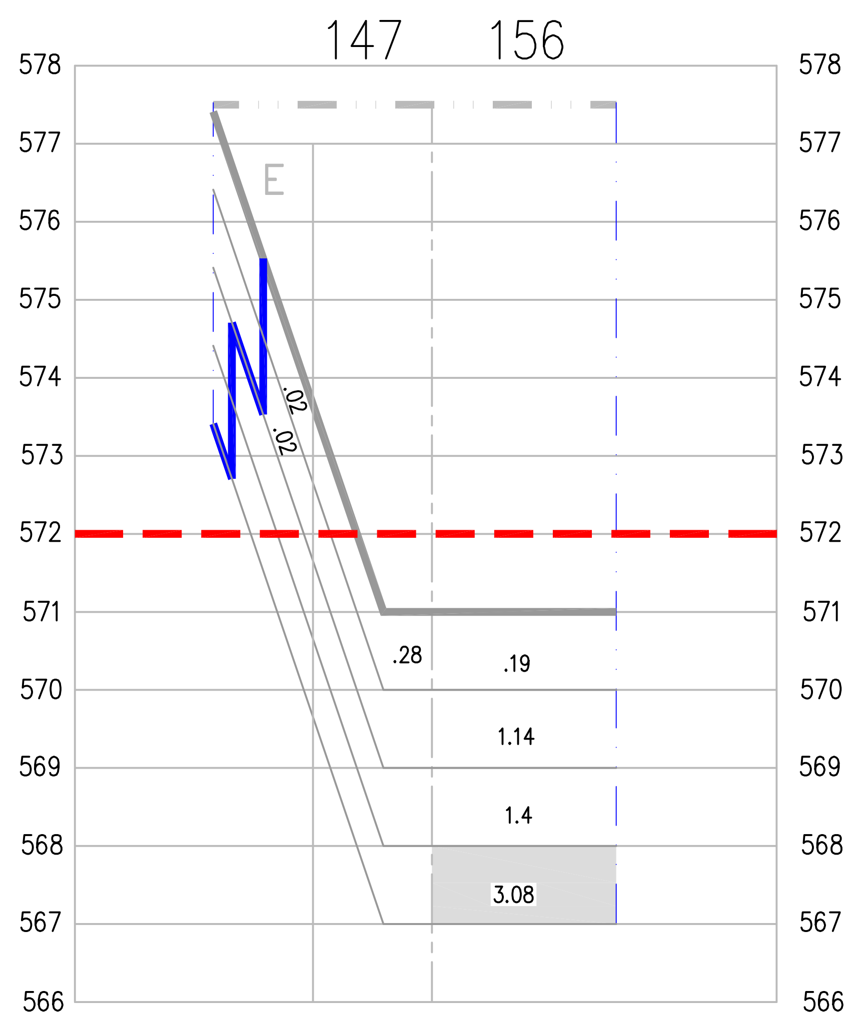

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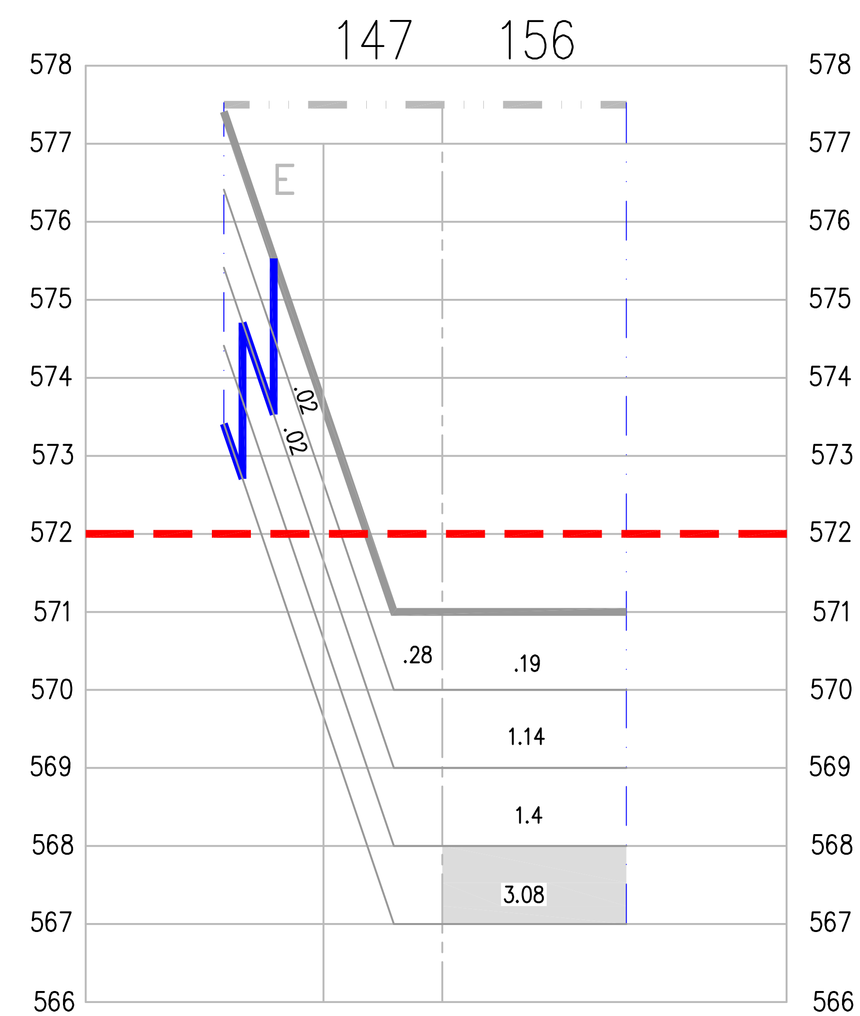

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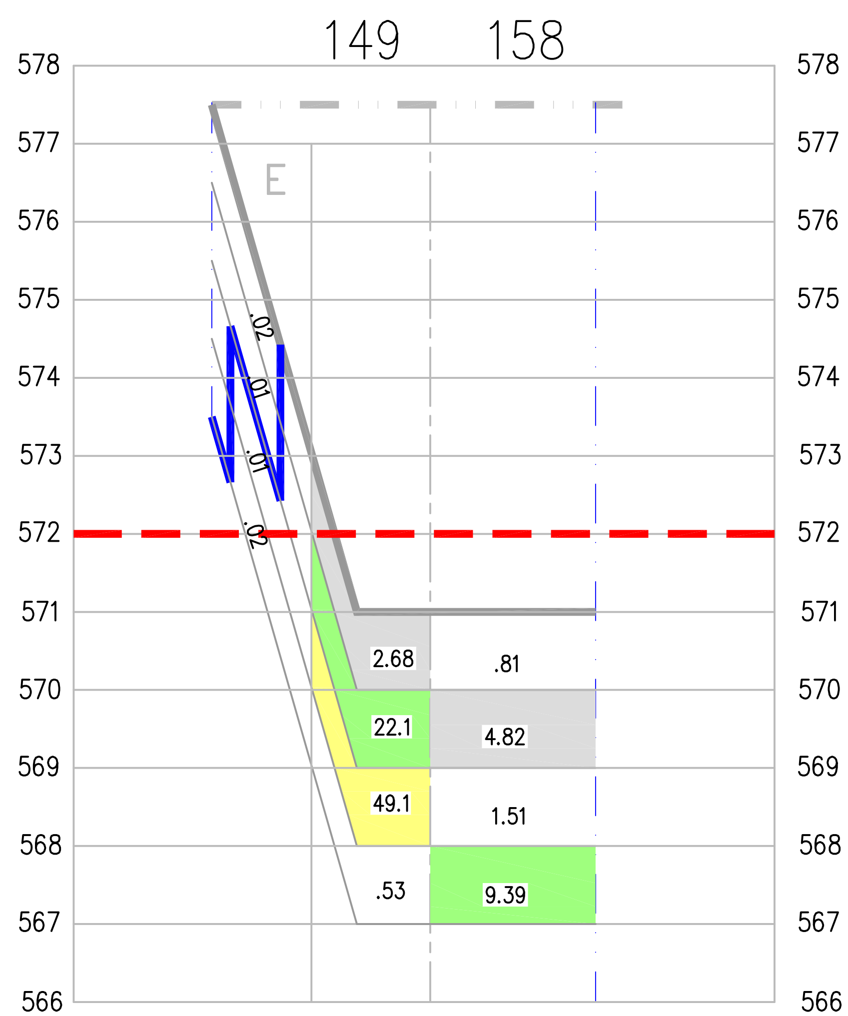

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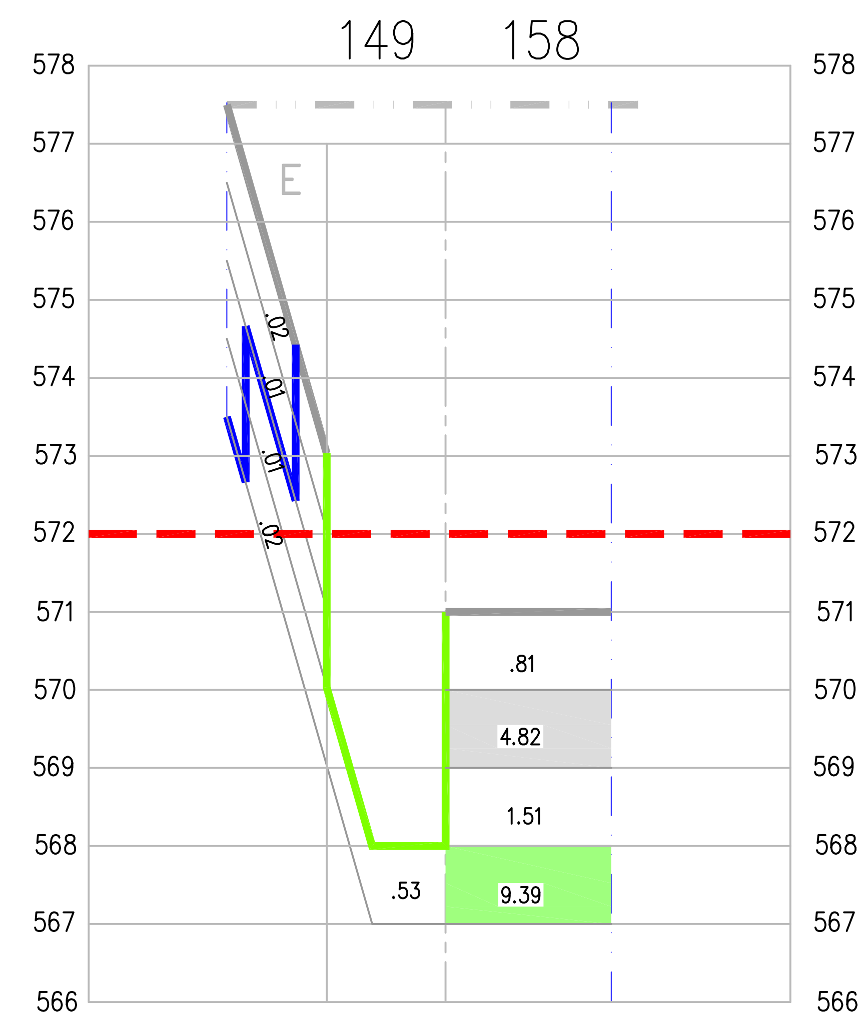

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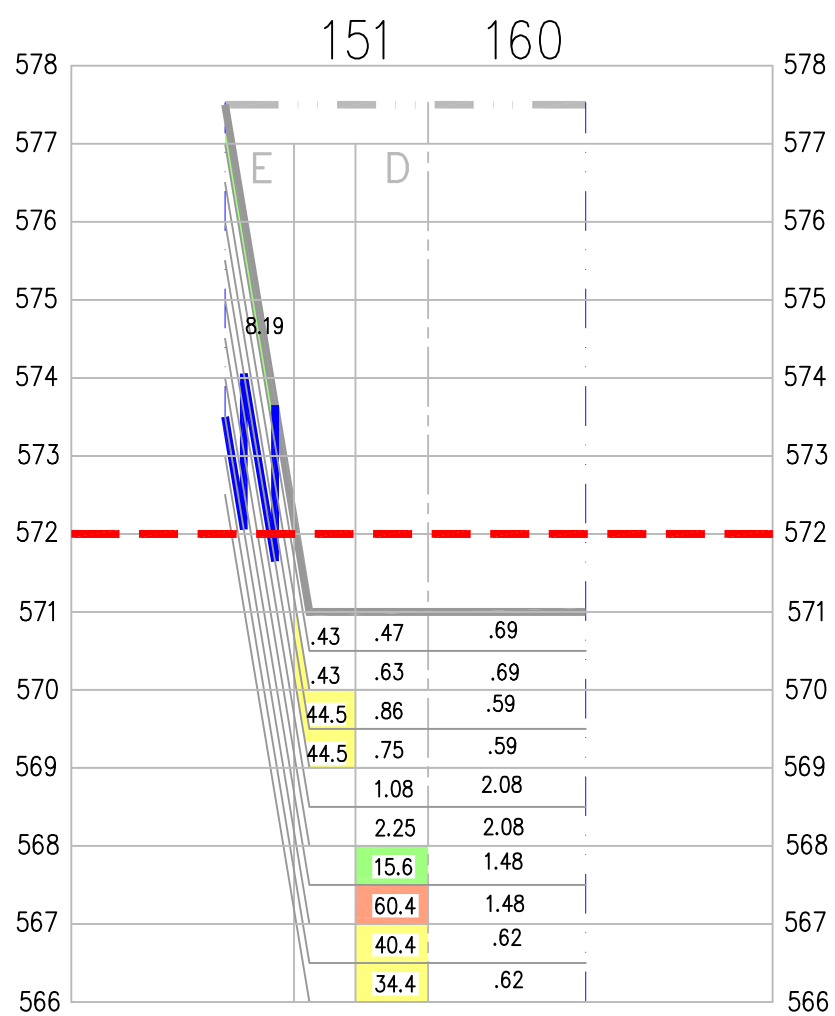

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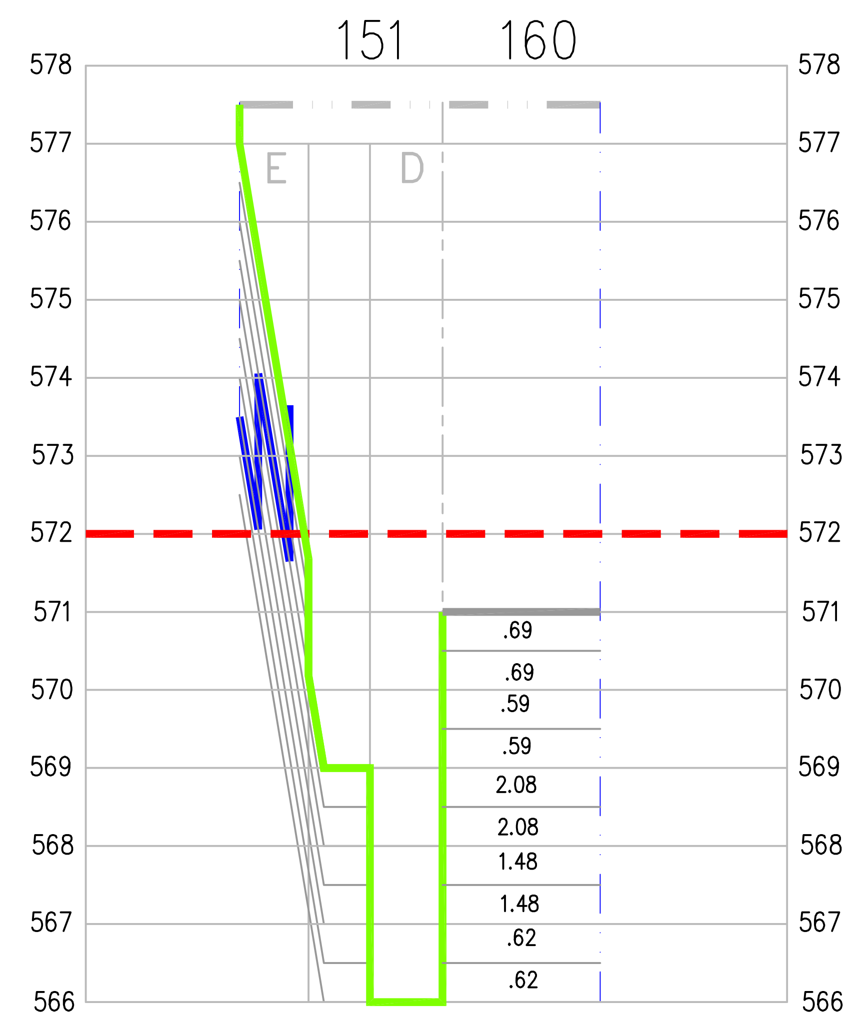

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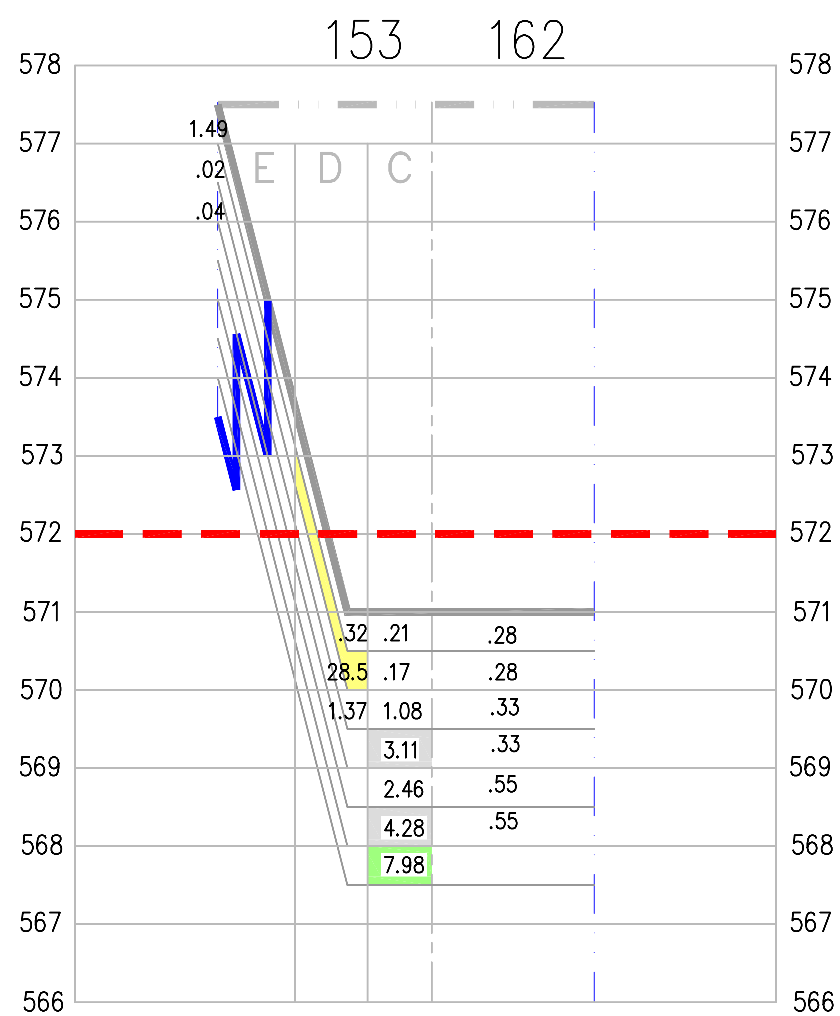

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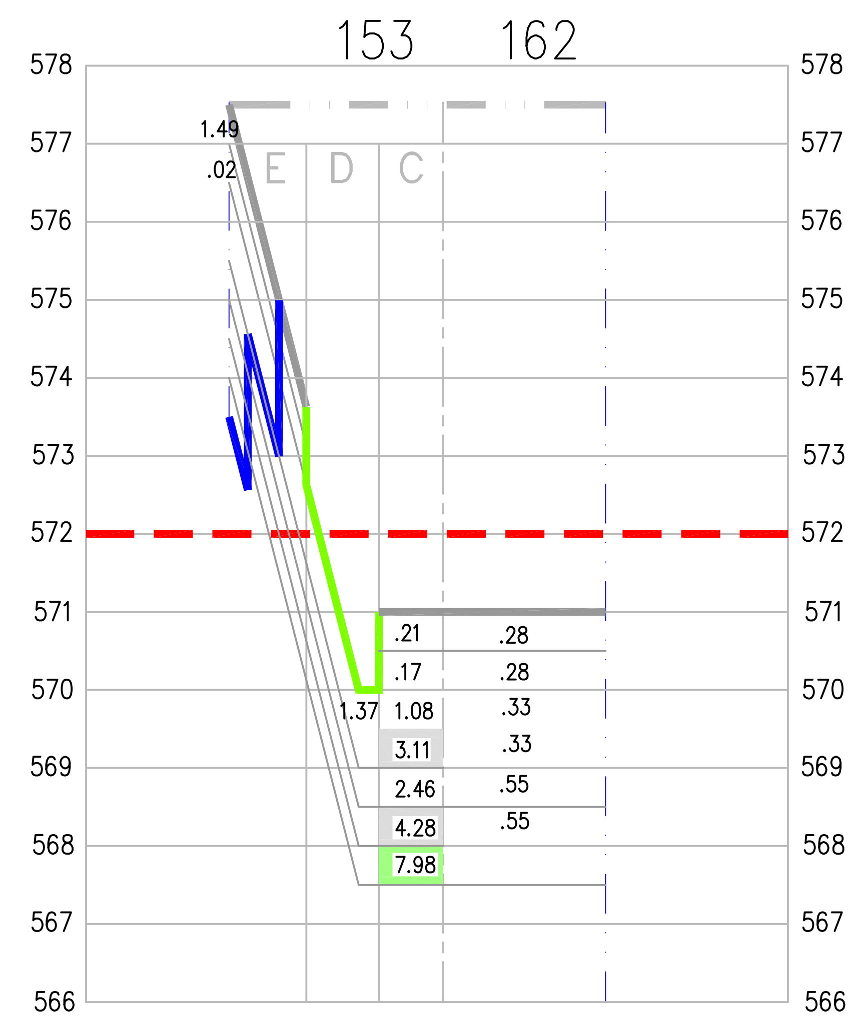

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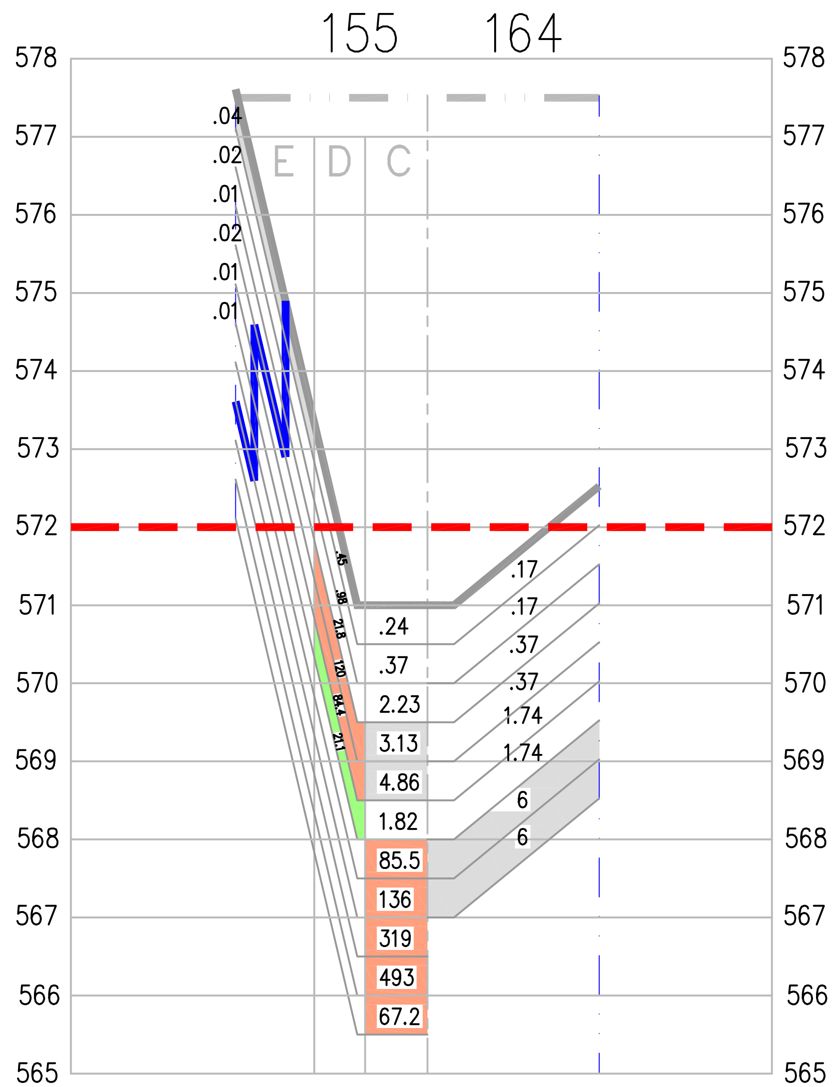

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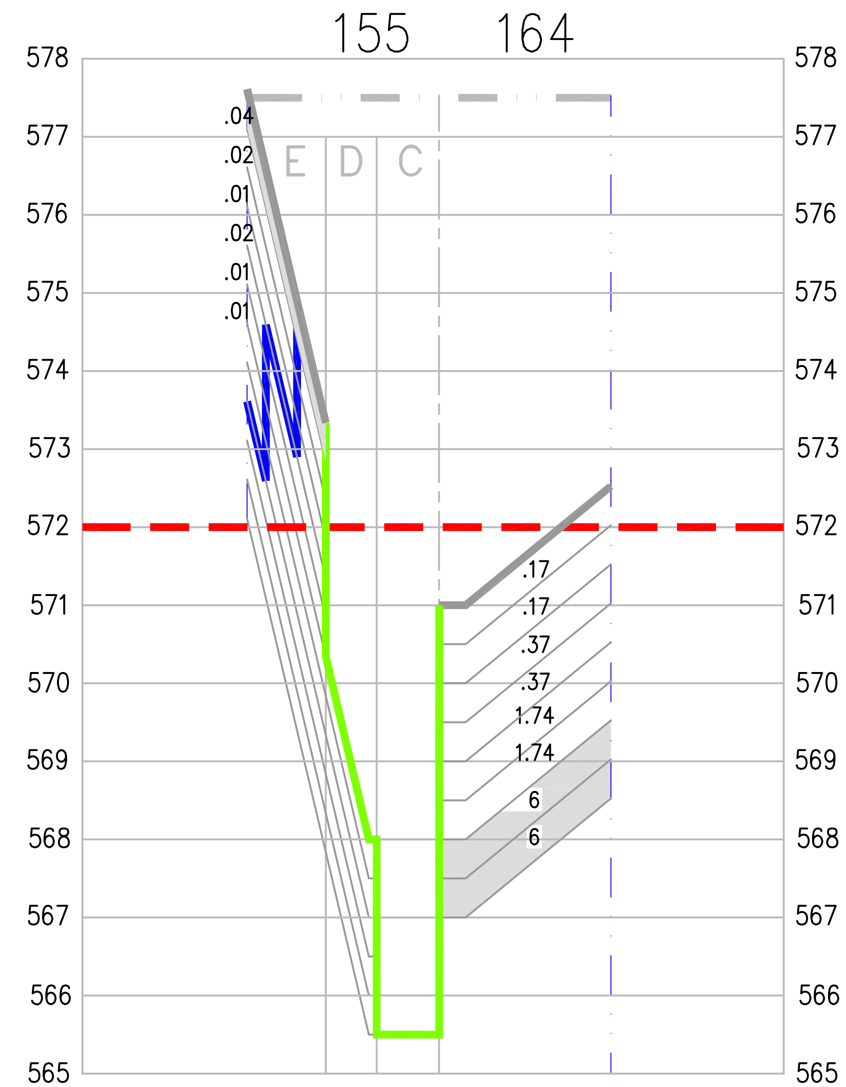

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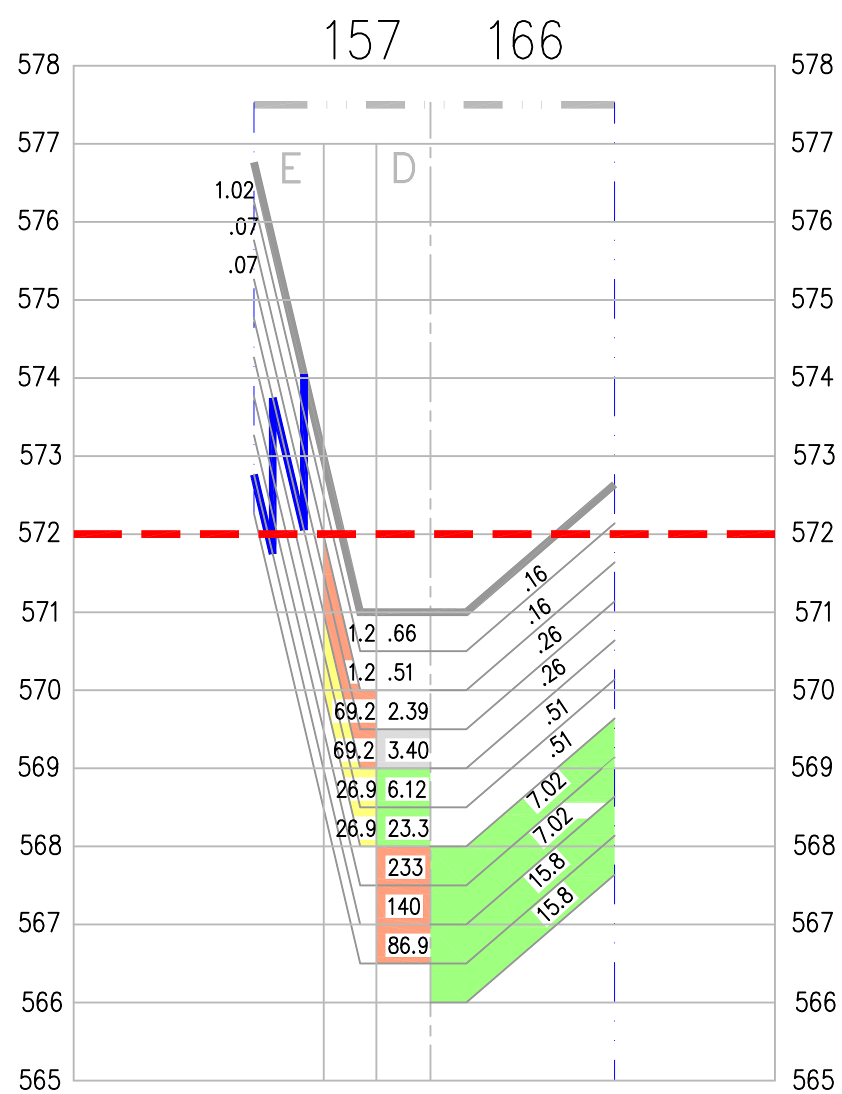

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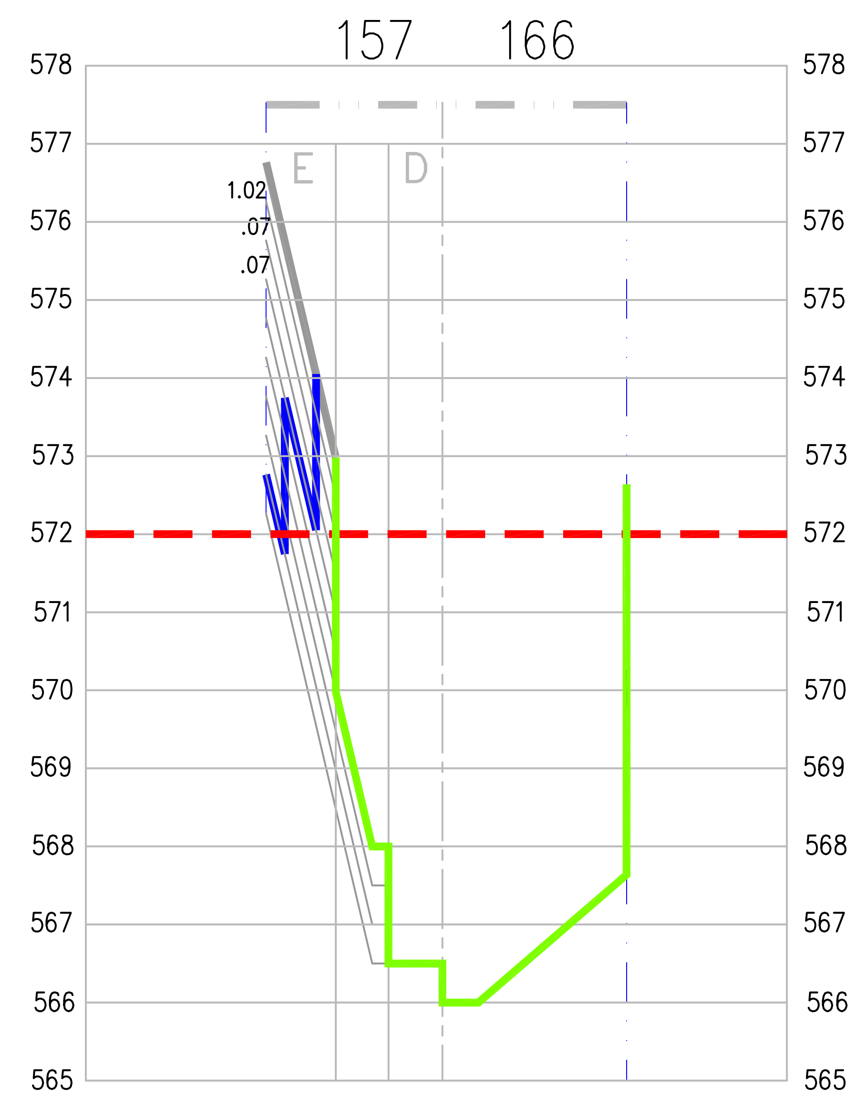

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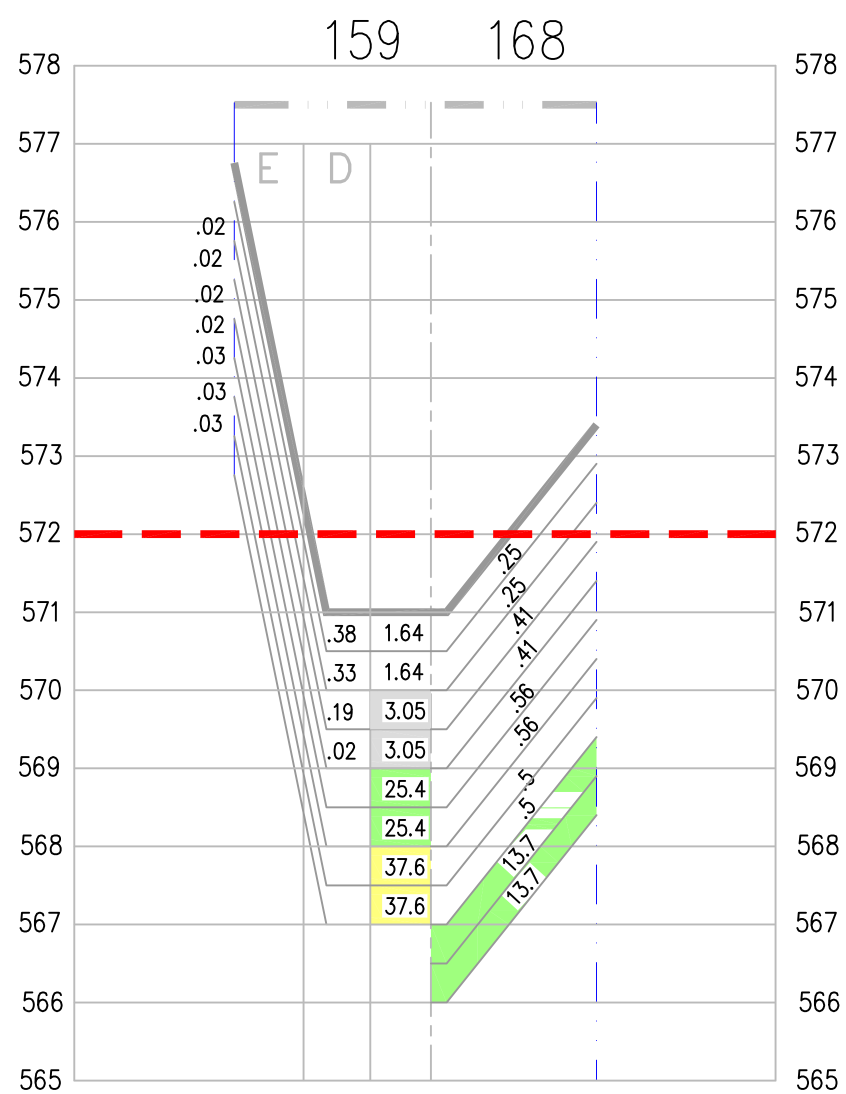

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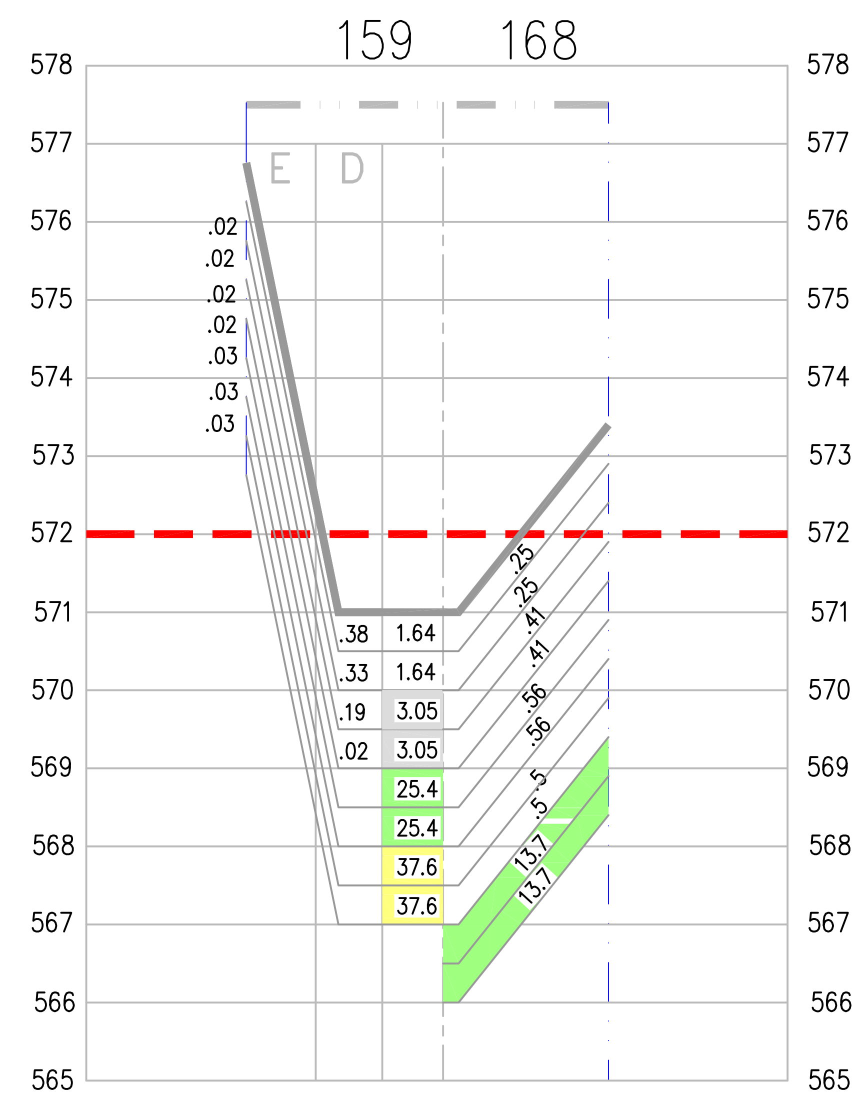

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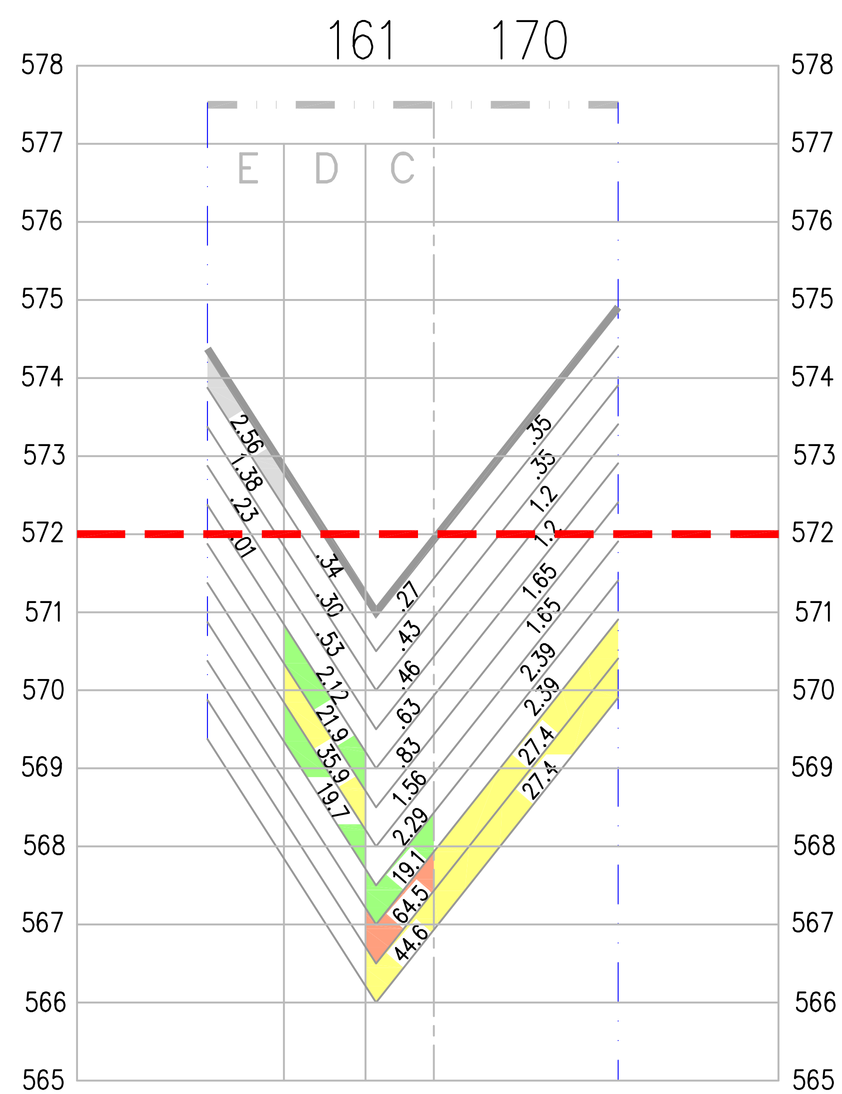

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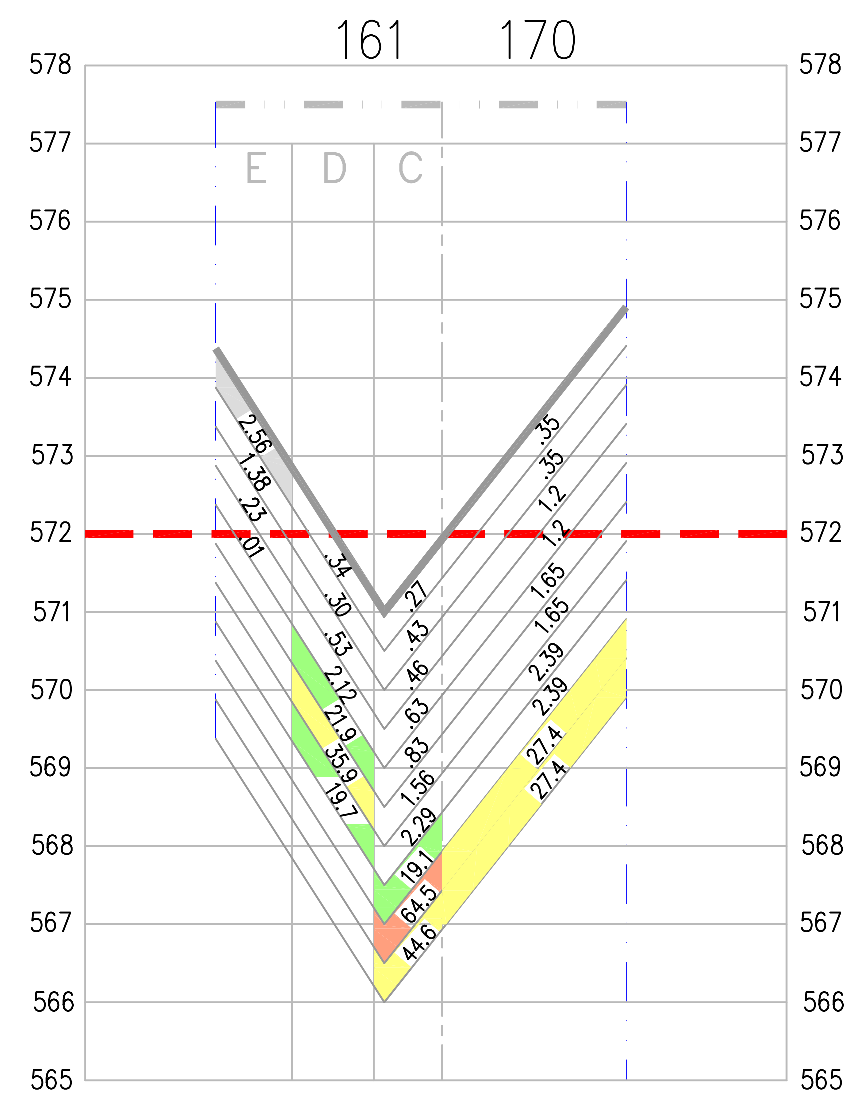
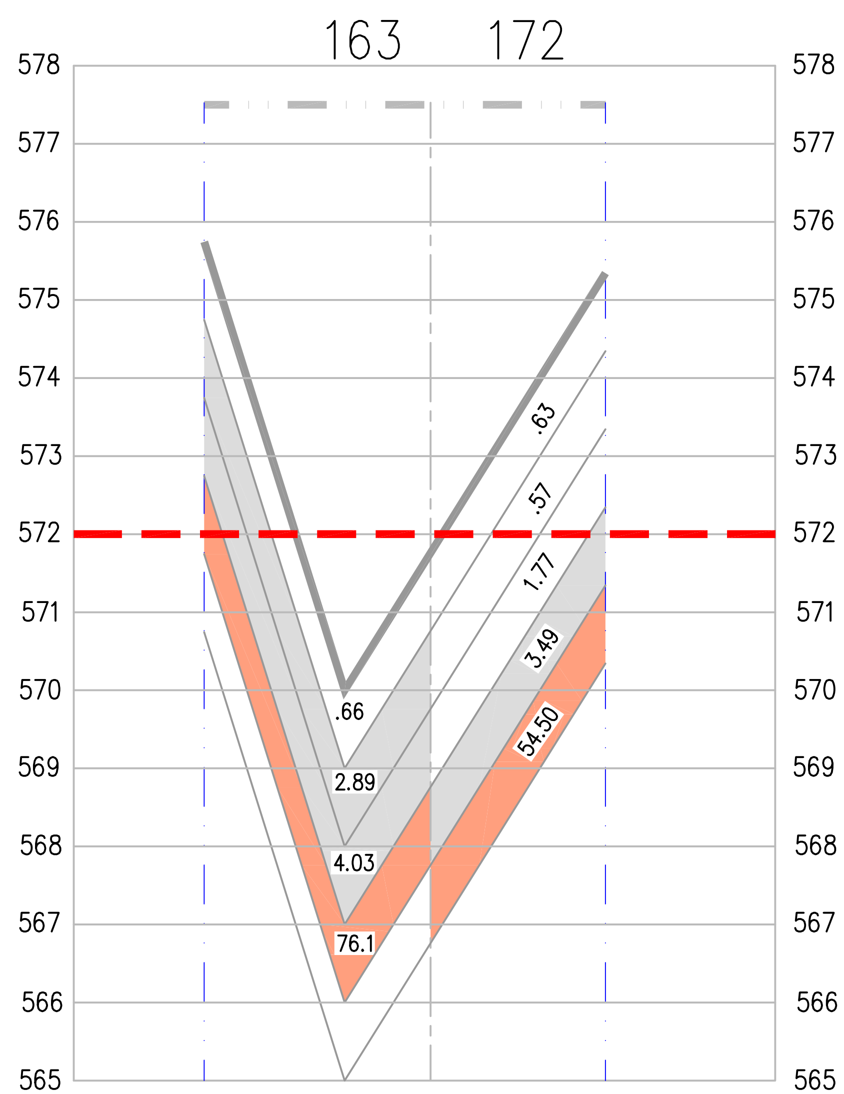


DESIGN

GRID 161 - 170 DOWNRIVER



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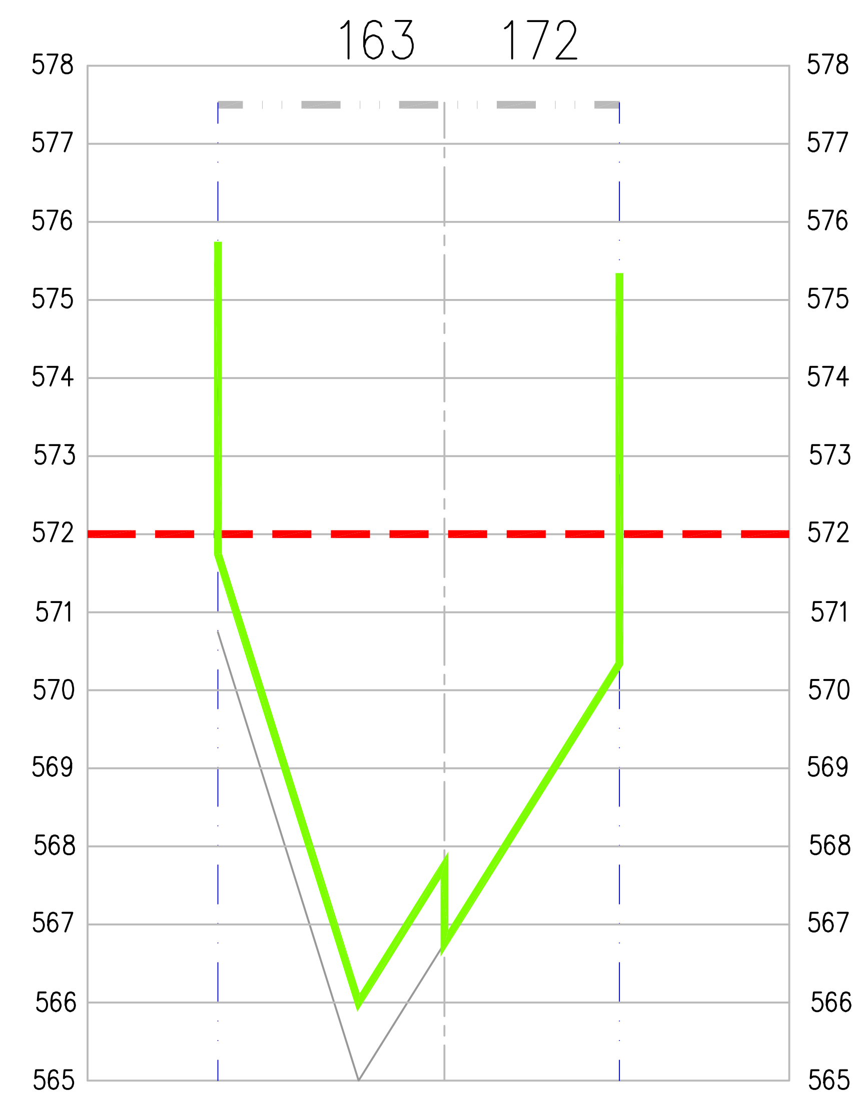
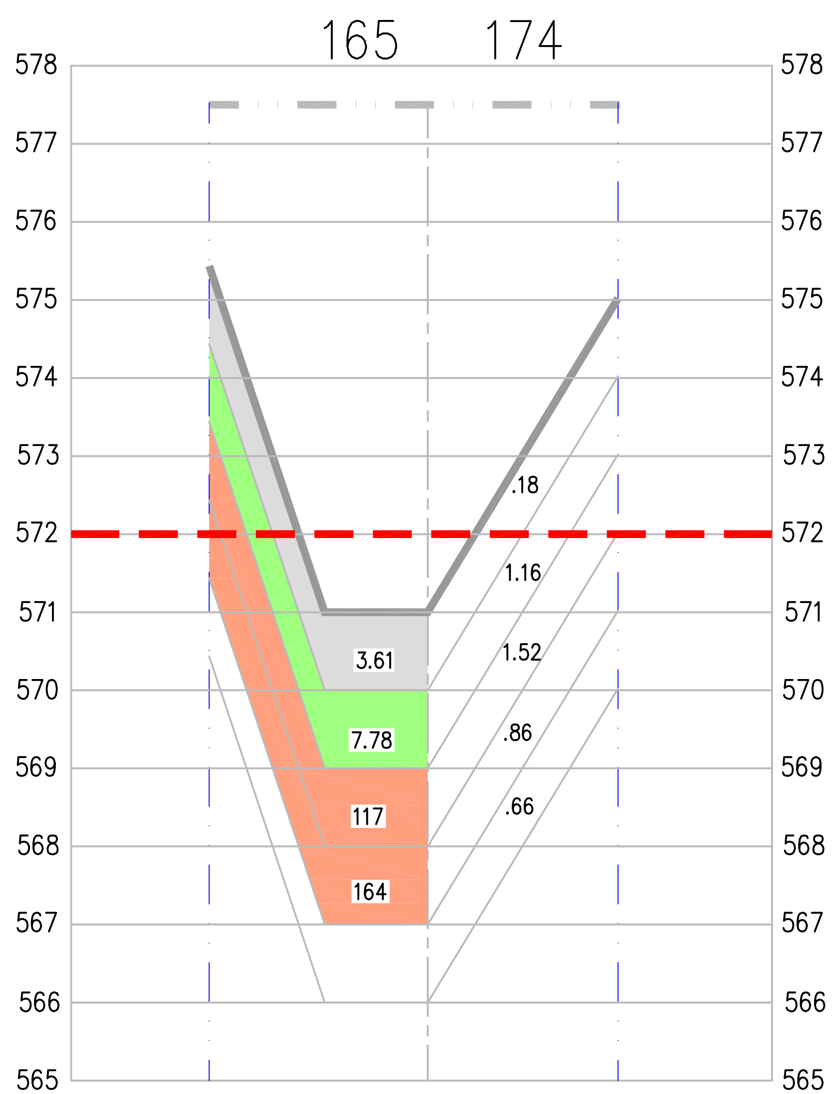


DESIGN

GRID 163 - 172



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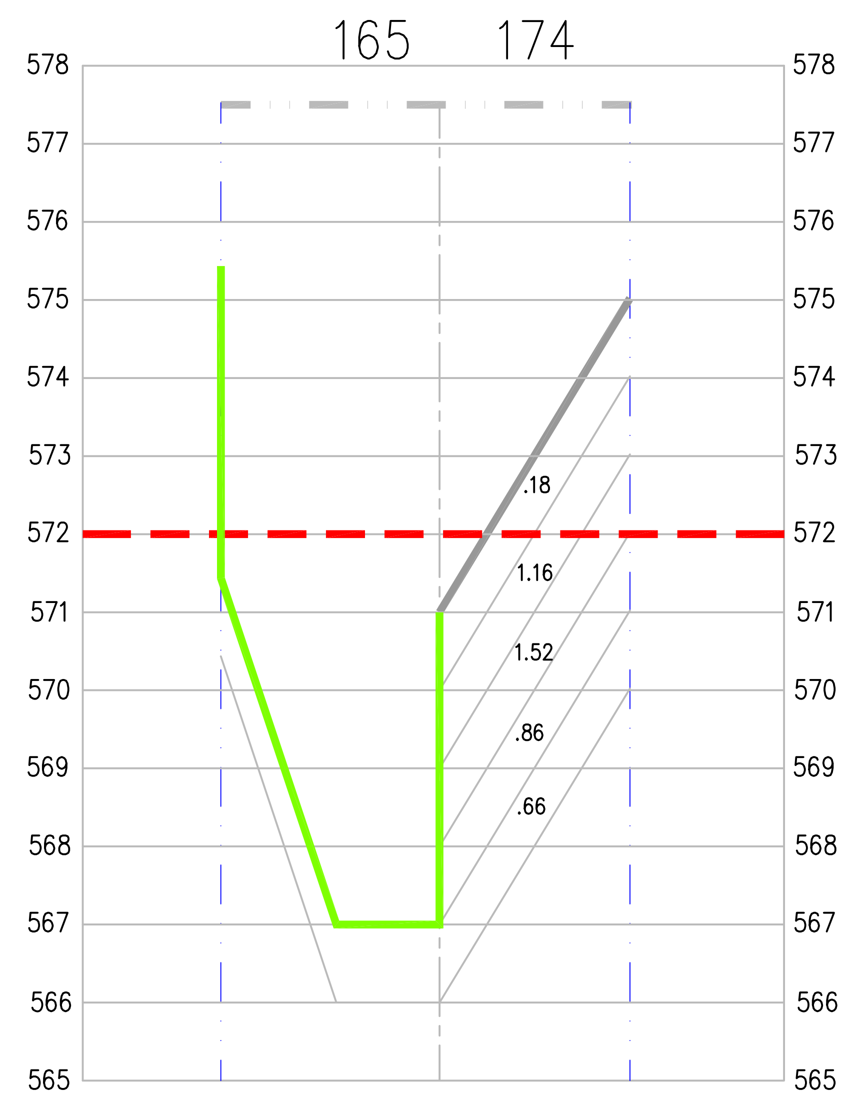

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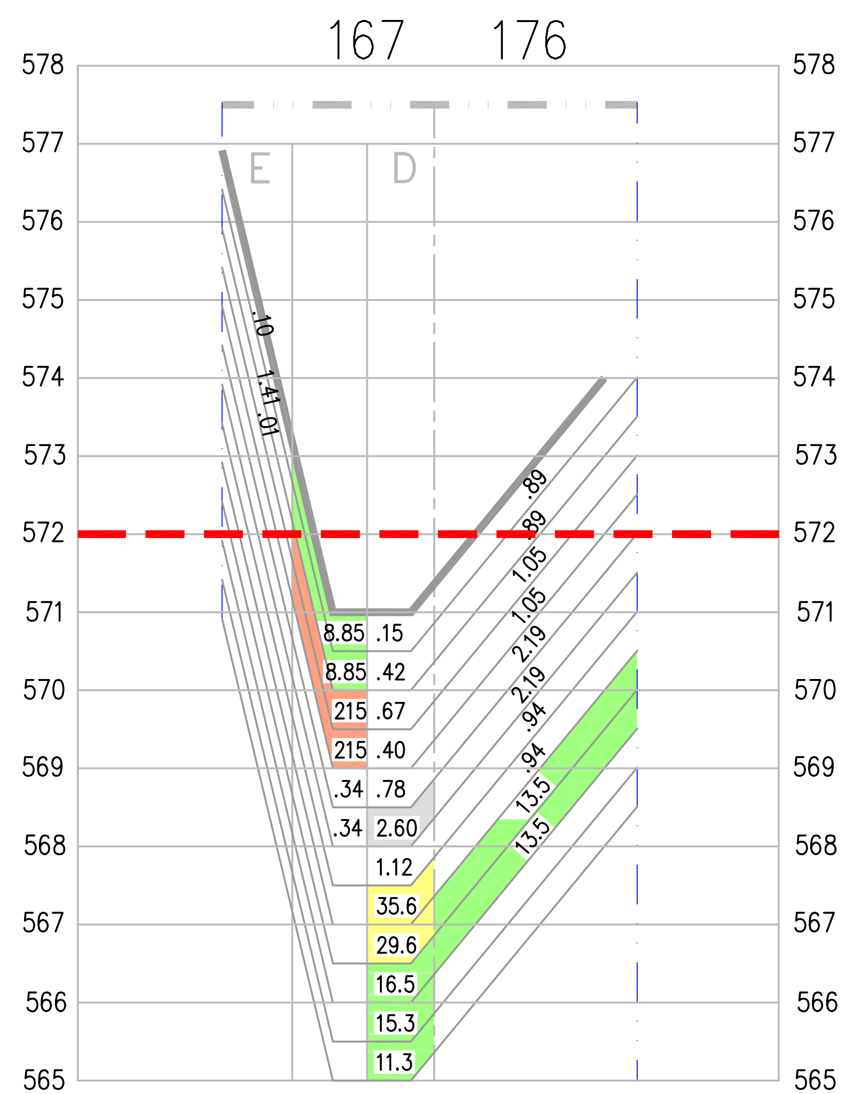
GRID 165 - 174



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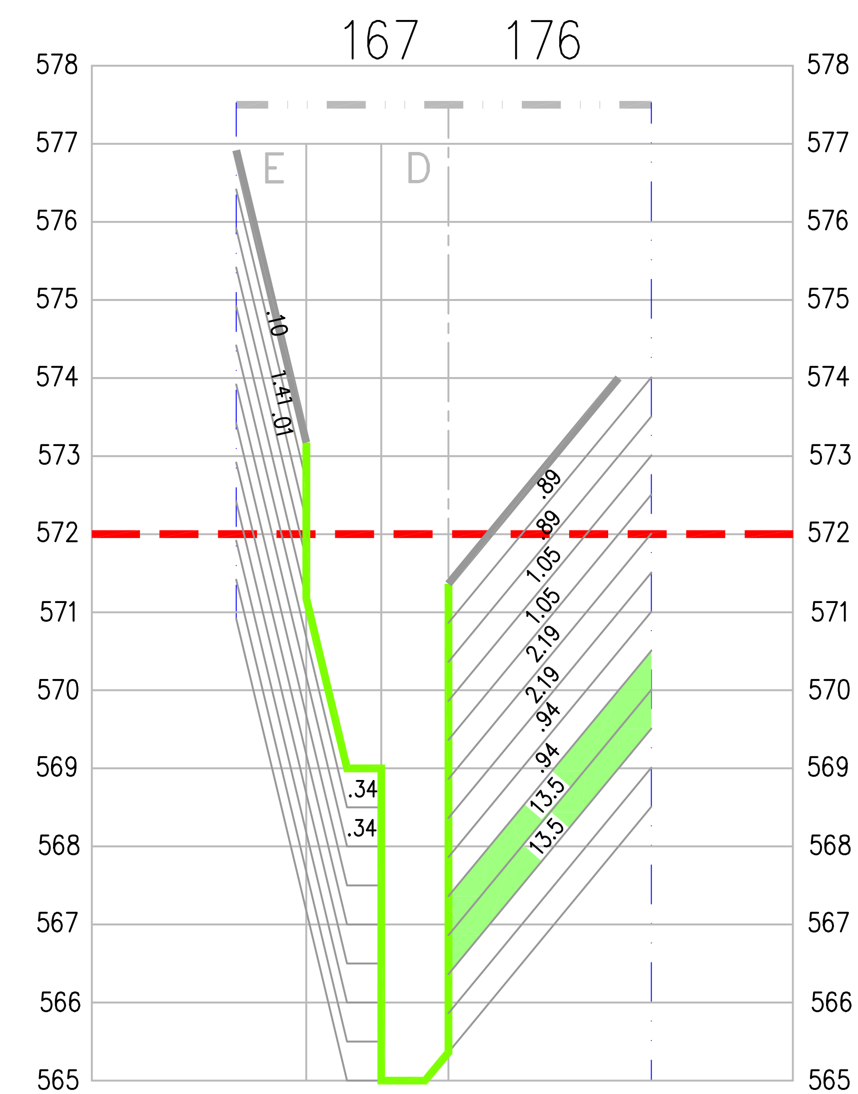

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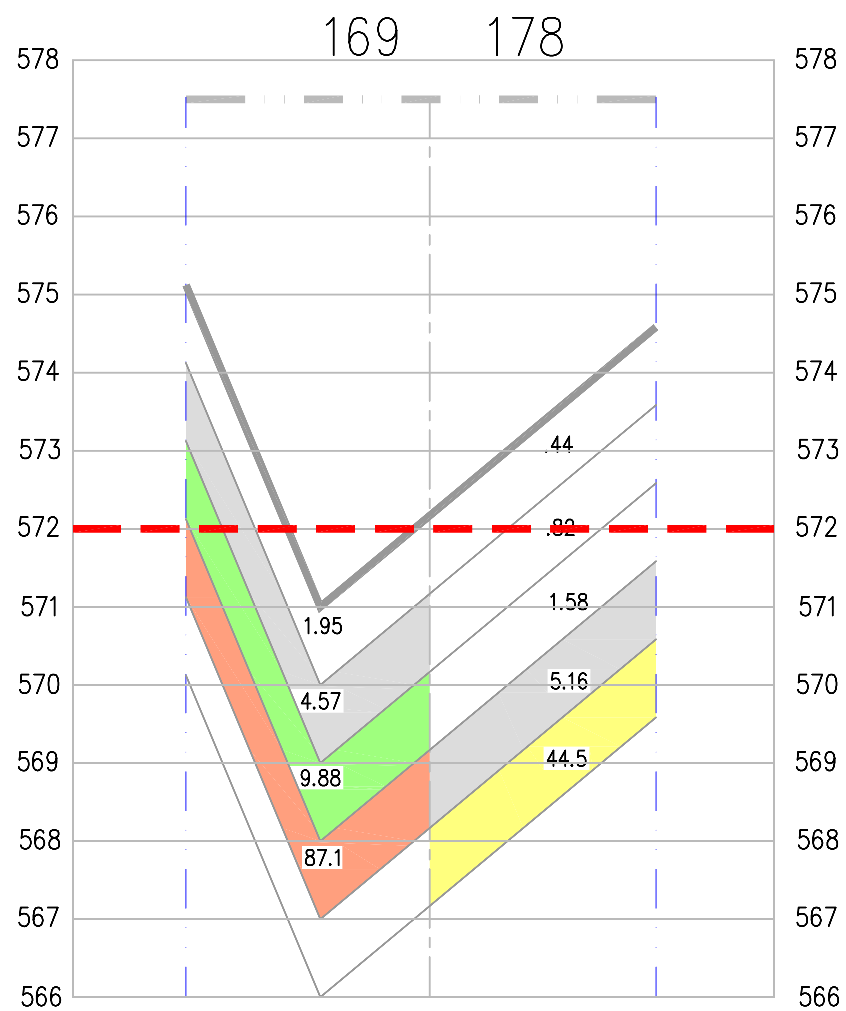
GRID 167 - 176 DOWNRIVER



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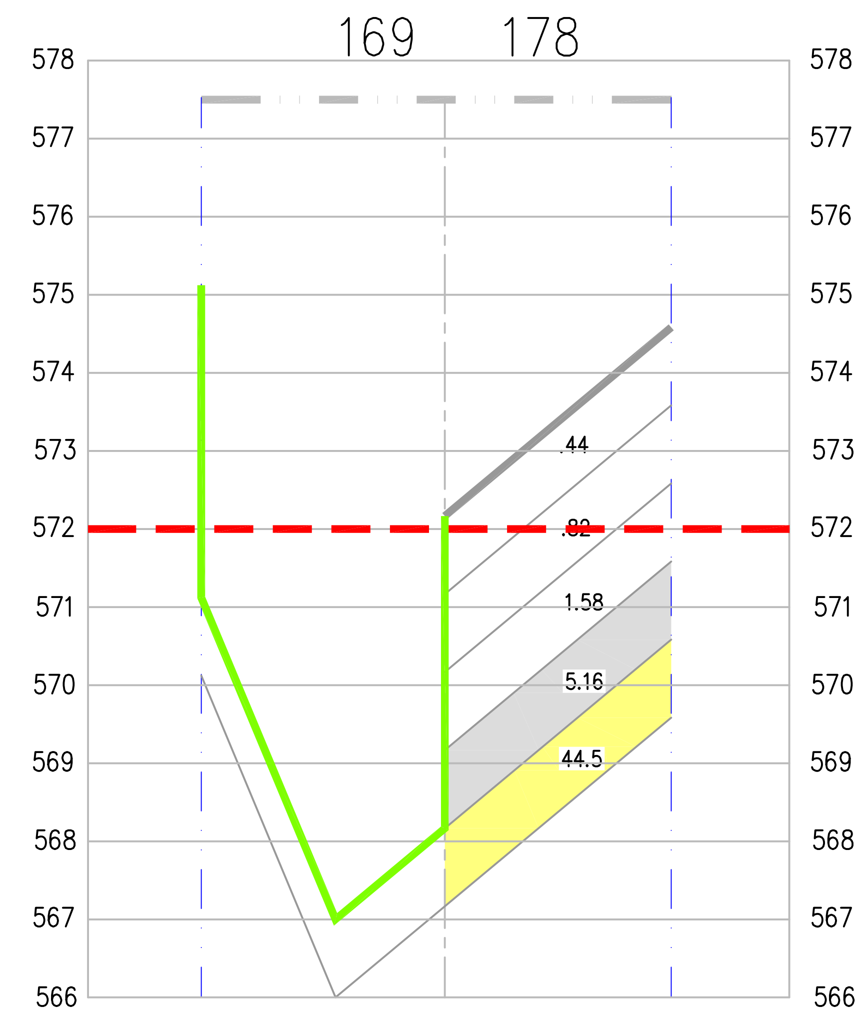

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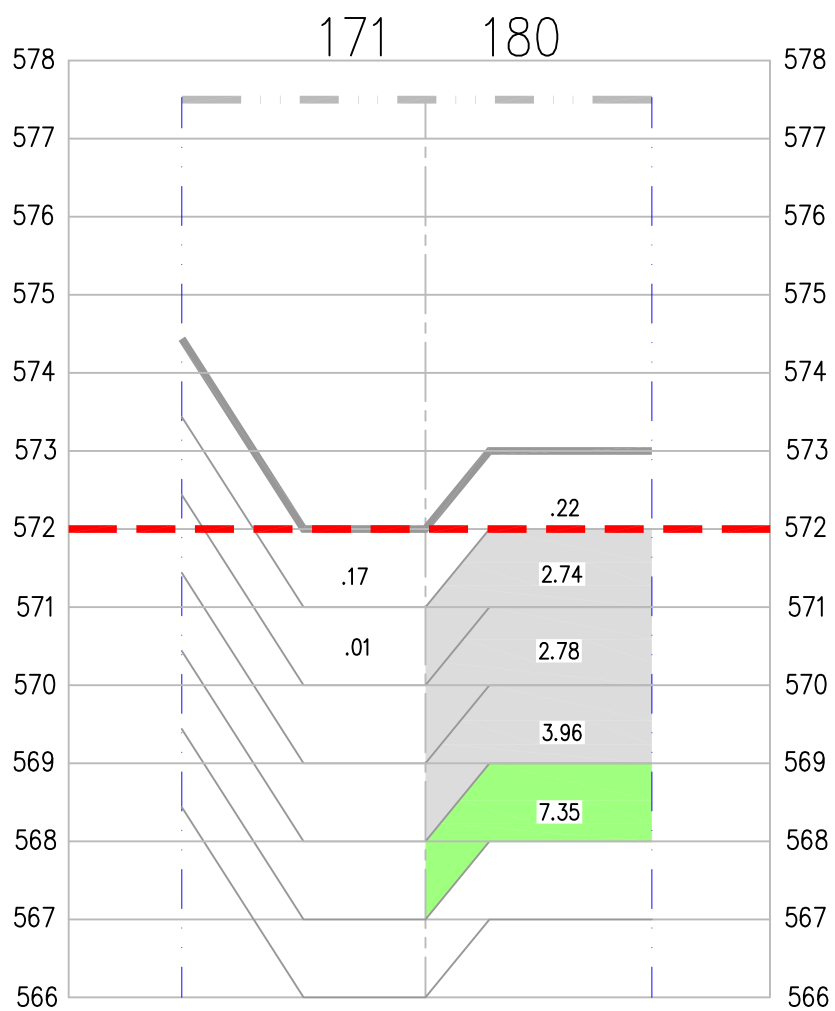
GRID 169 - 178



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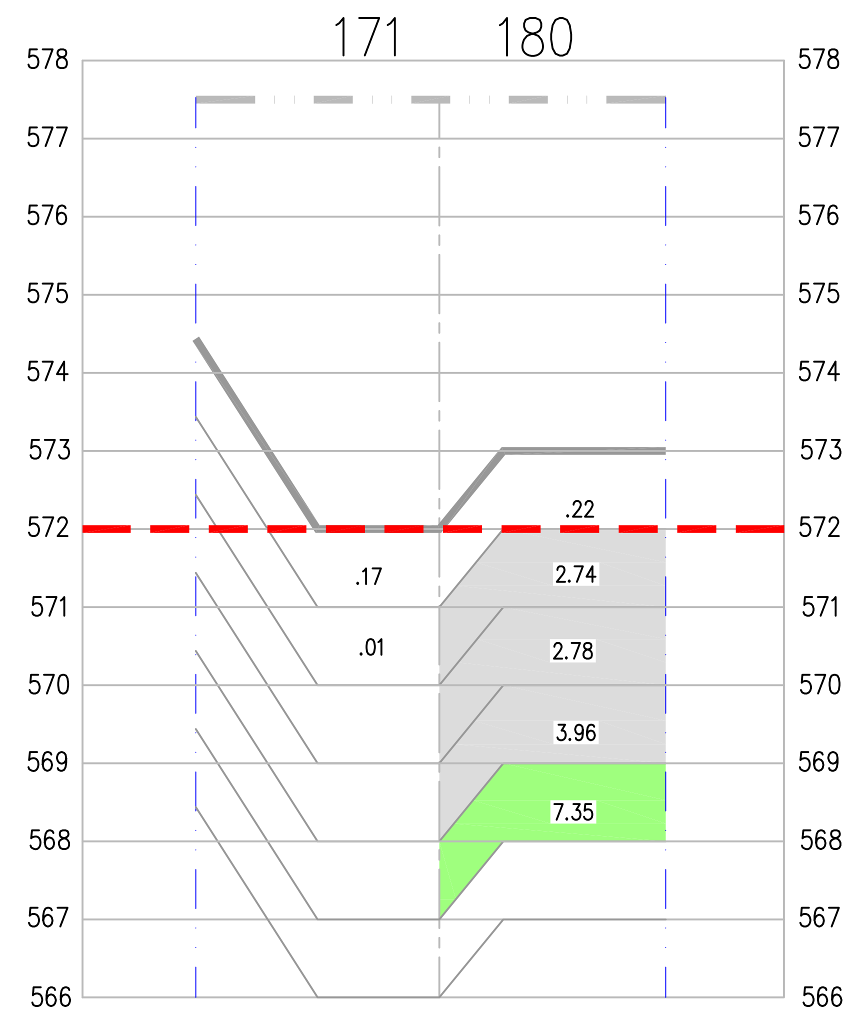

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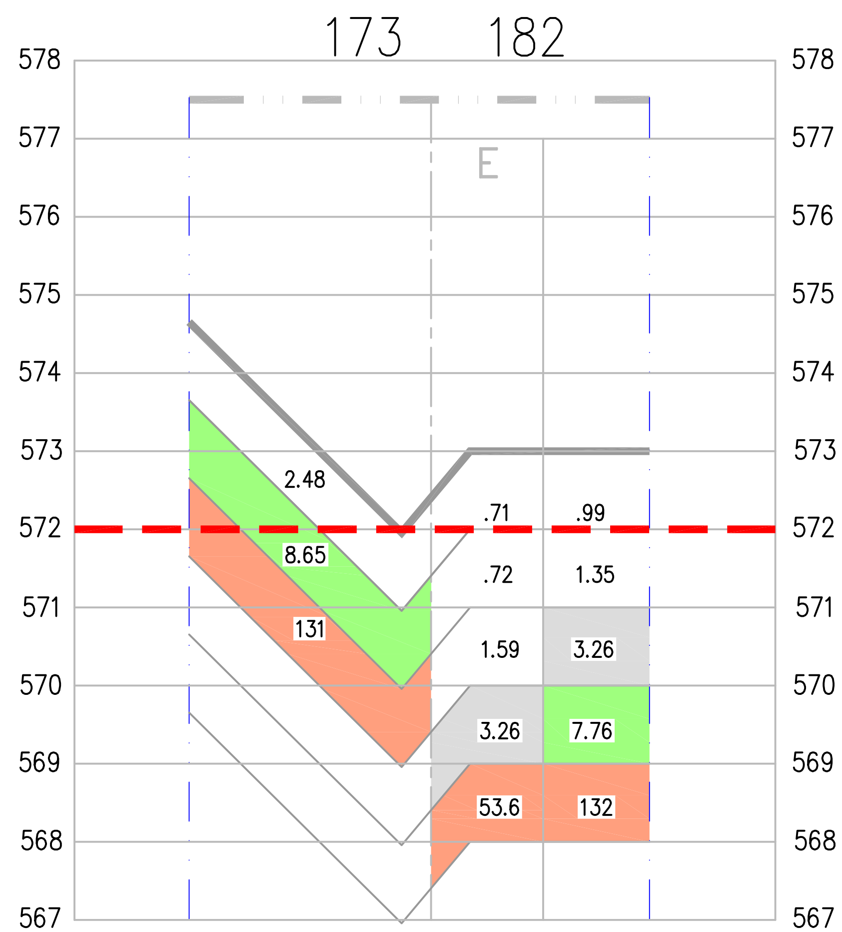

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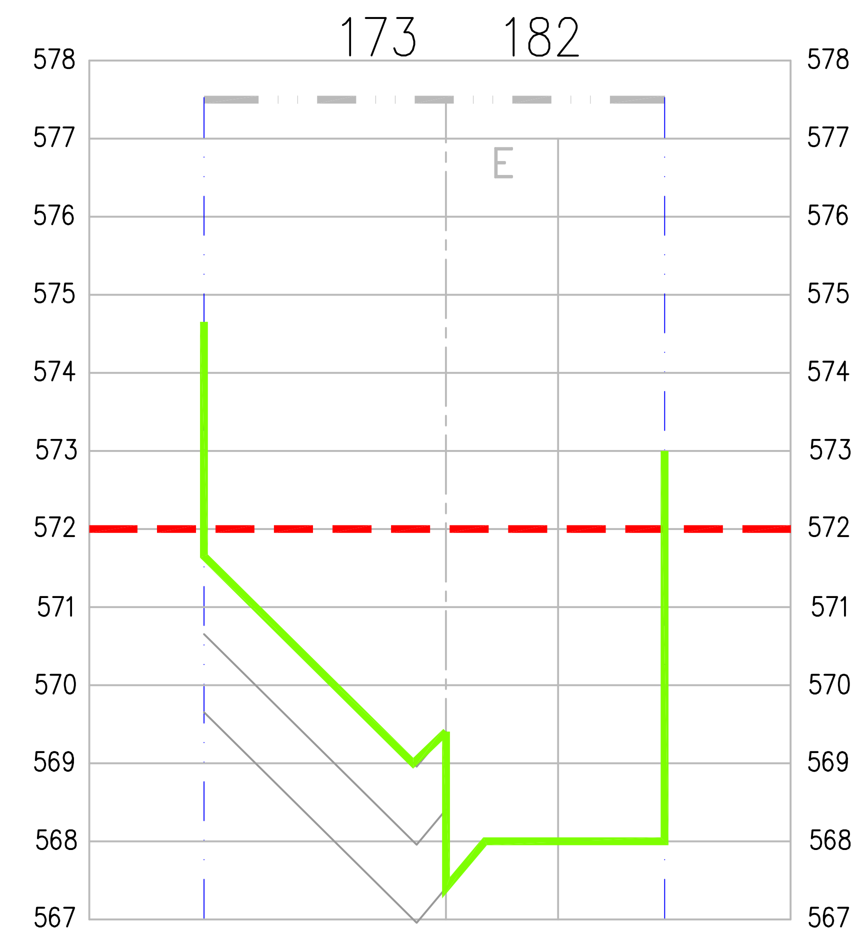

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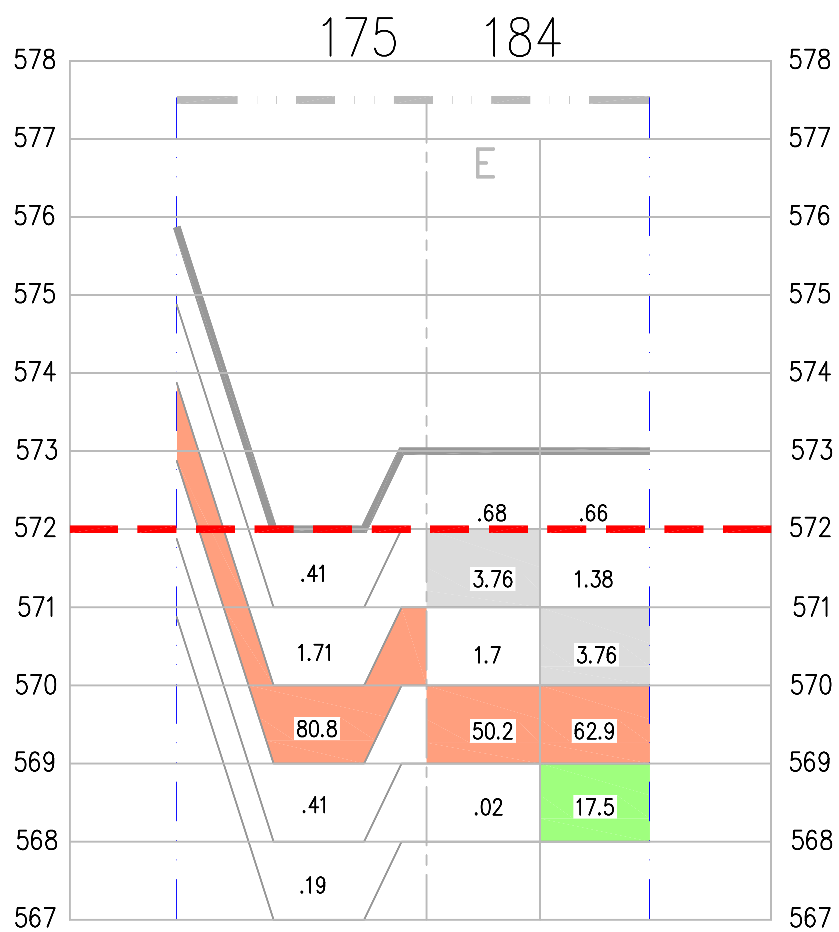

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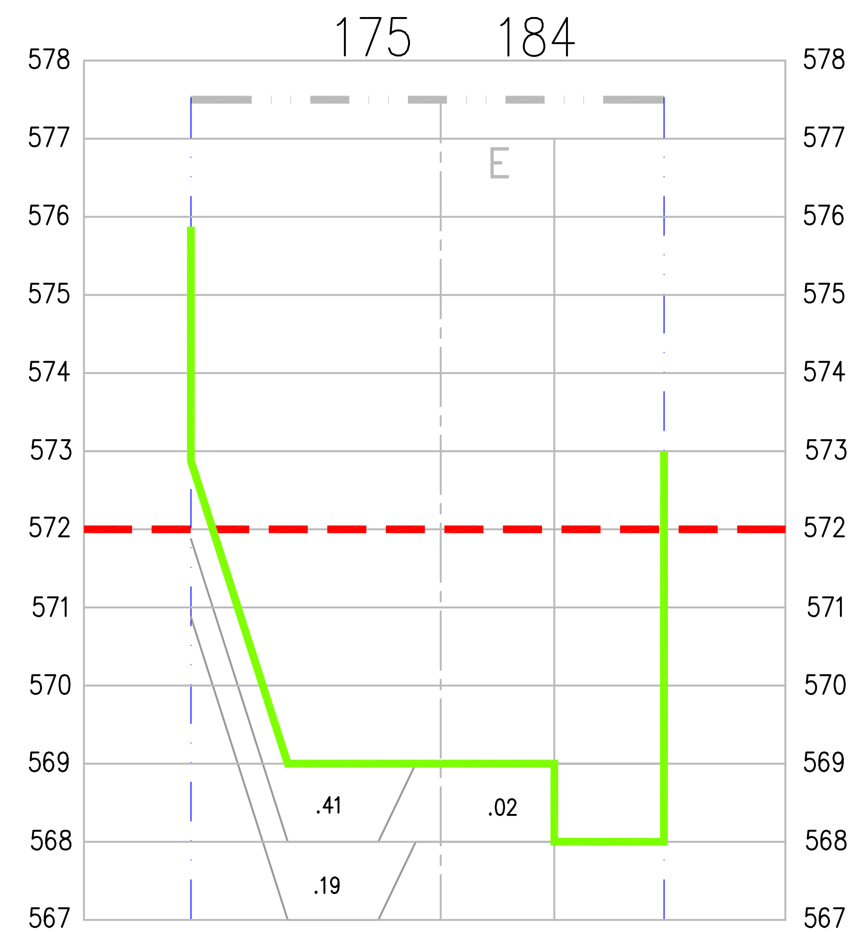

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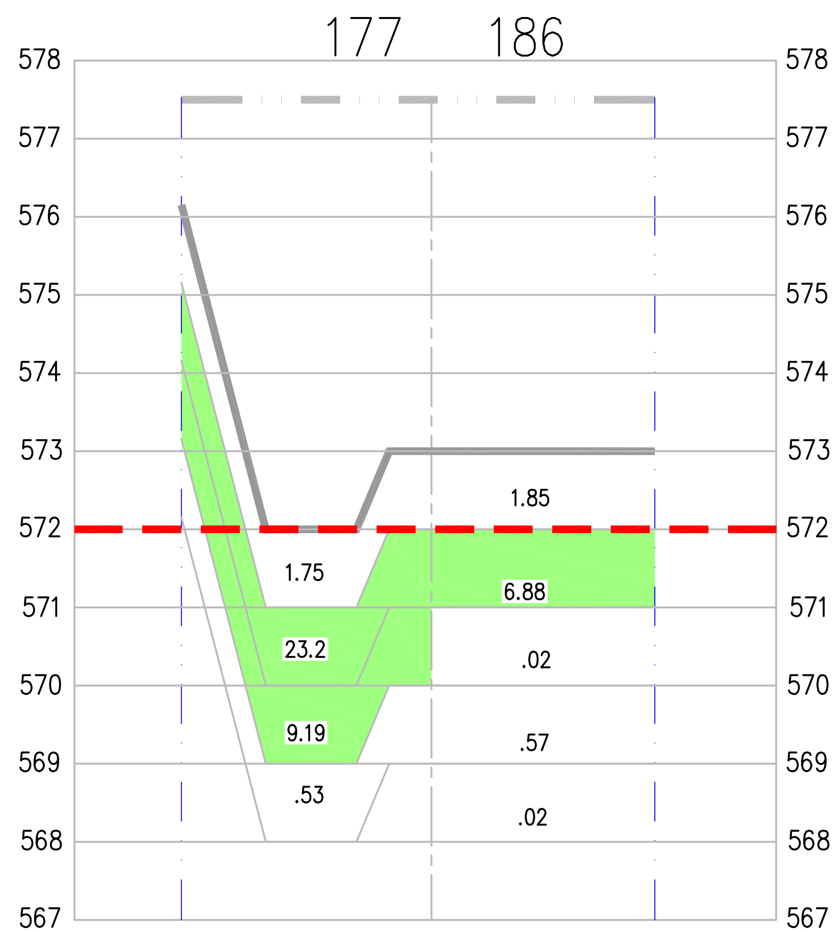

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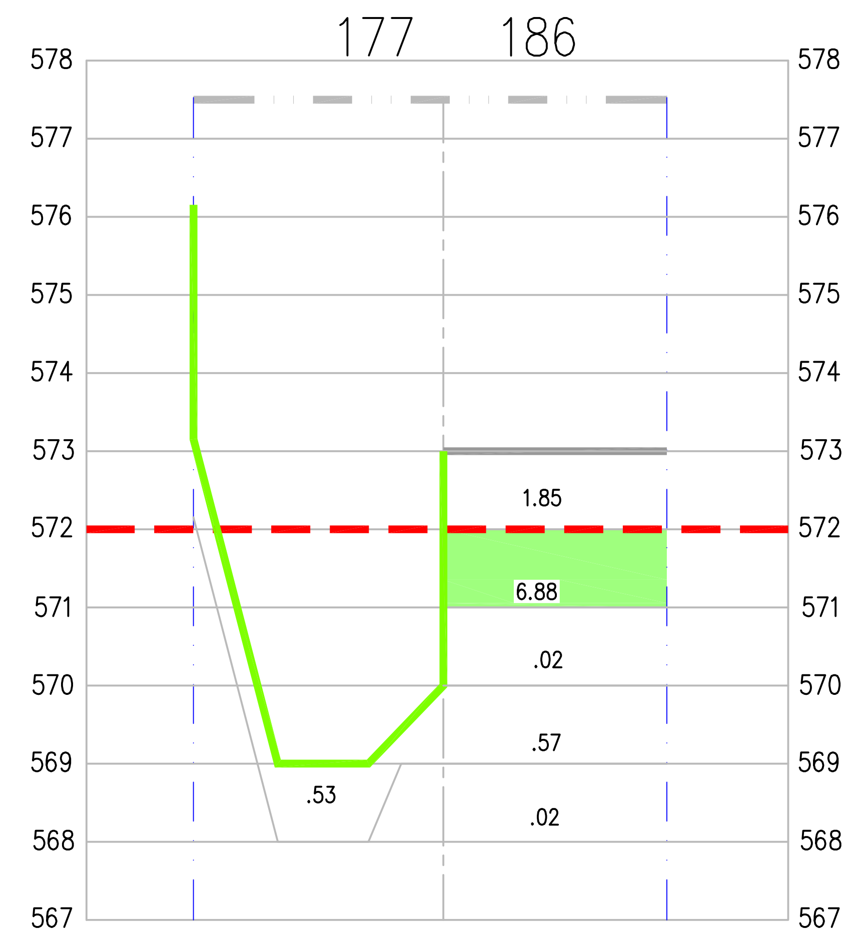

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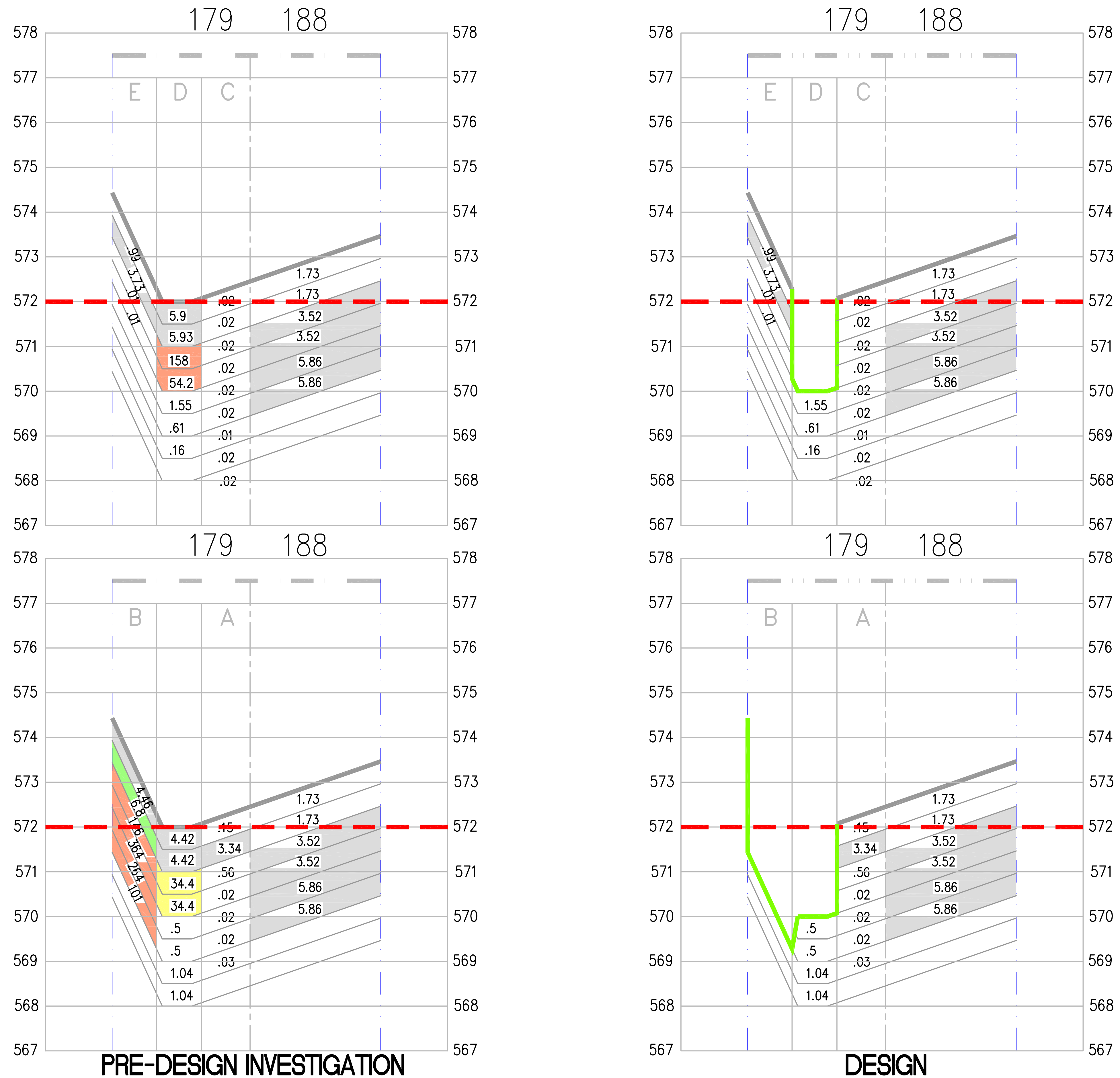
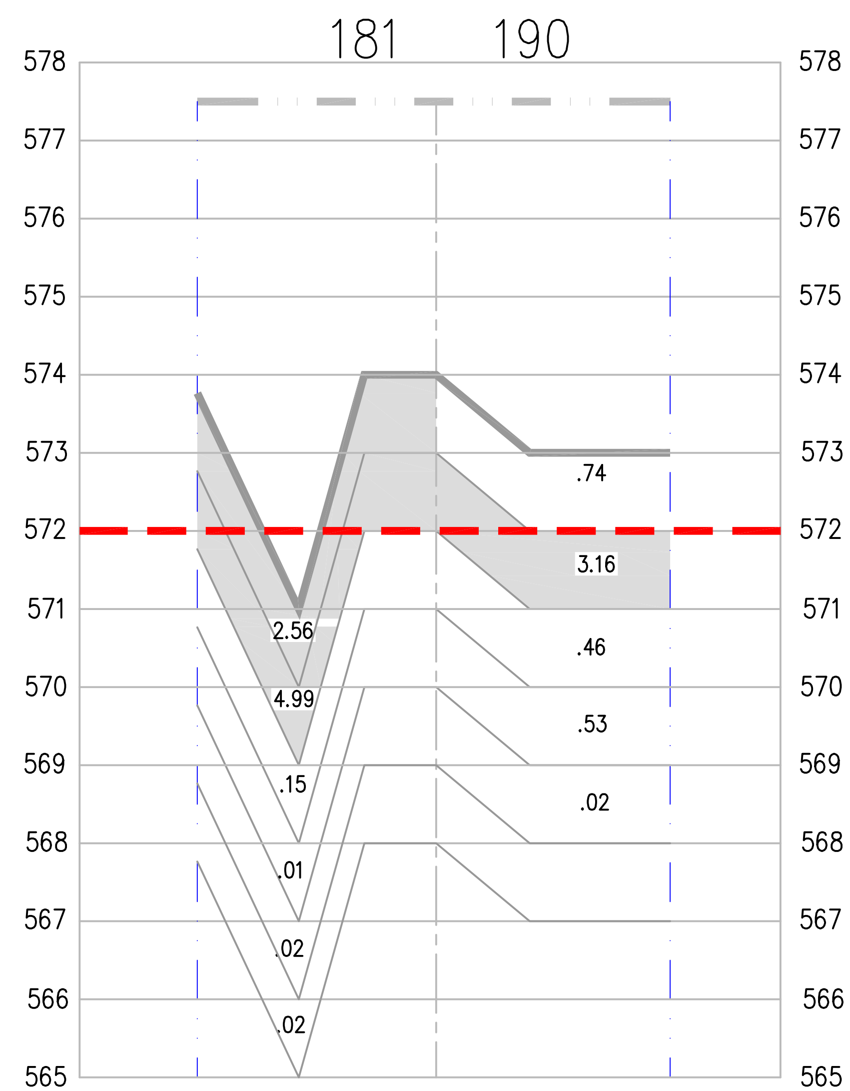


GRID 179 - 188



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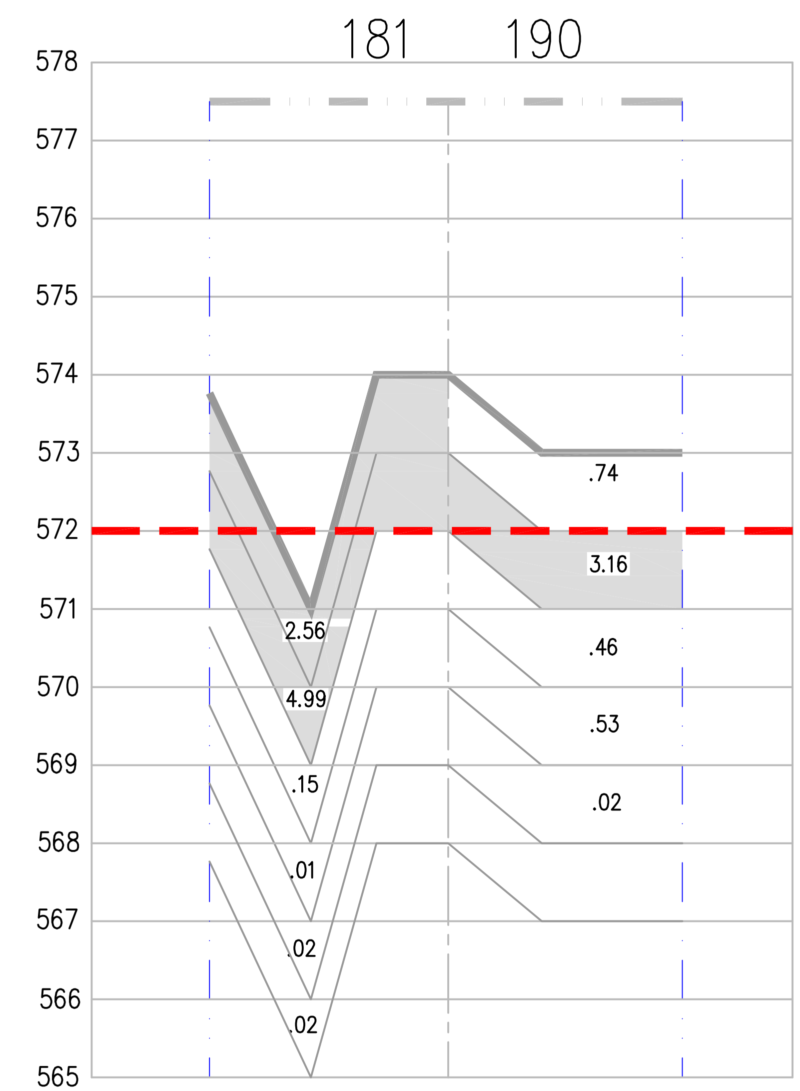

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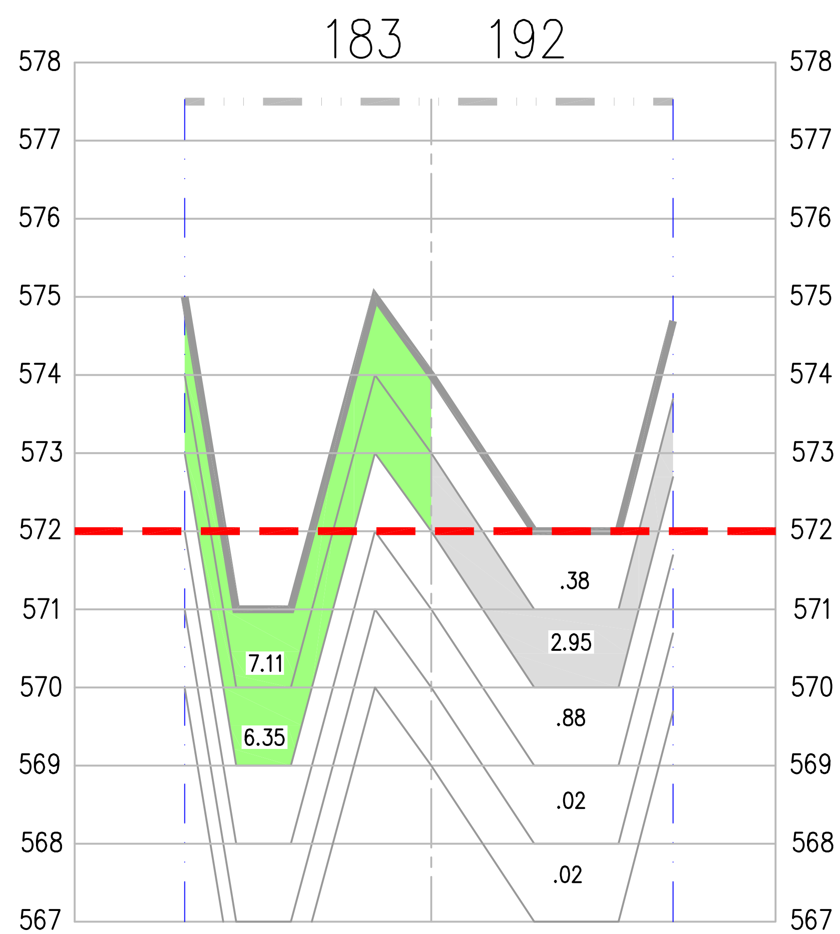

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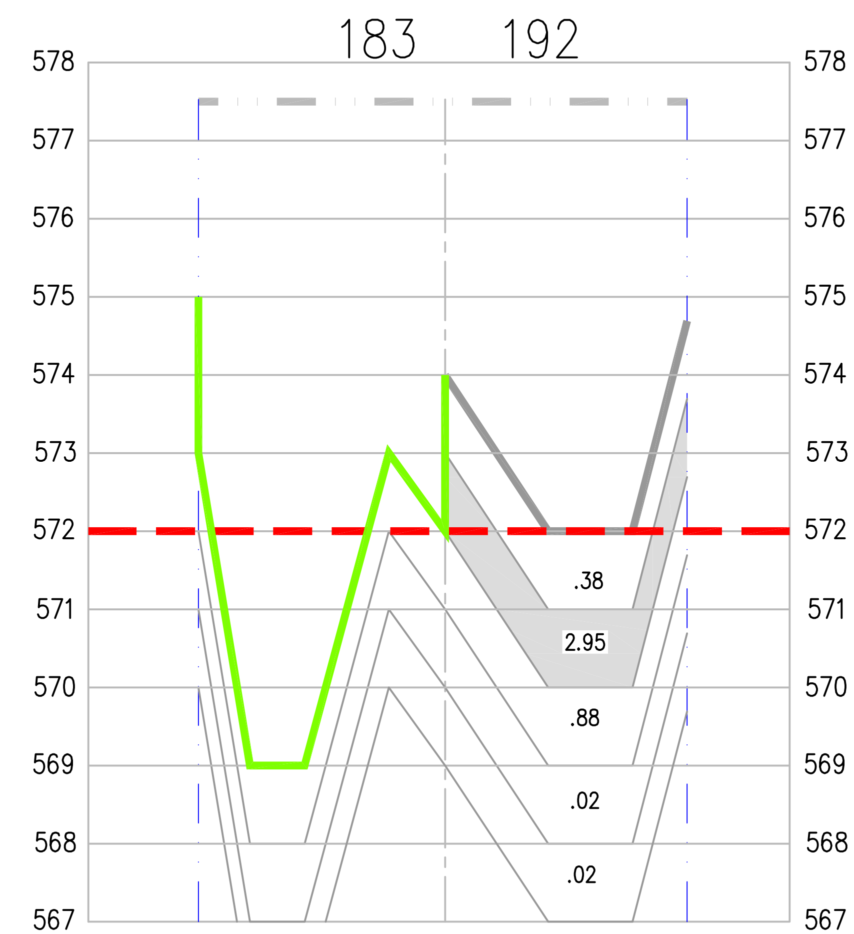

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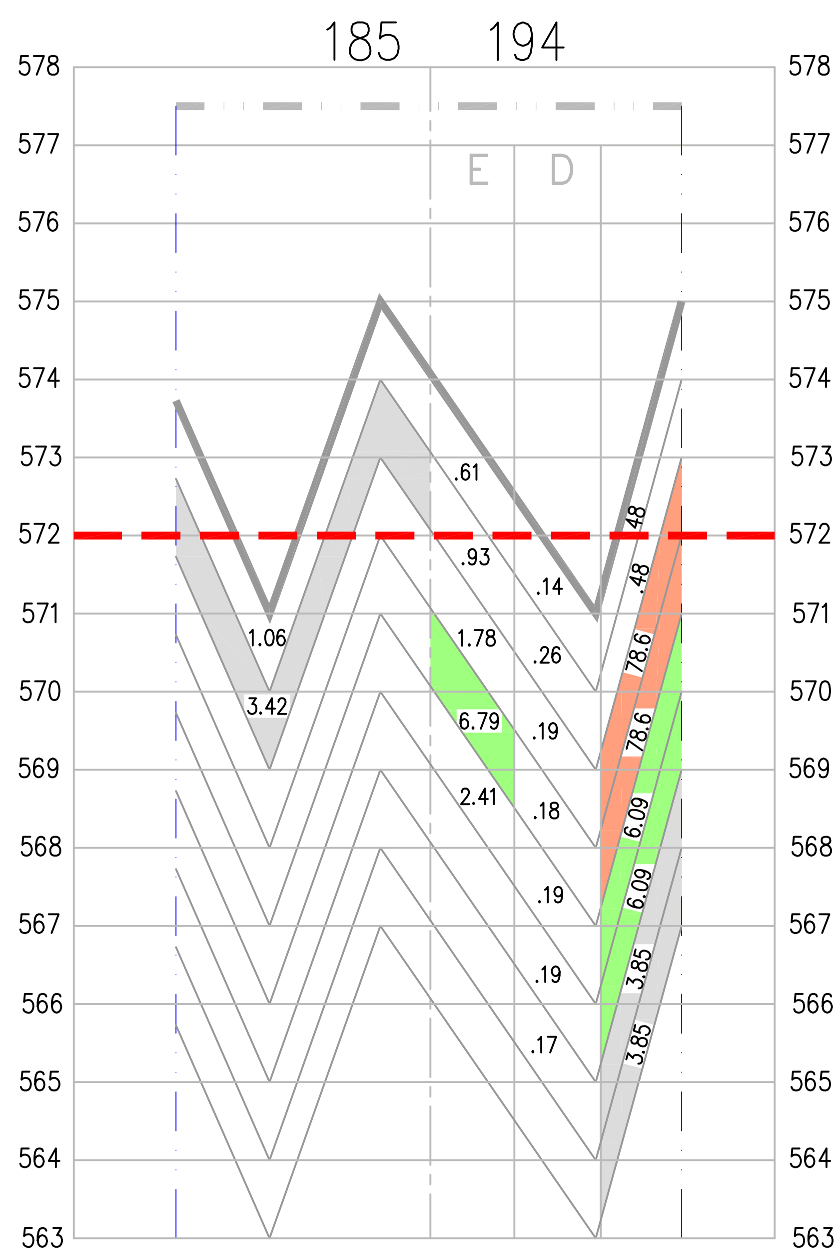

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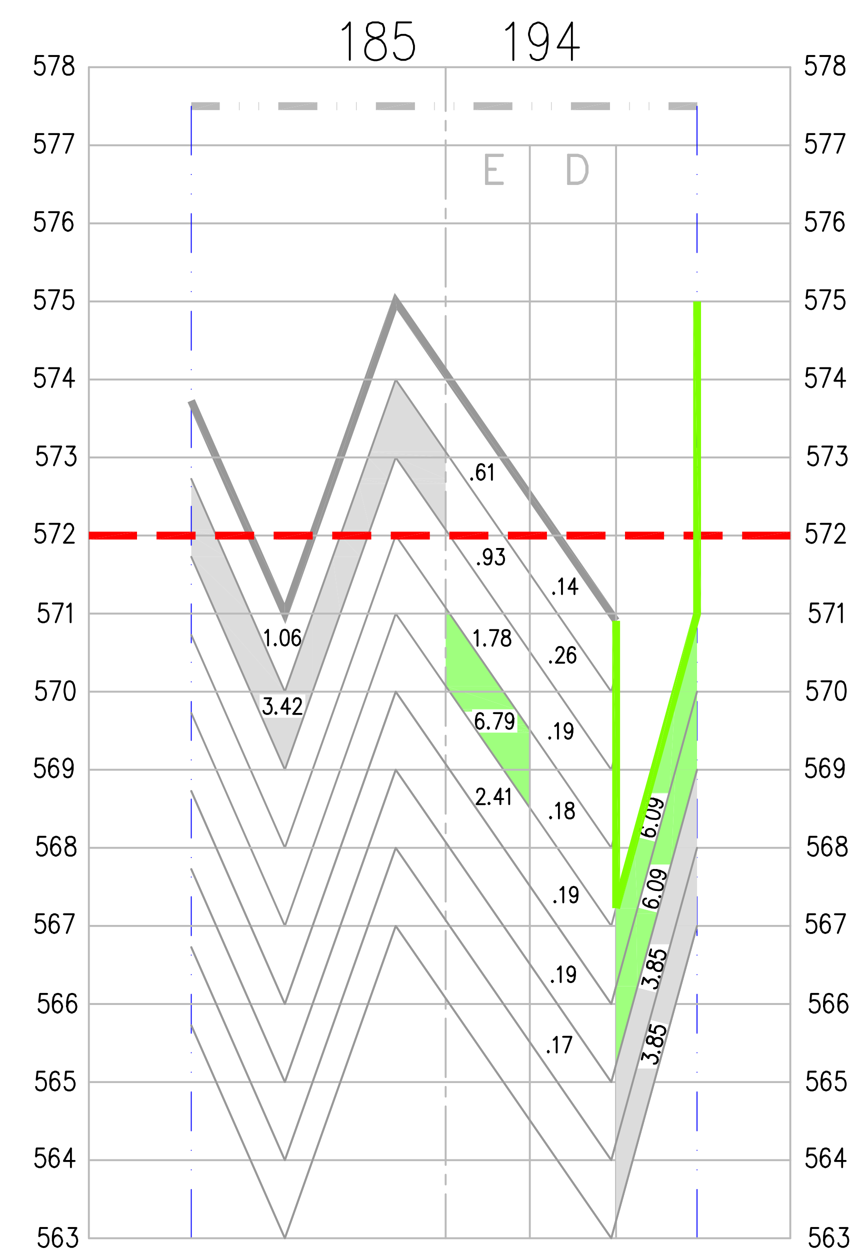

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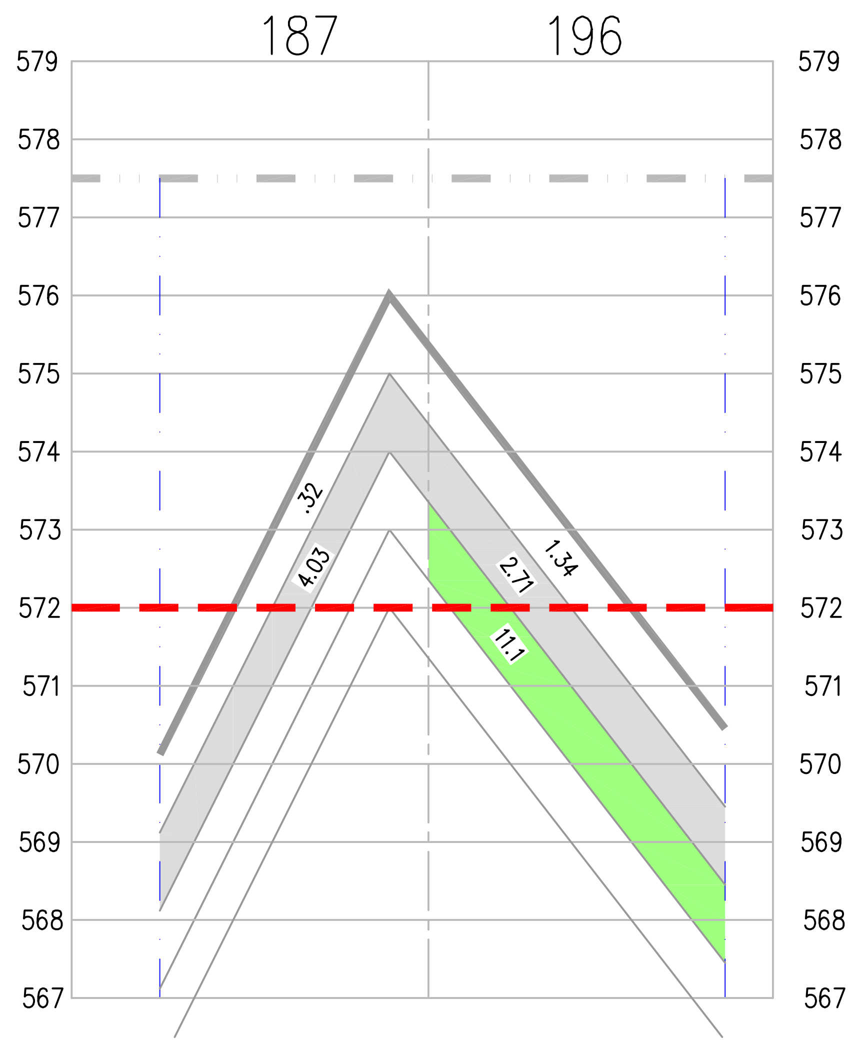
GRID 185 - 194 DOWNRIVER



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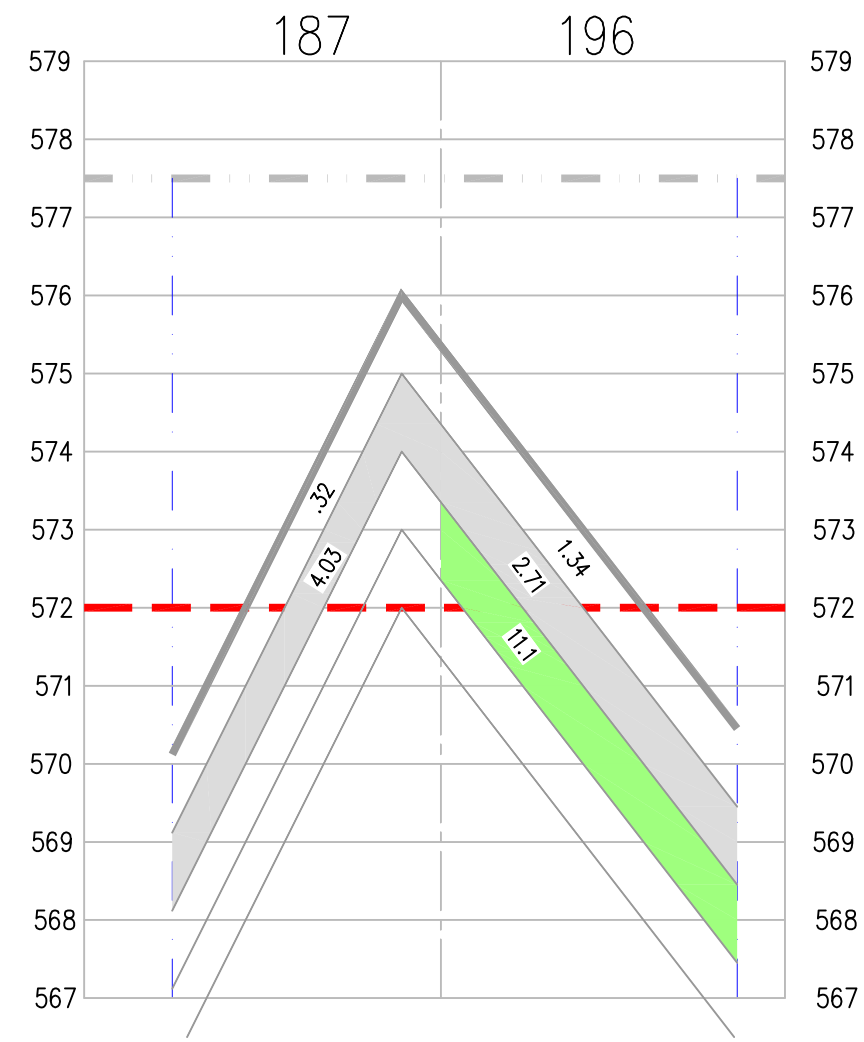

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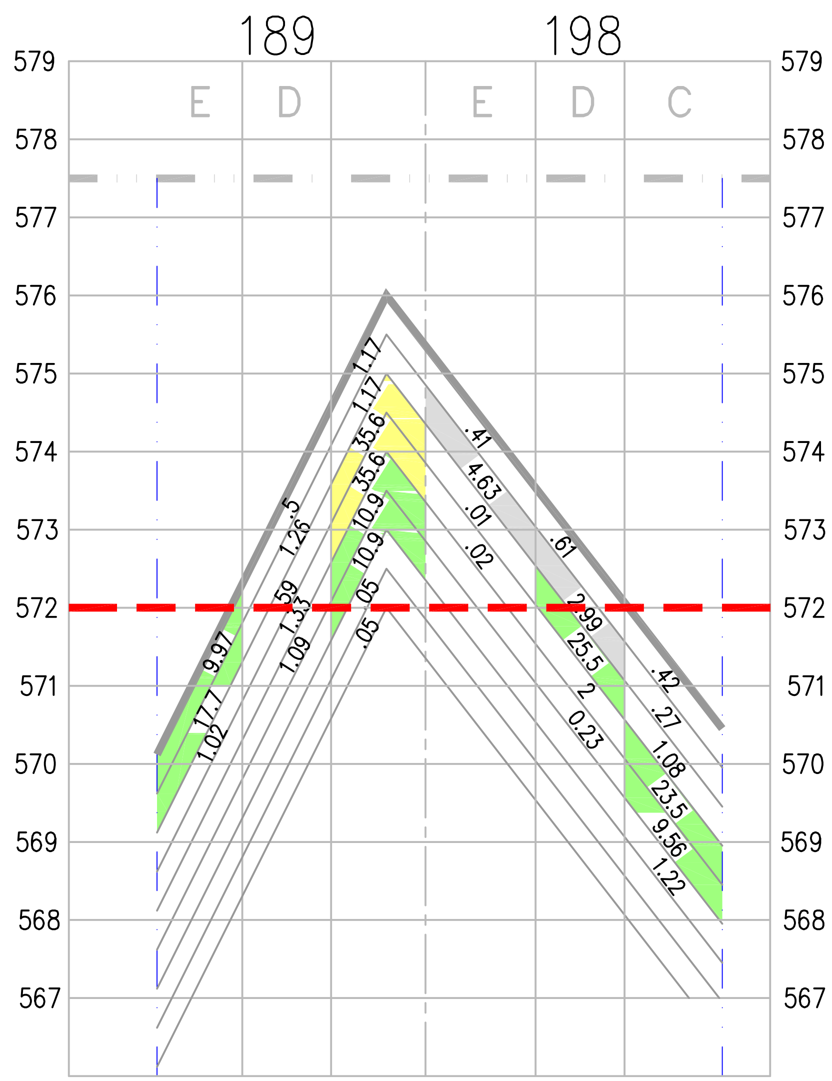
GRID 187 - 196



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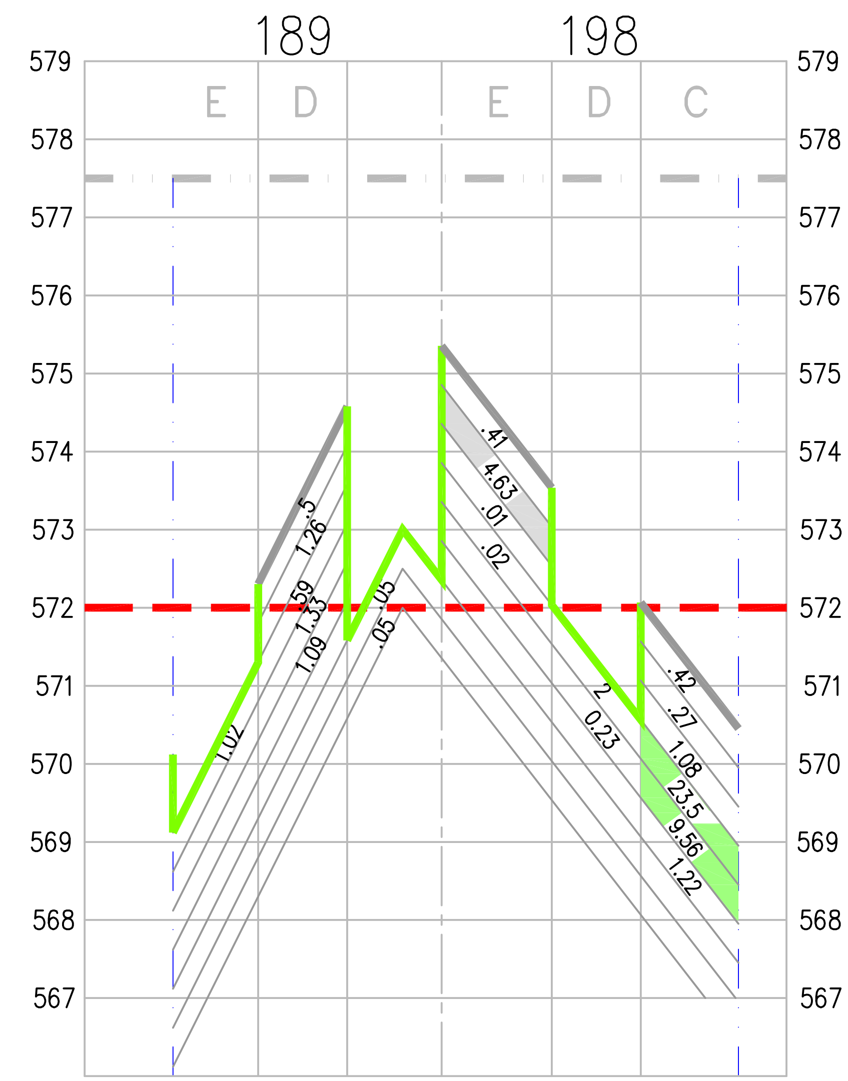

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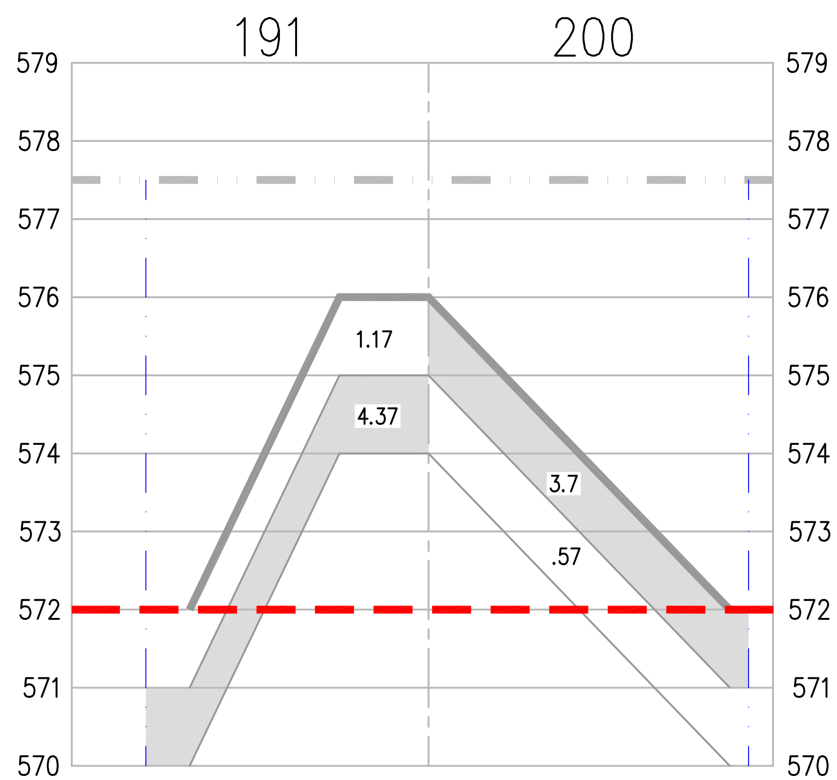
GRID 189 - 198 DOWNRIVER



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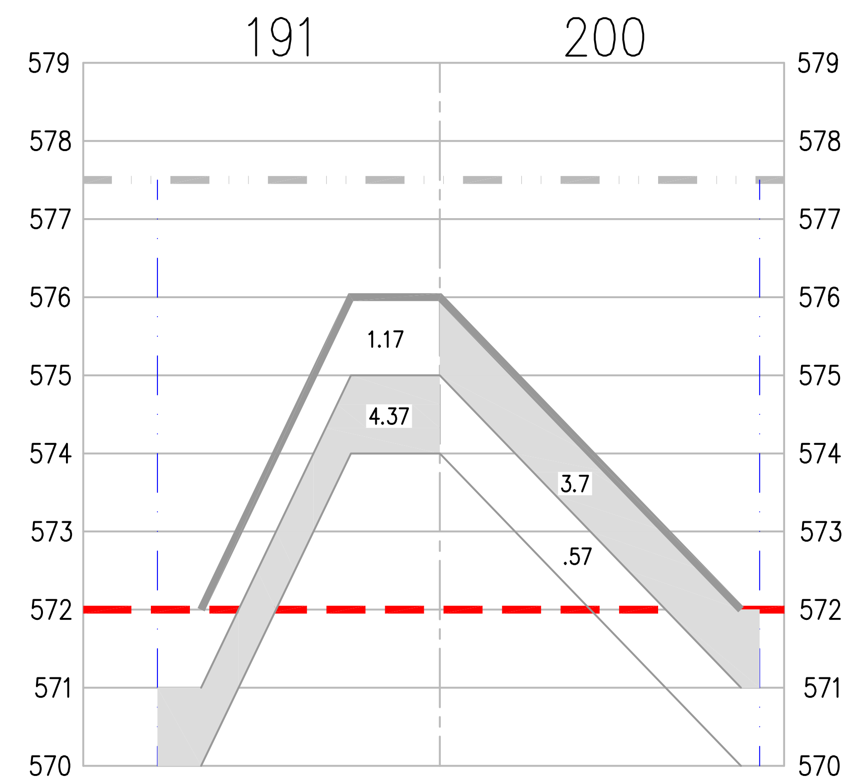

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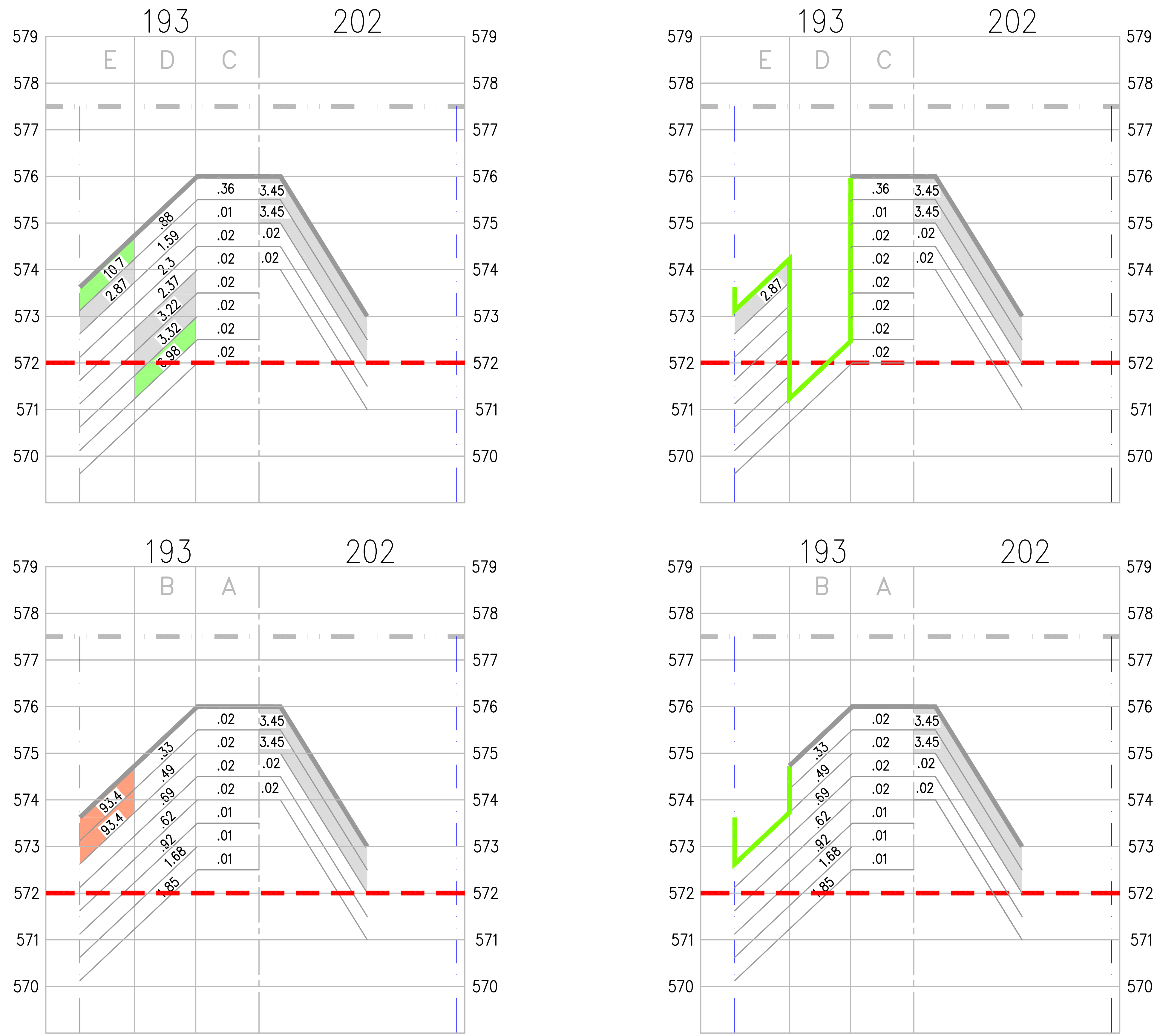

PRE-DESIGN INVESTIGATION

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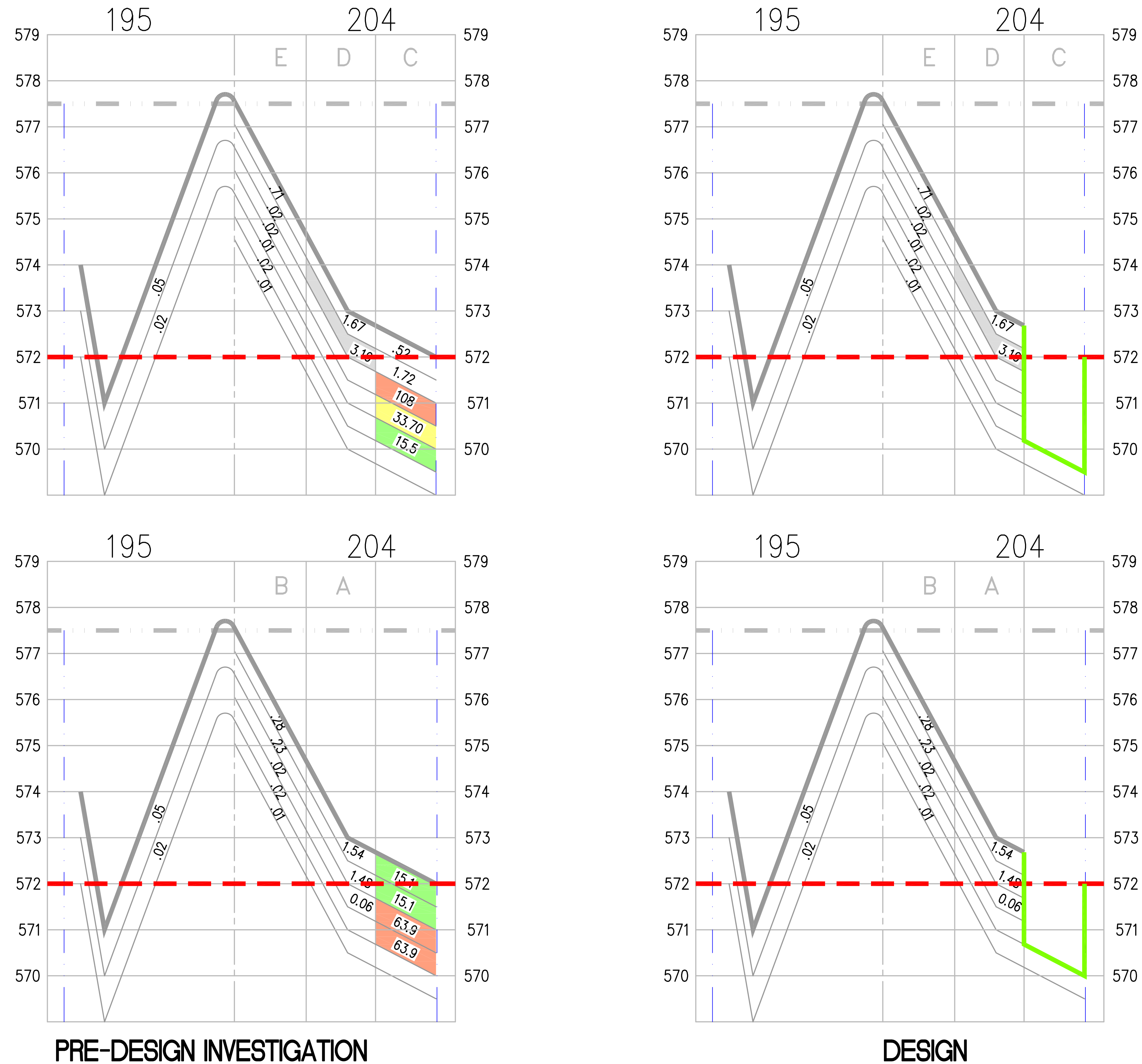
GRID 193 - 202



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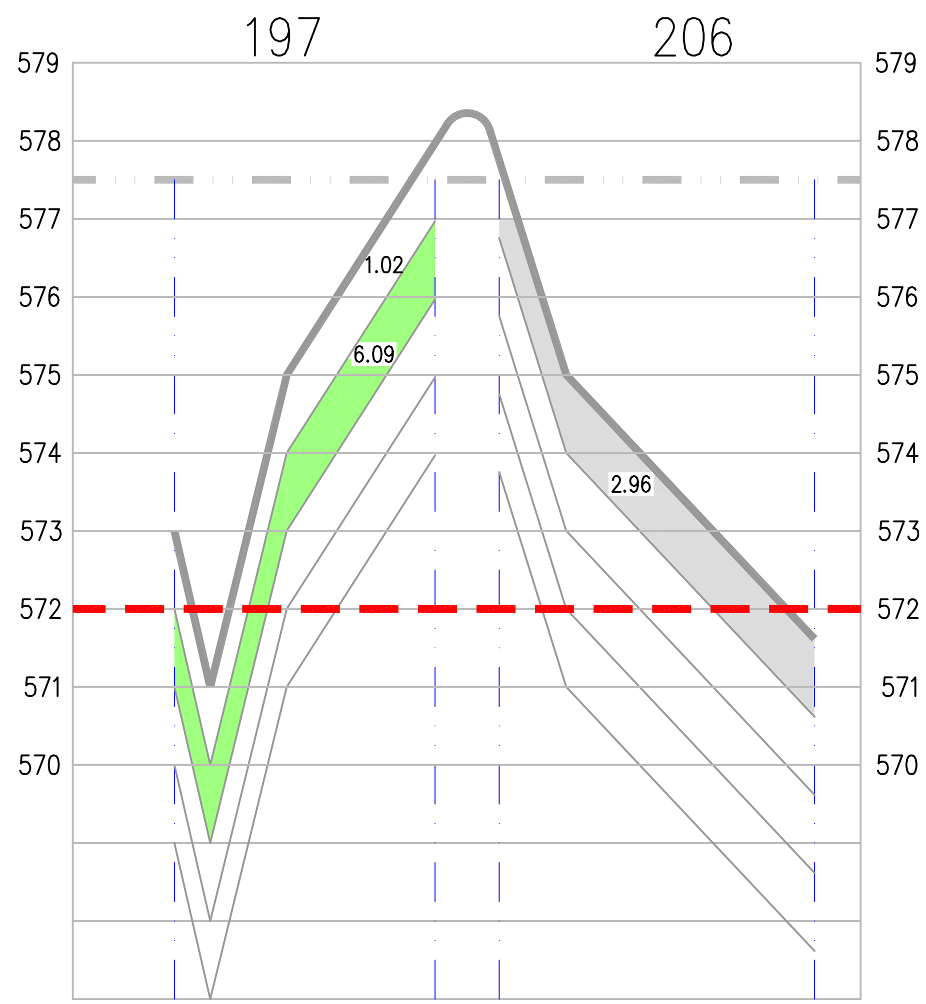

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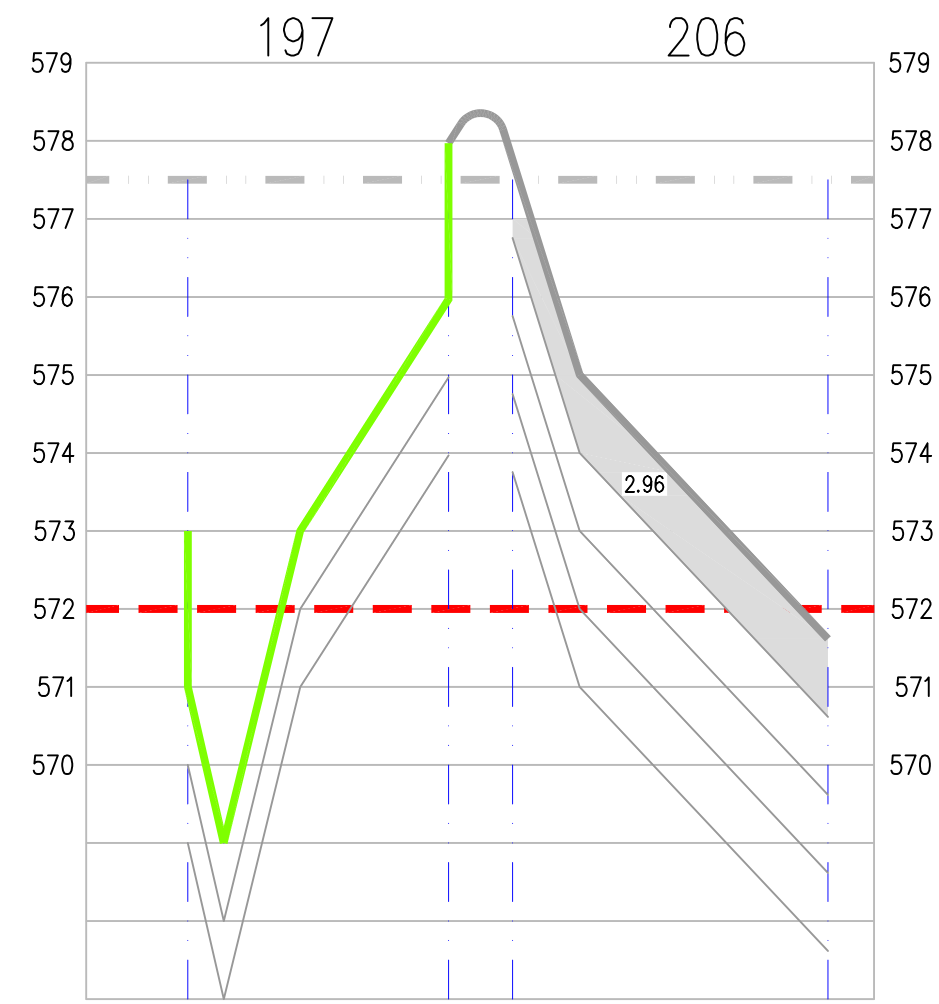

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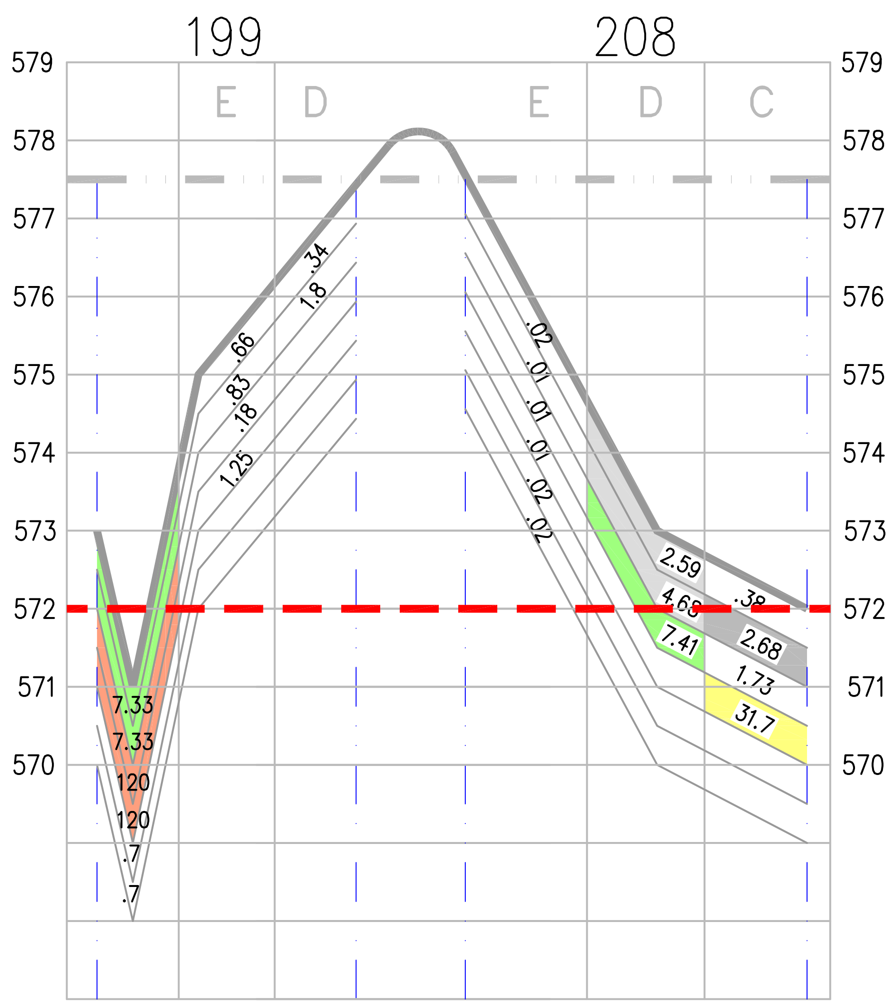
GRID 197 - 206



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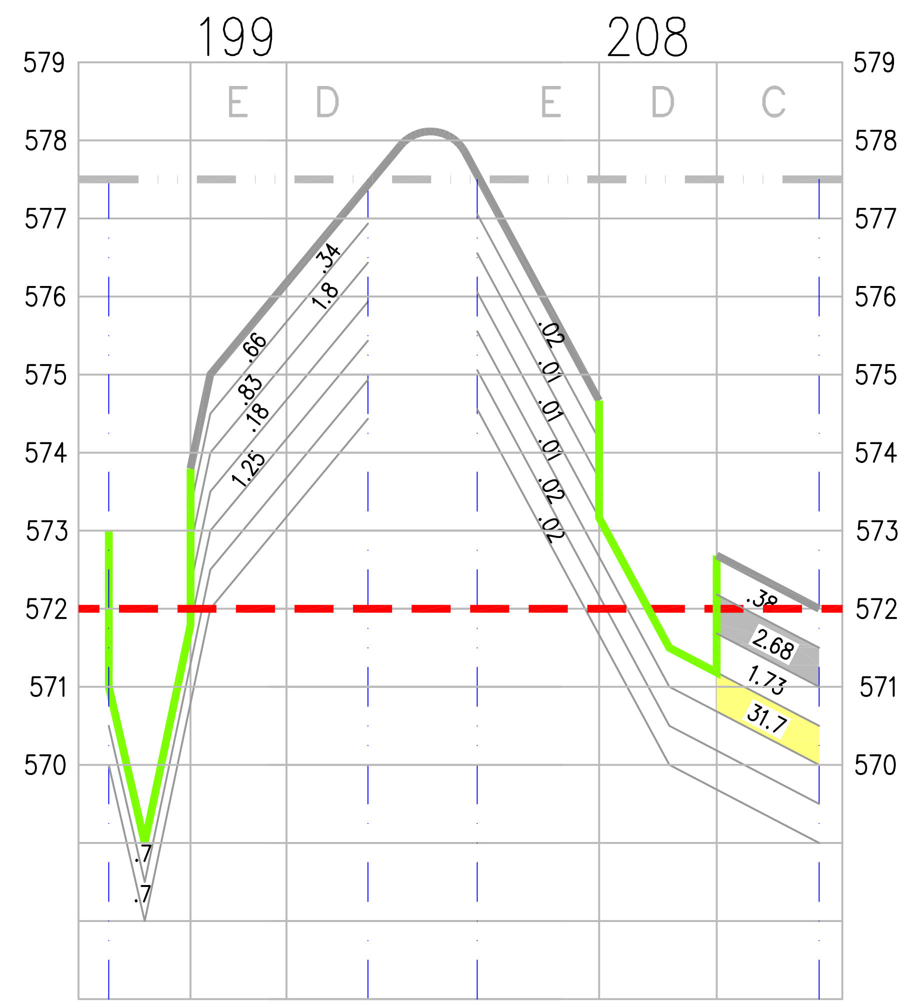

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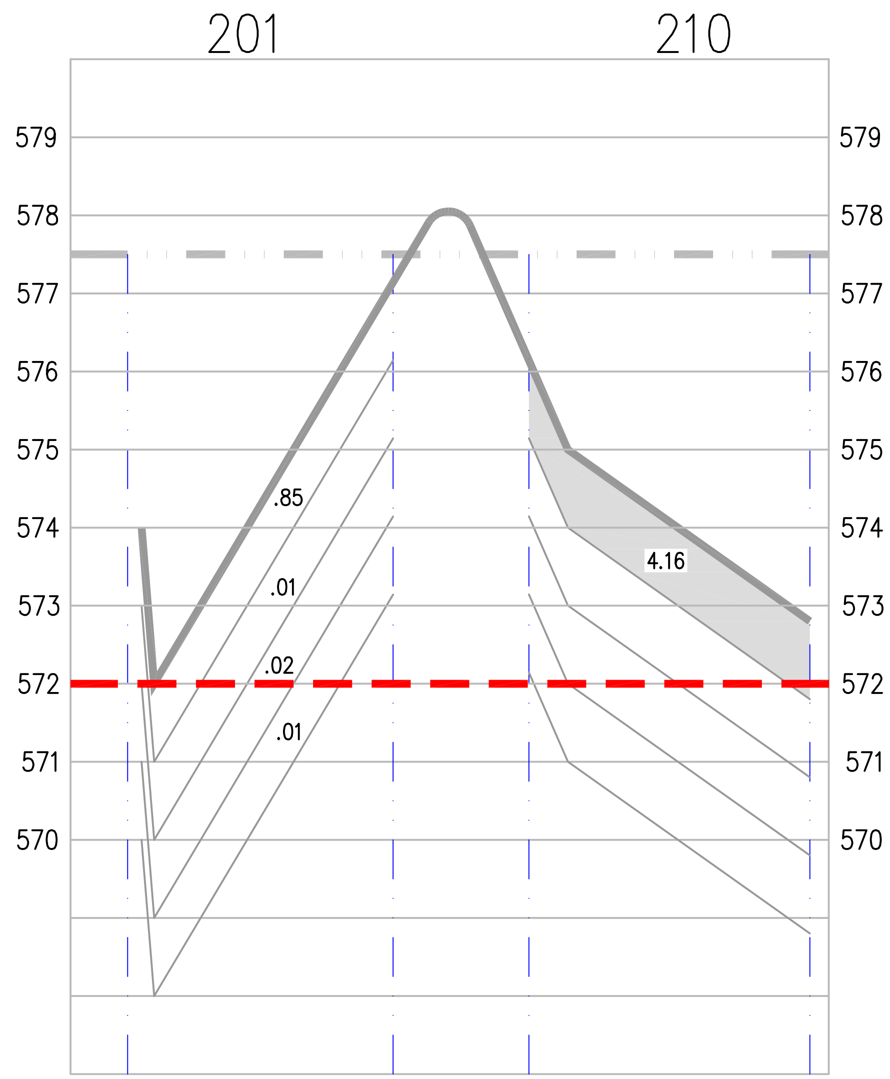
GRID 199 - 208 DOWNRIVER



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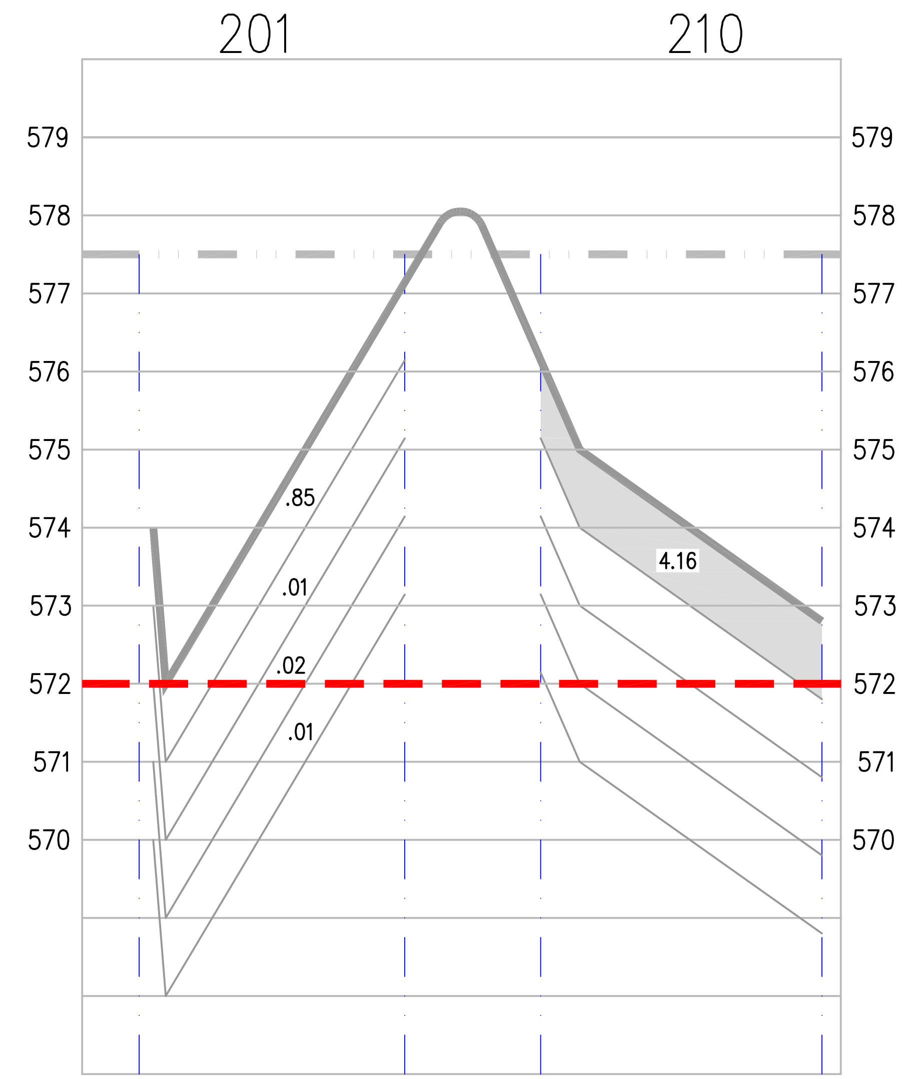

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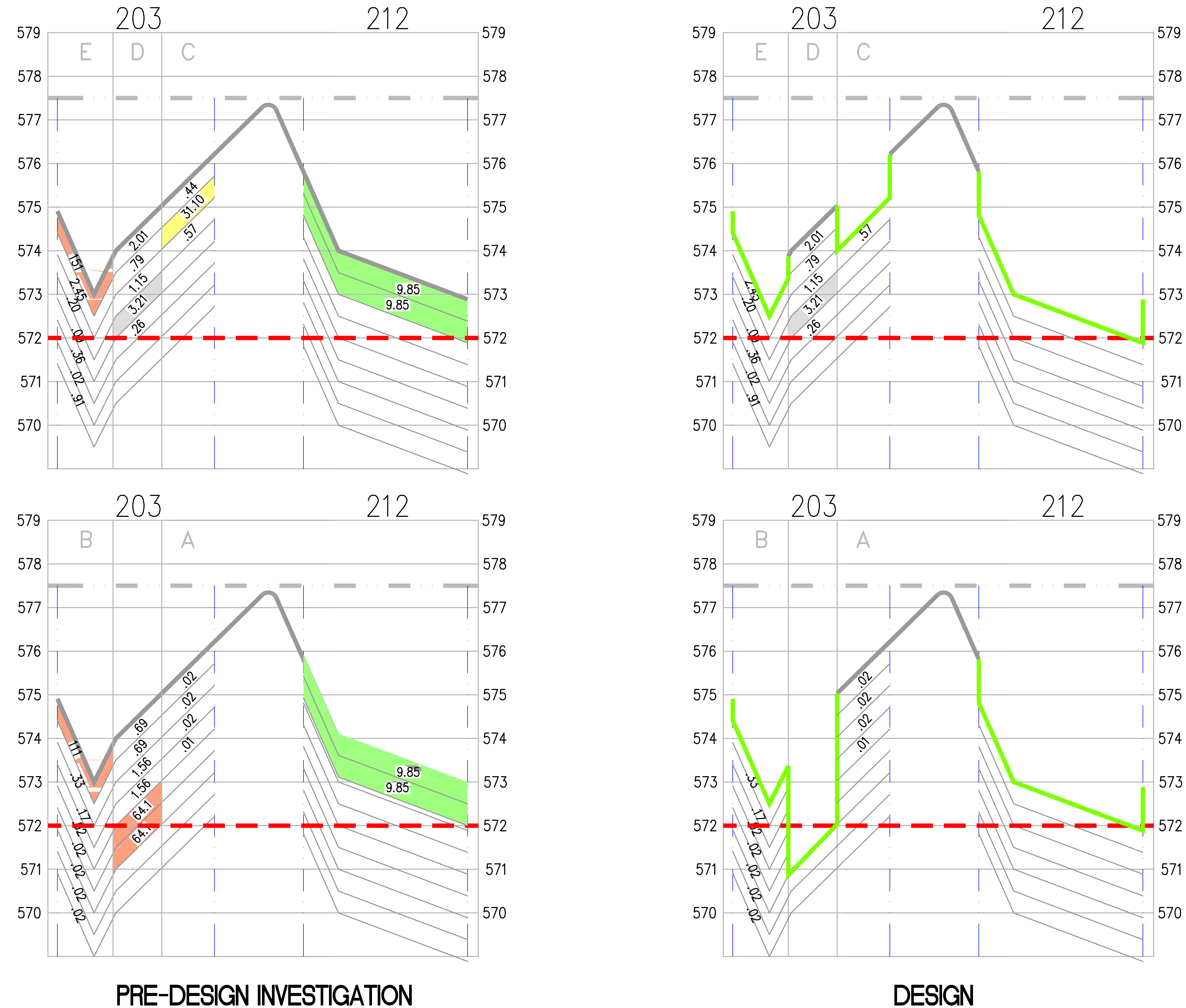
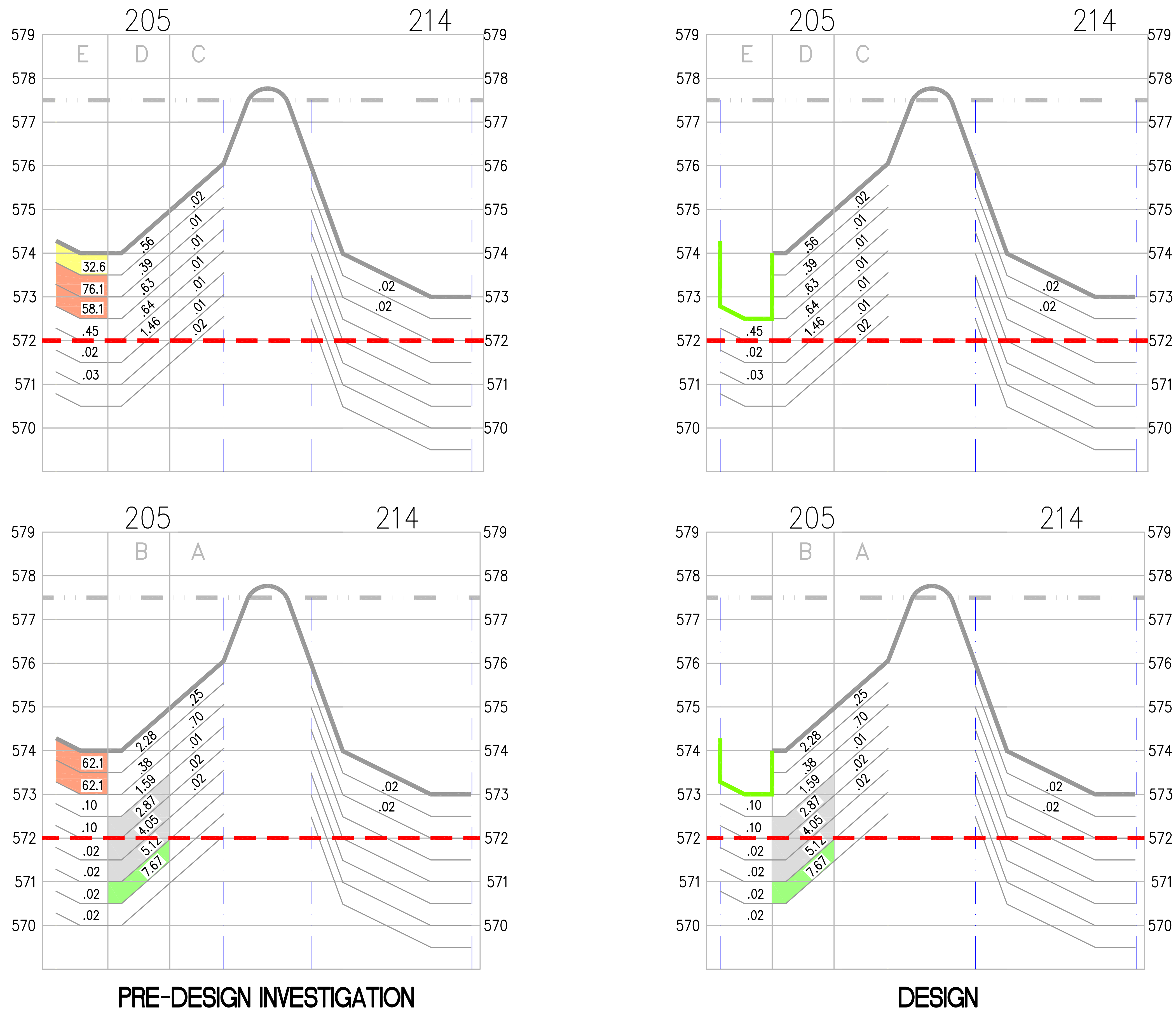


GRID 203 - 212



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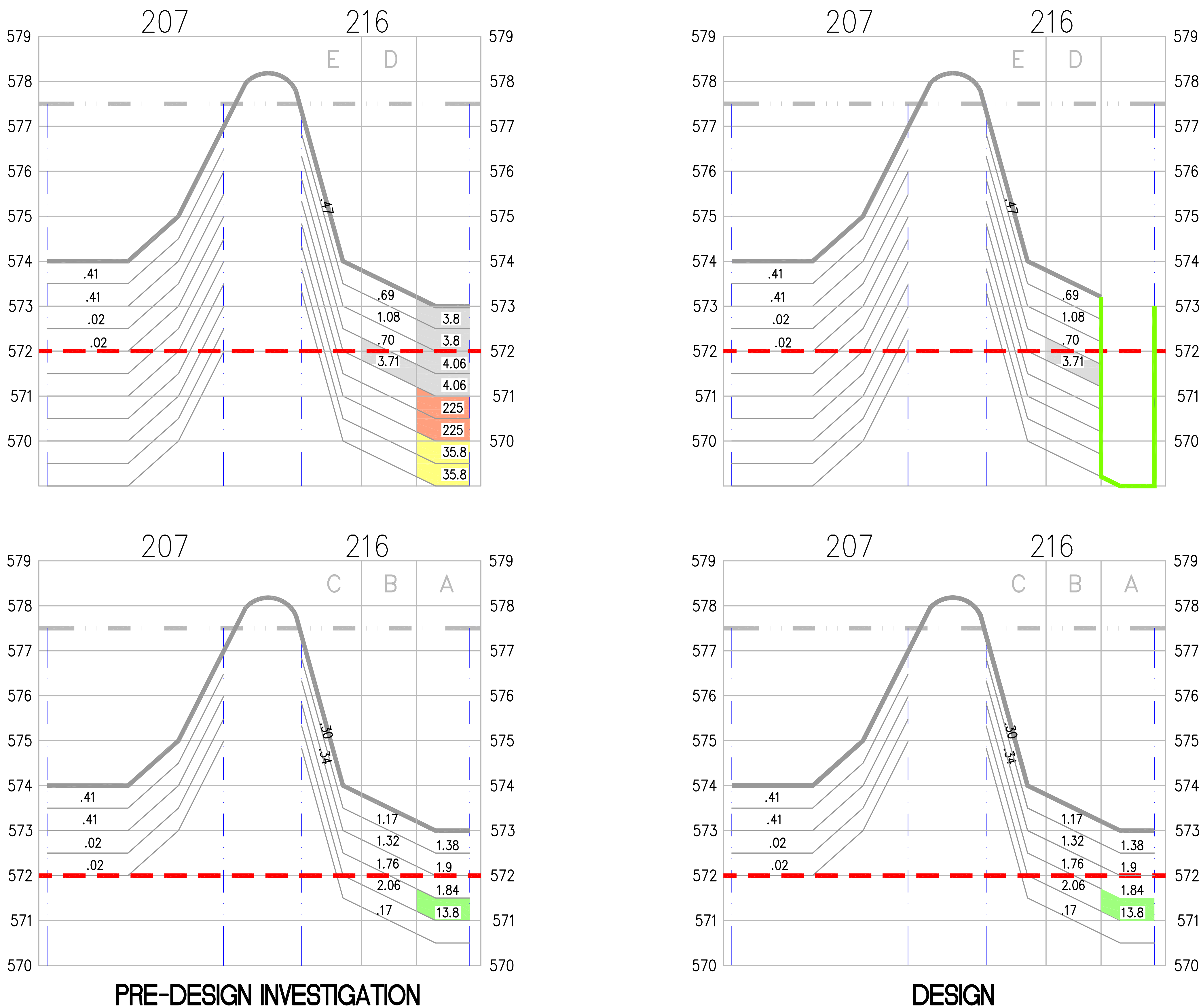

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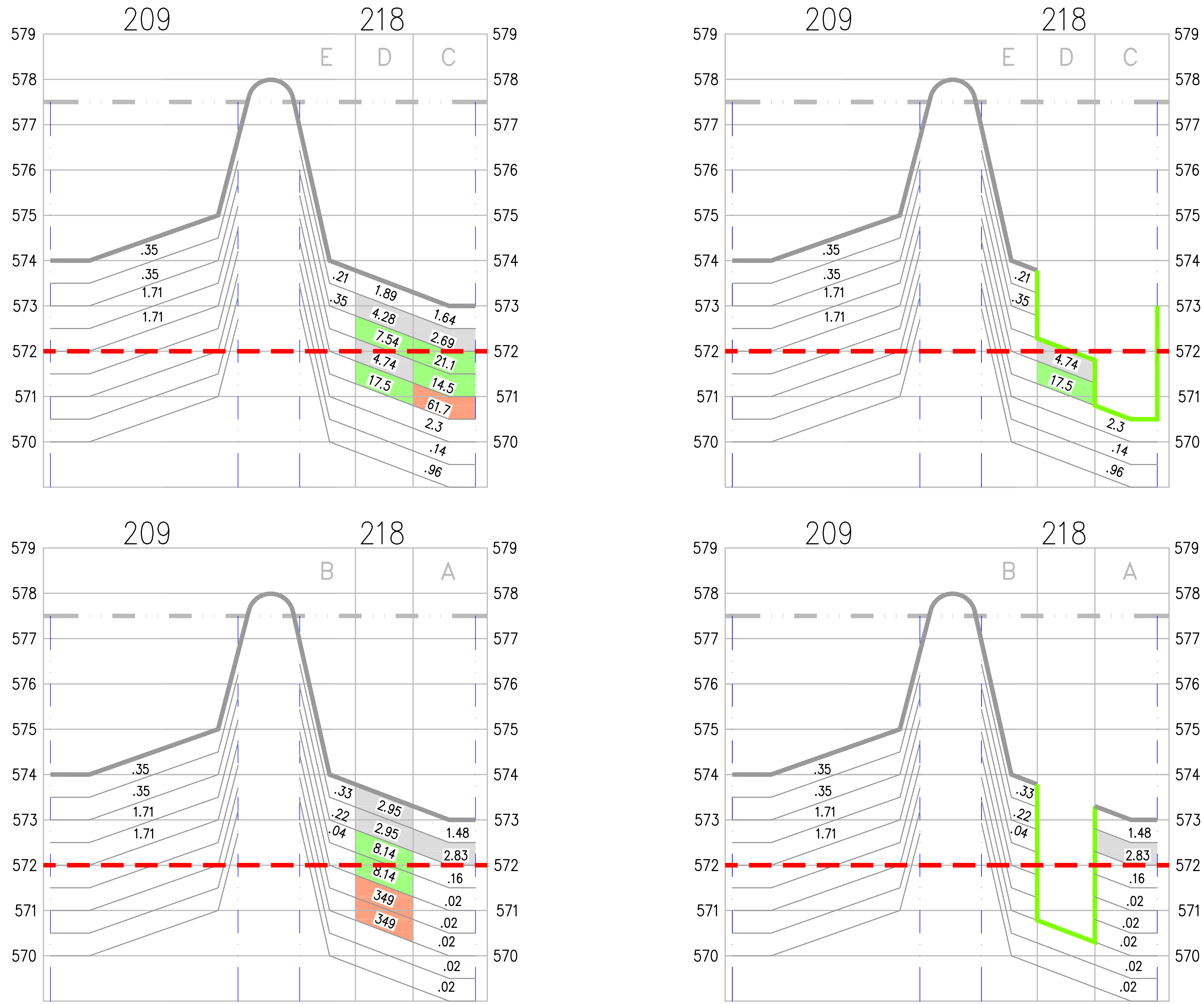

PRE-DESIGN INVESTIGATION

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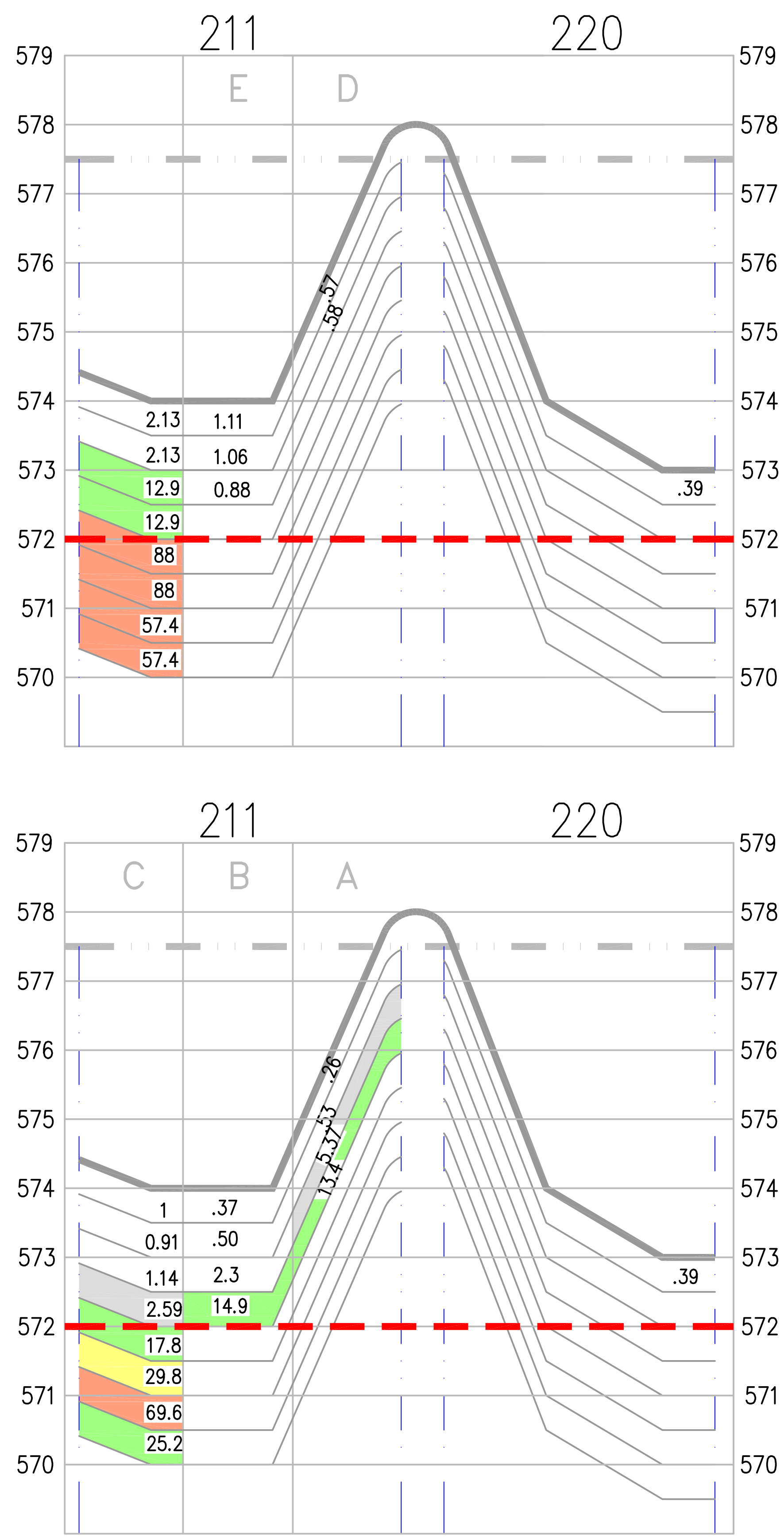
GRID 209 - 218



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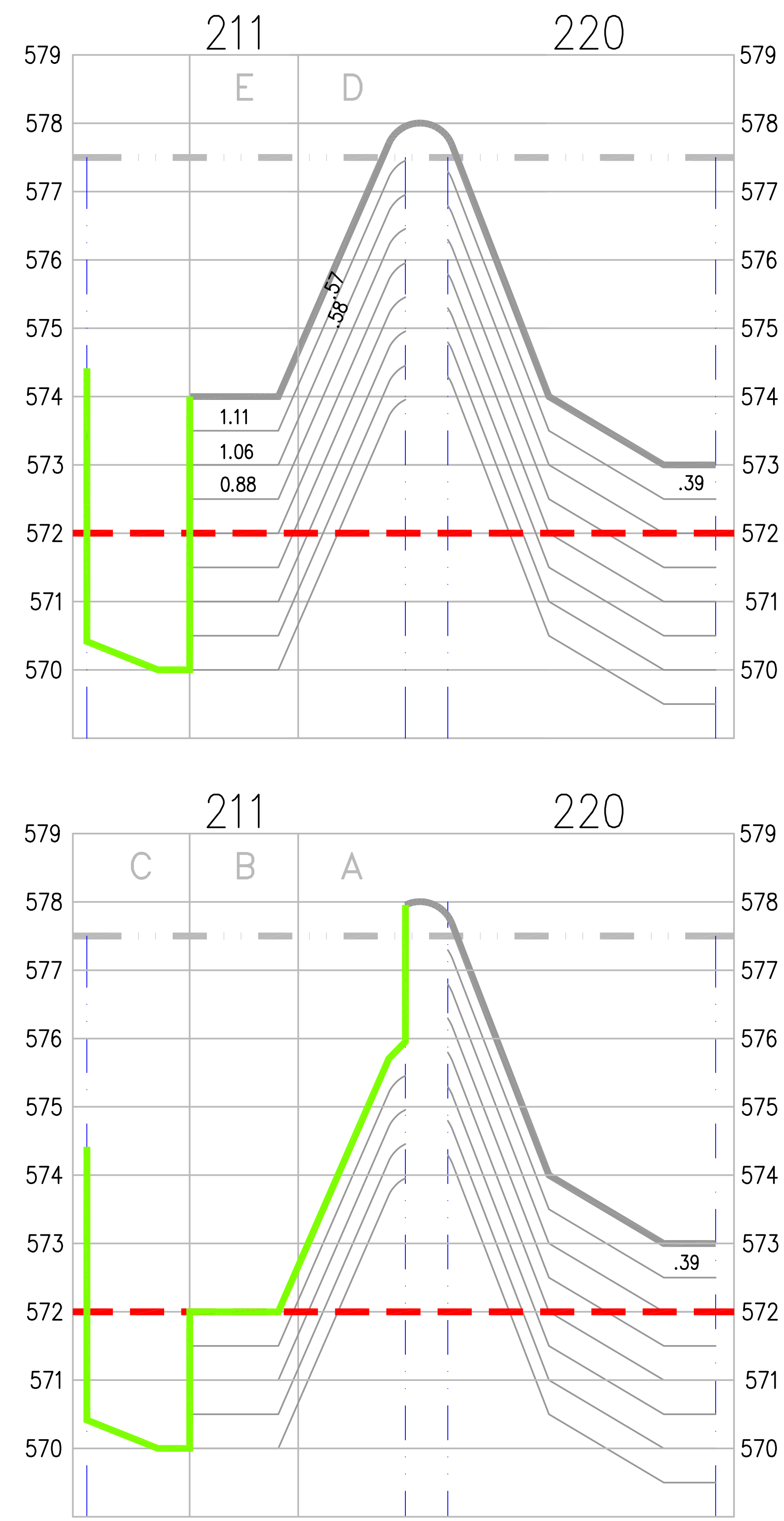

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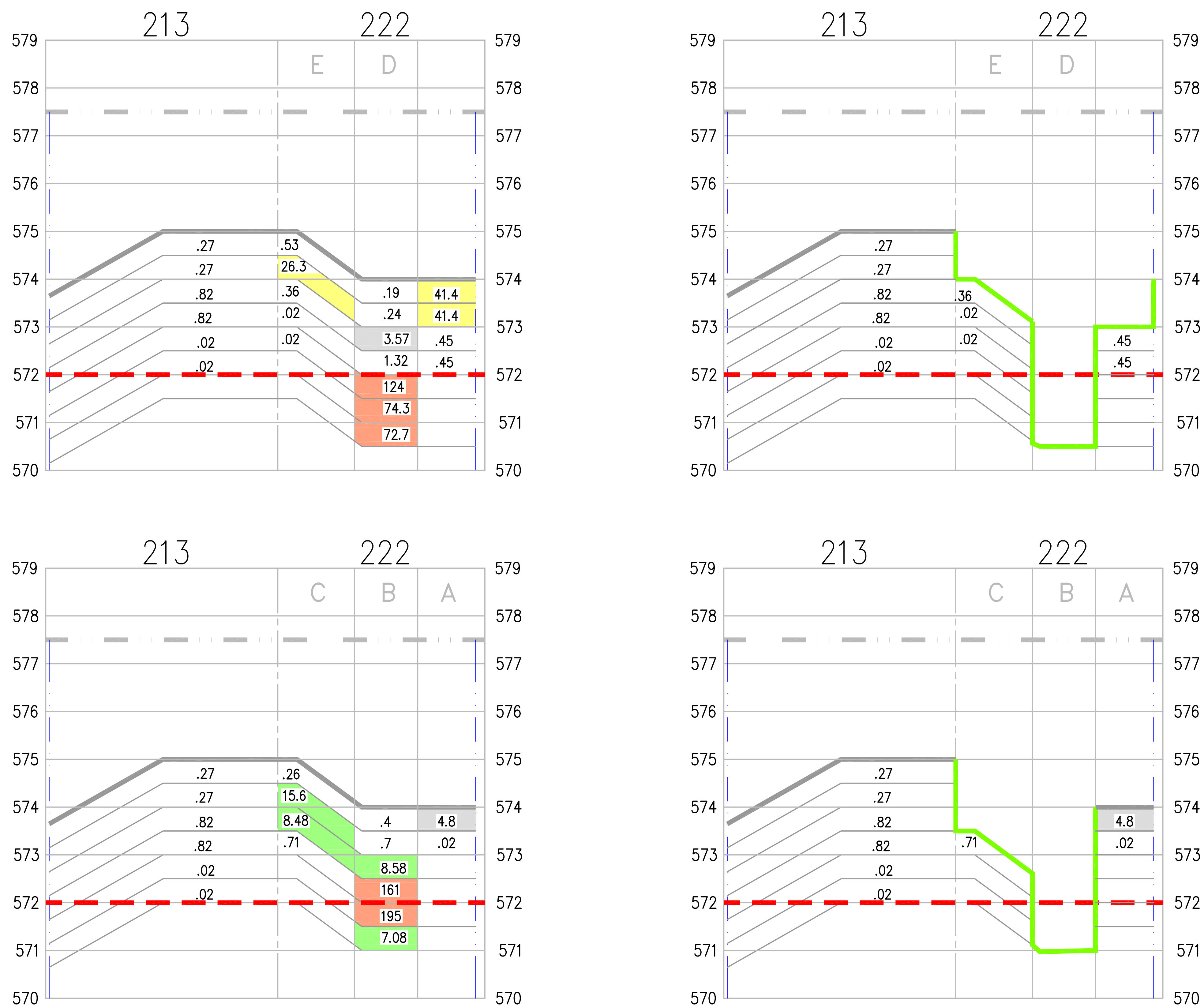

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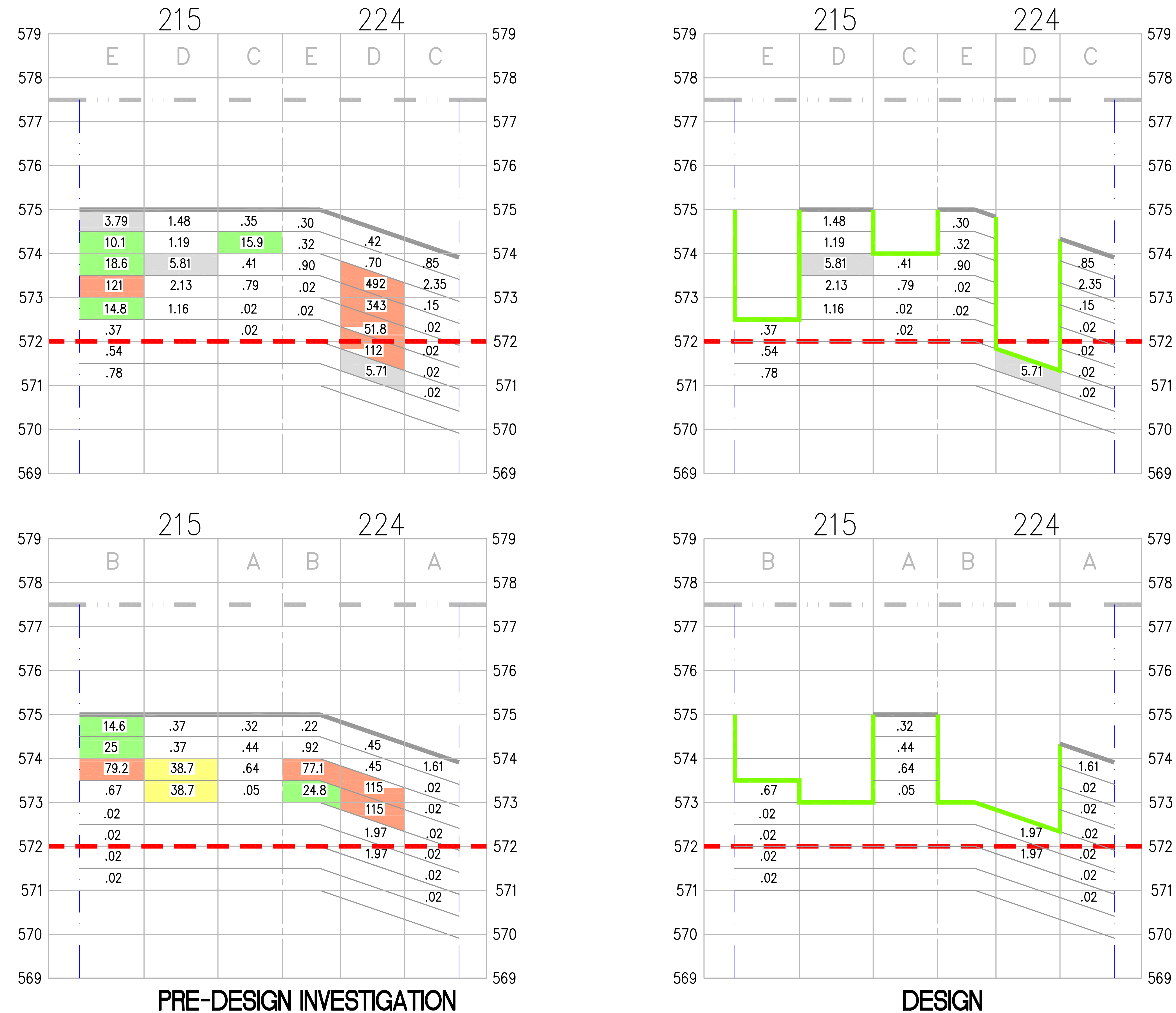
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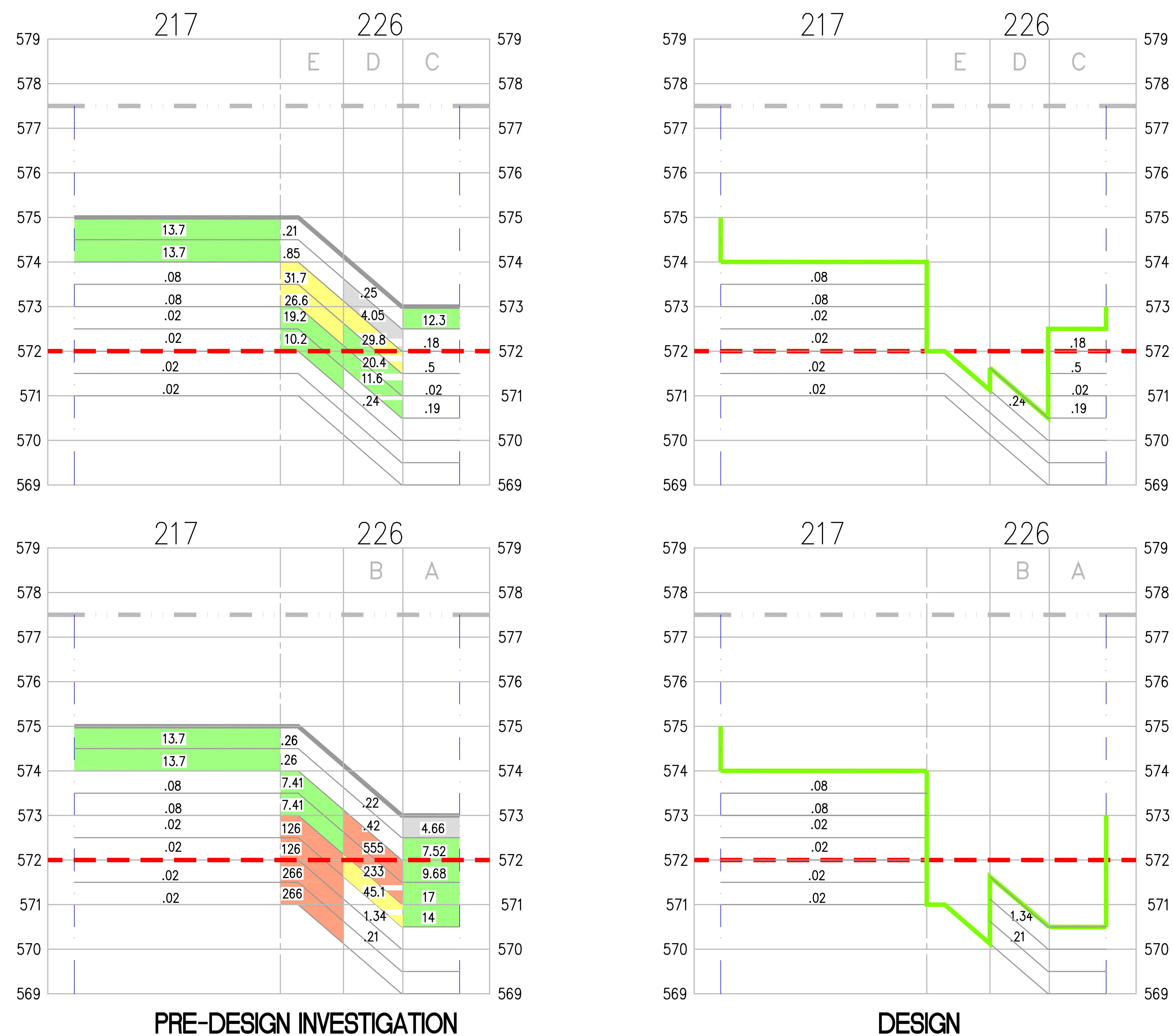
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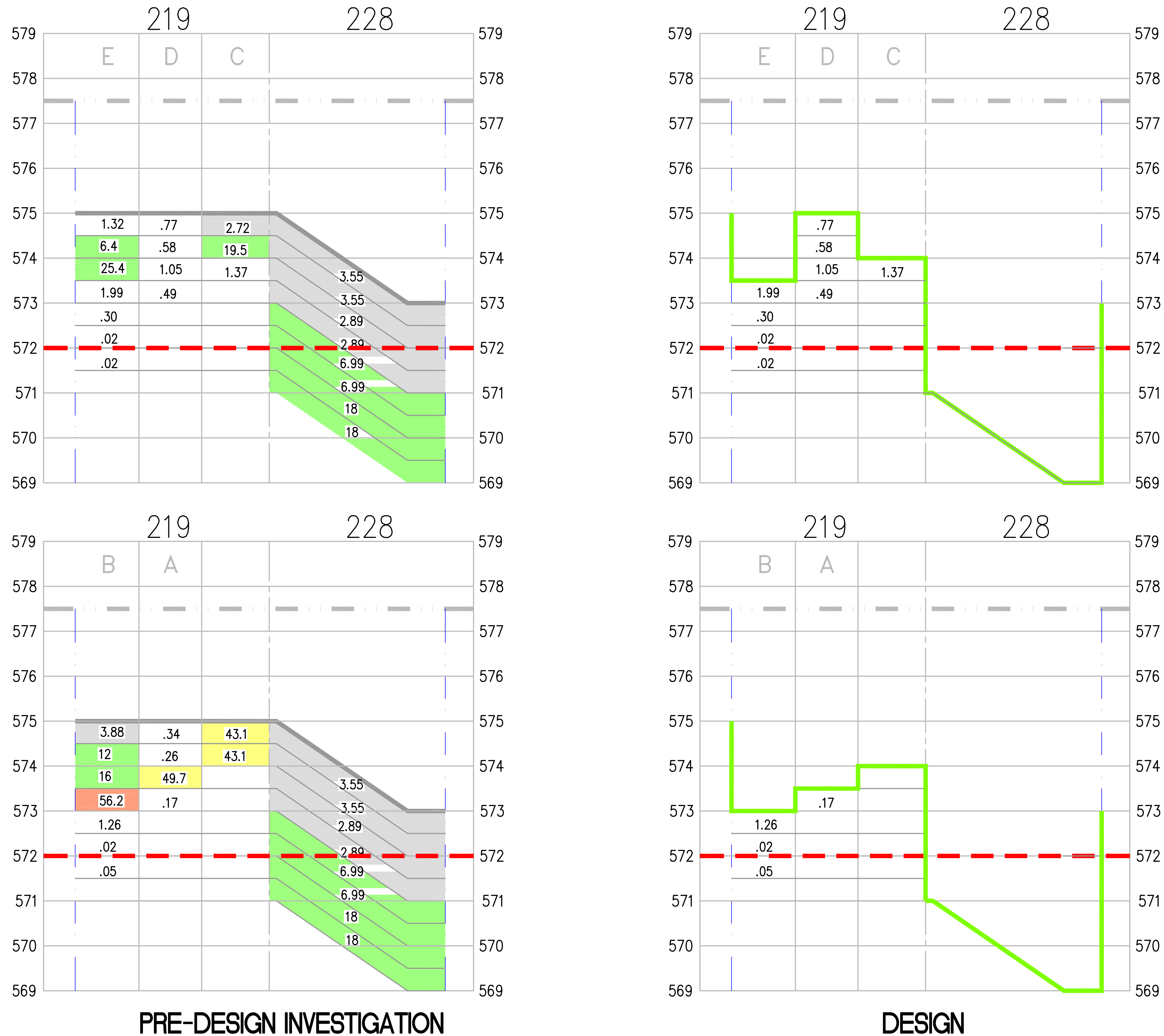
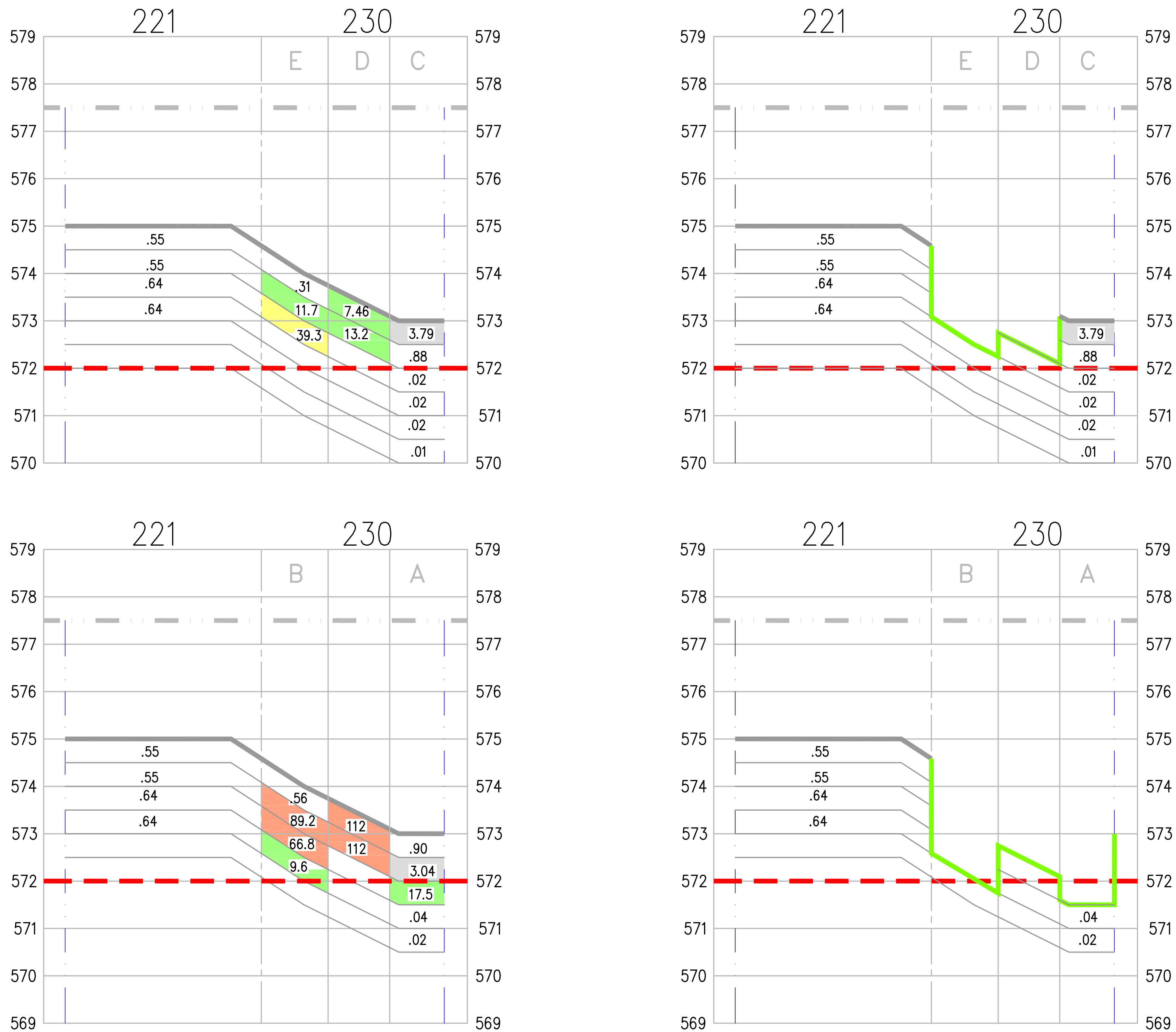


GRID 219 - 228



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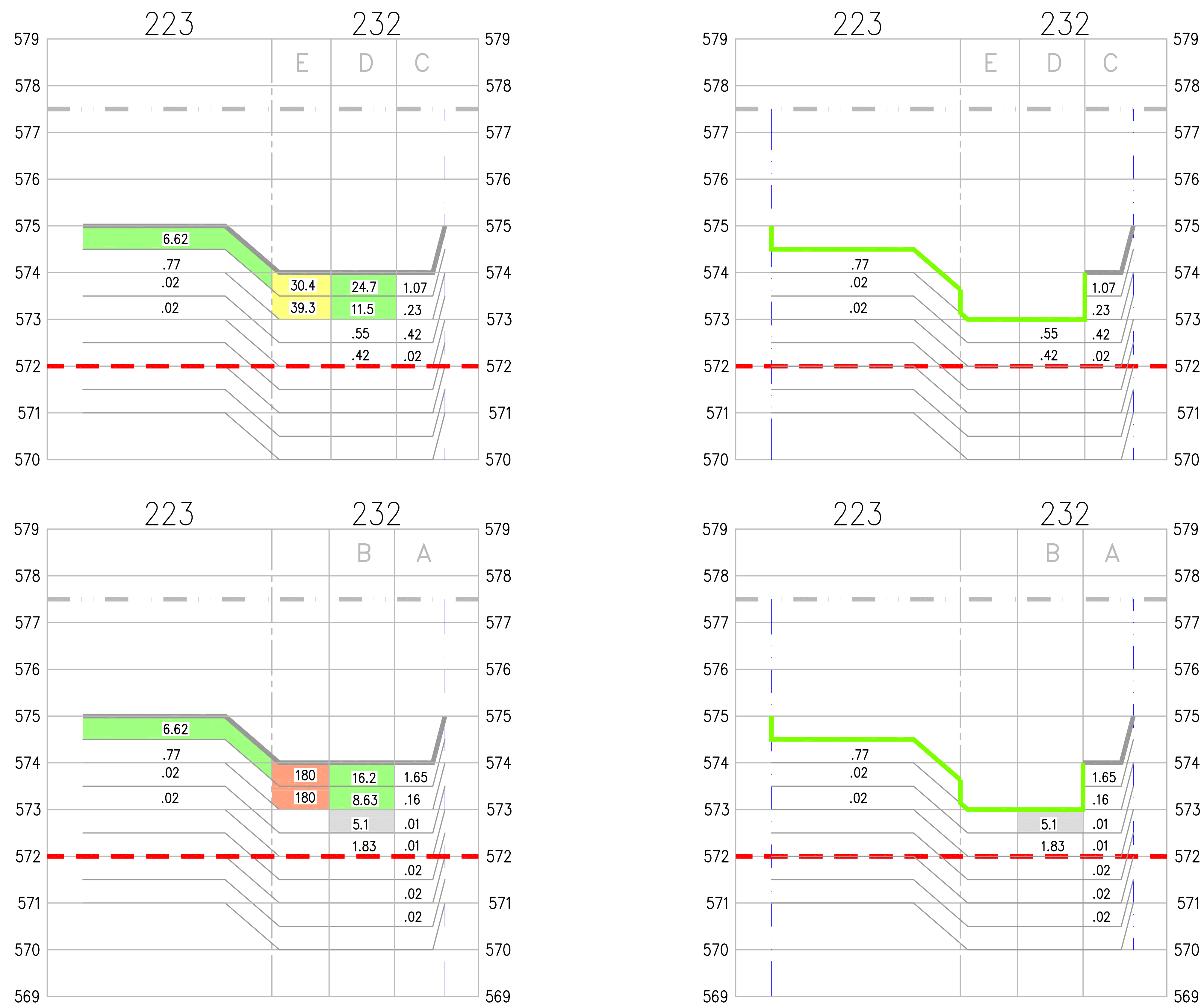
GRID 221 - 230



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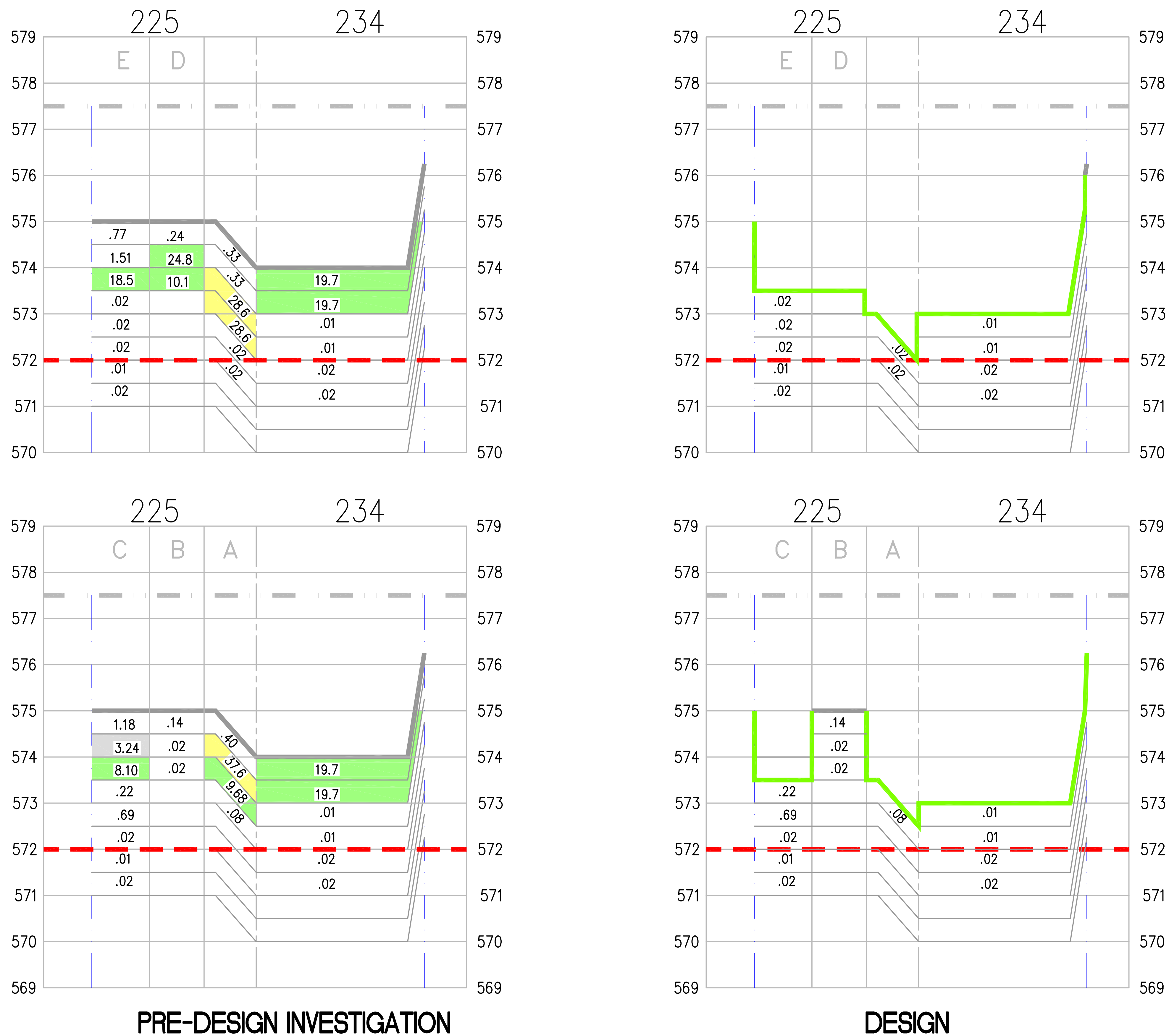
GRID 223 - 232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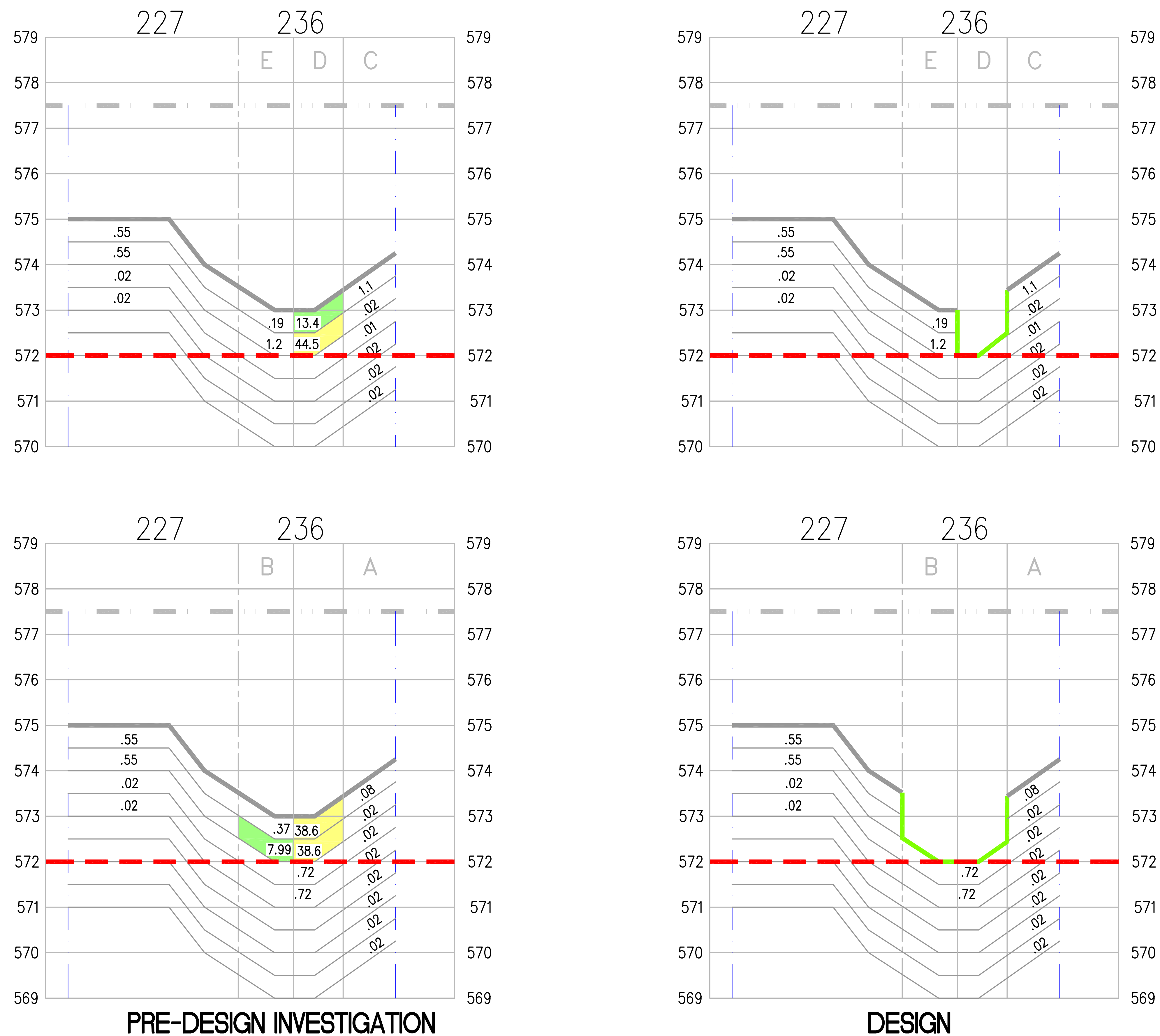

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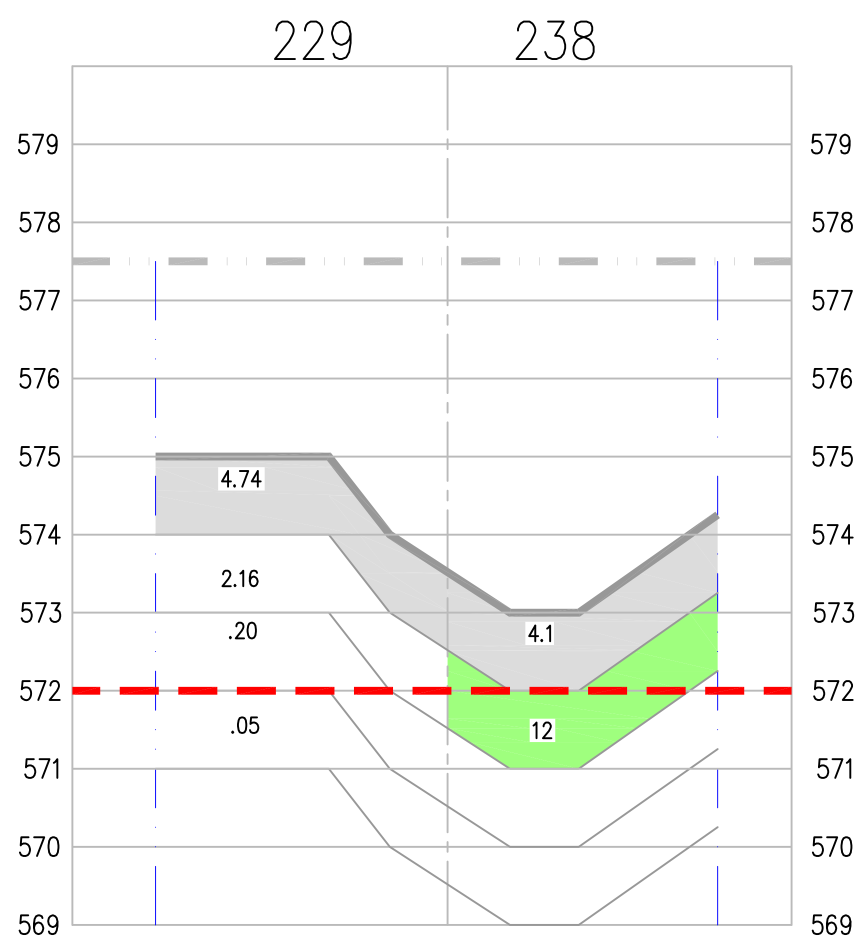
GRID 227 - 236



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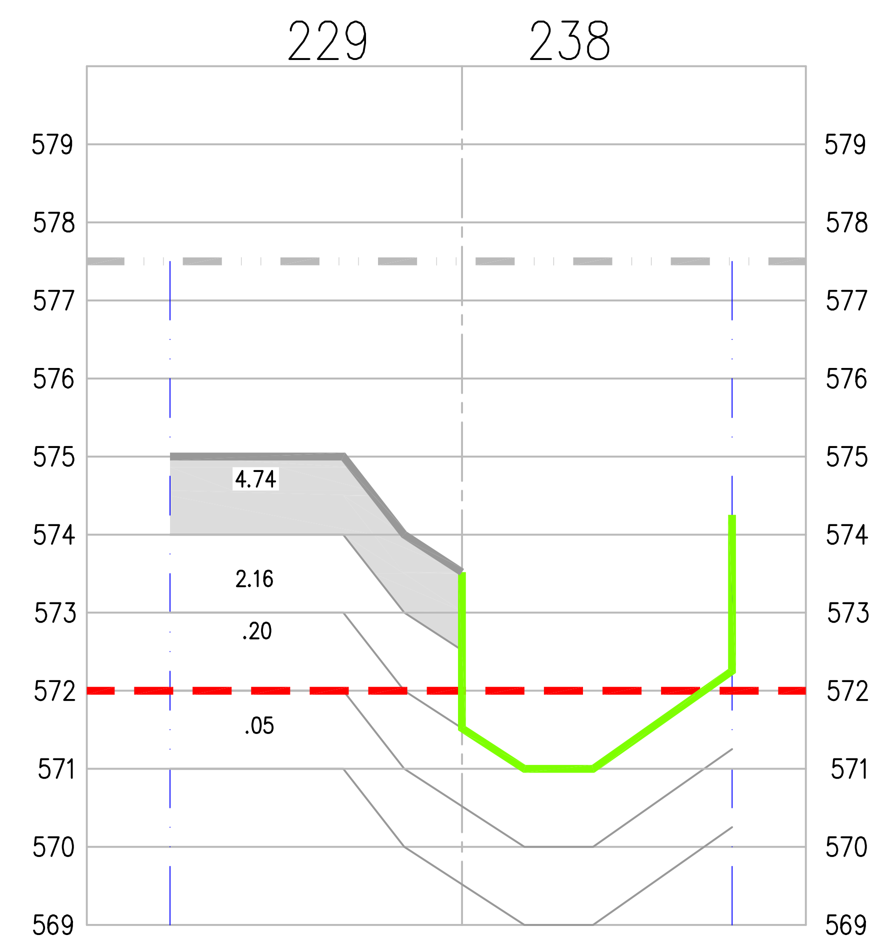

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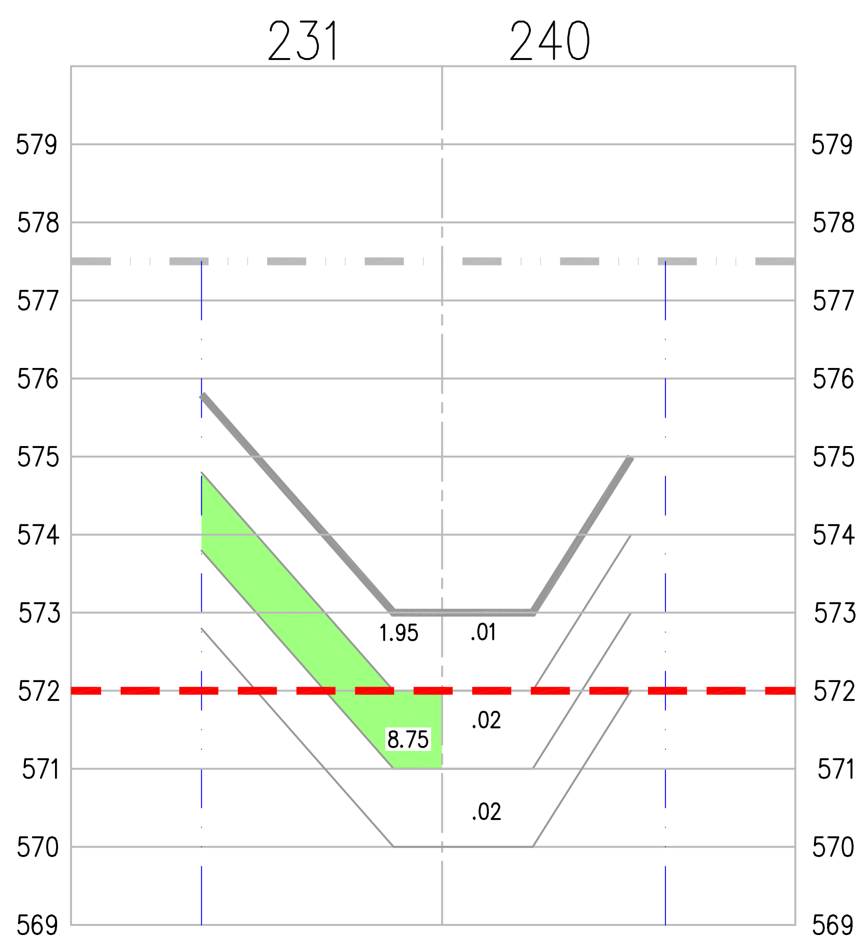
GRID 229 - 238



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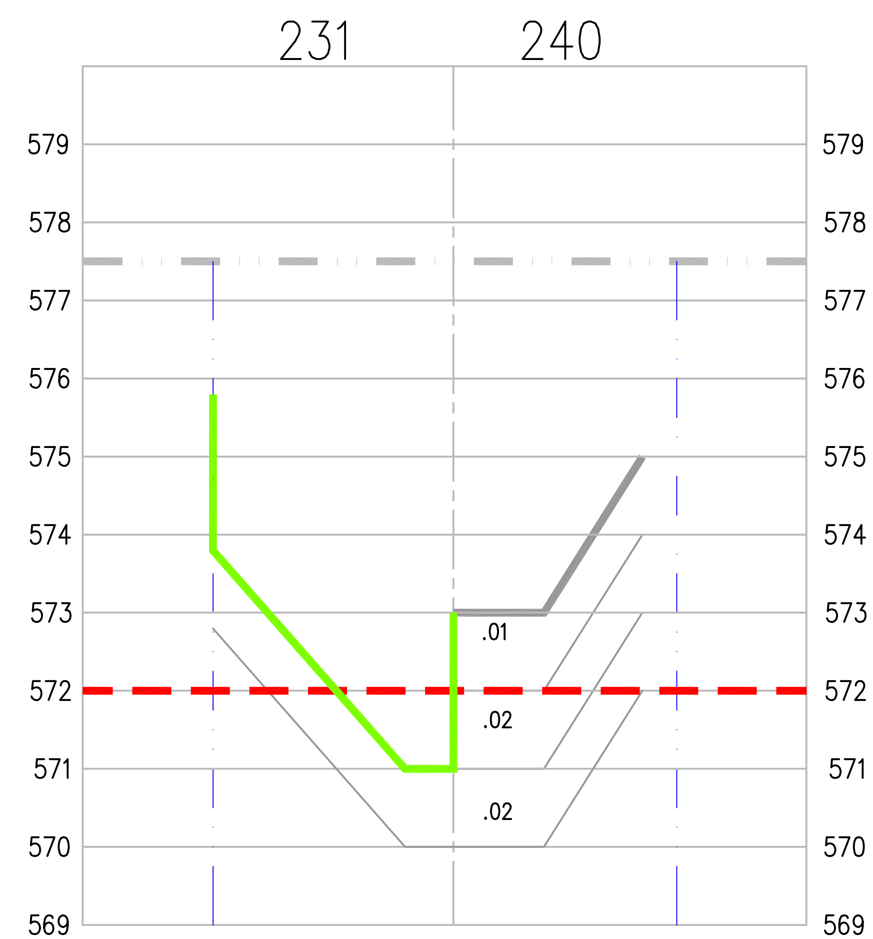


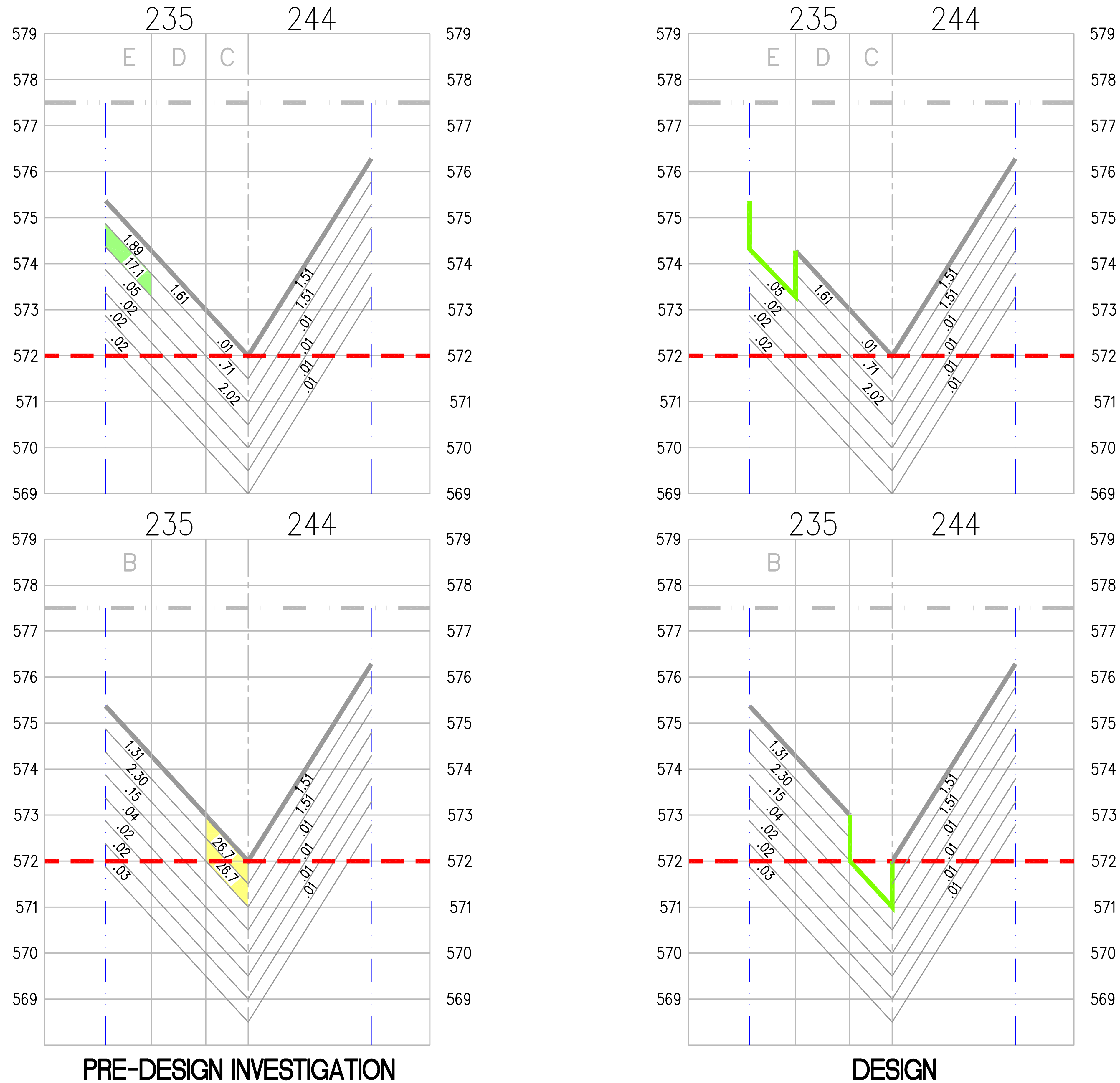
DESIGN

GRID 231 - 240

PRE-DESIGN INVESTIGATION

DESIGN

GRID 233 - 242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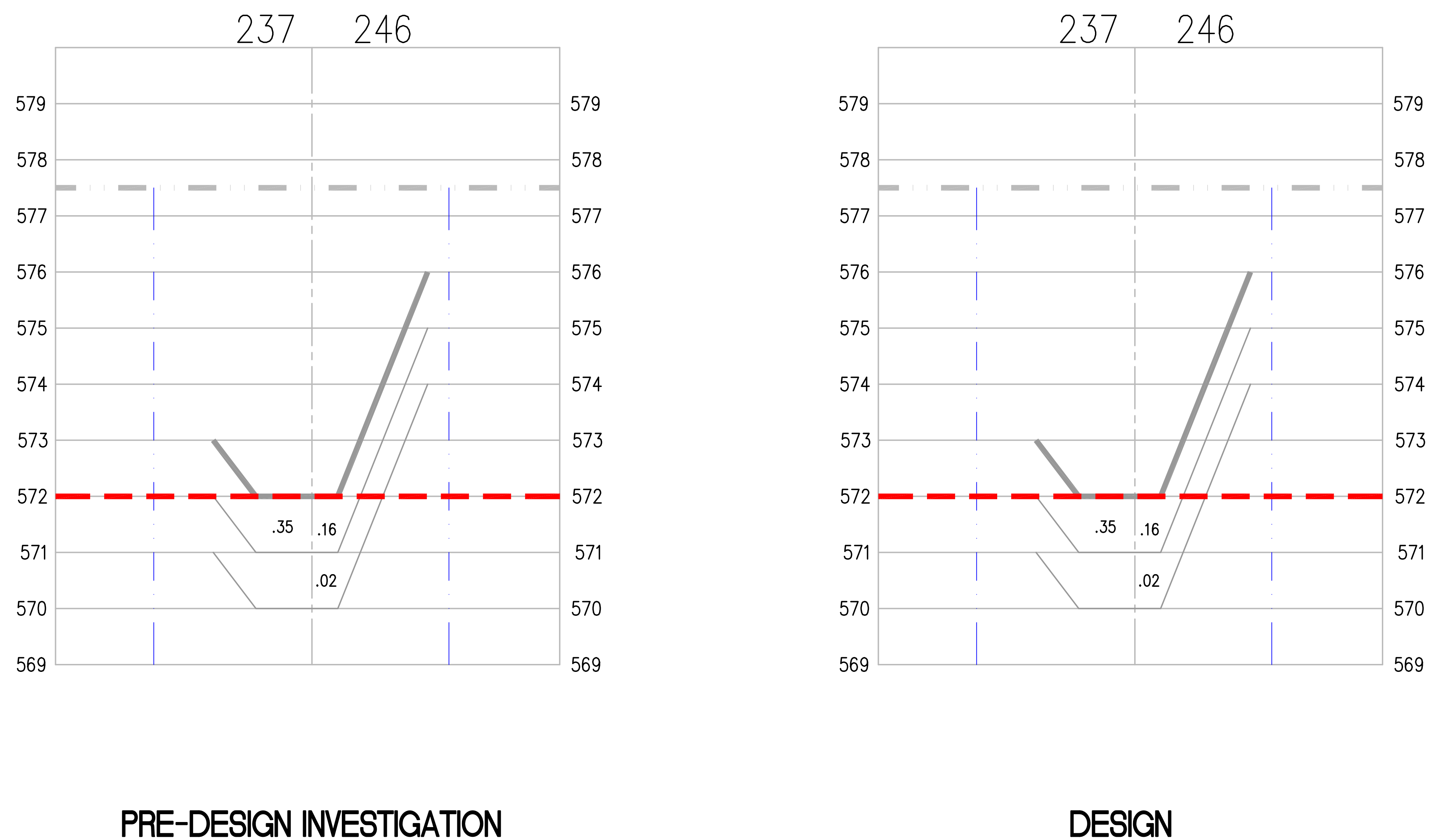
PRE-DESIGN INVESTIGATION
DESIGN

GRID 235 - 244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PRE-DESIGN INVESTIGATION
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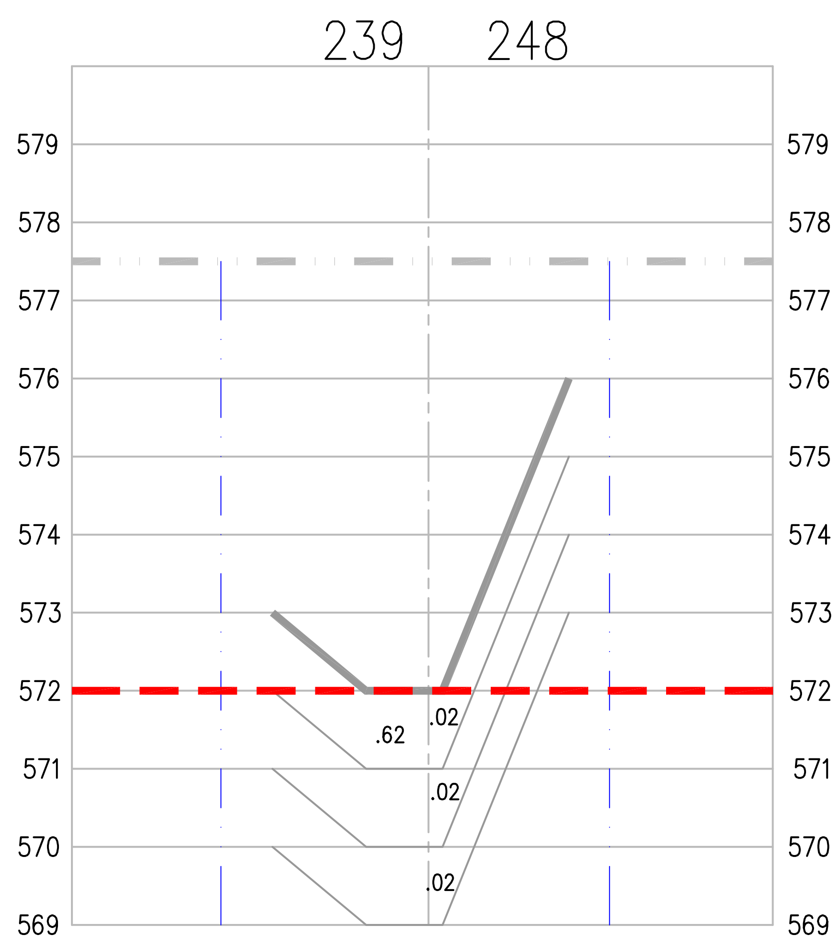
GRID 237 - 246



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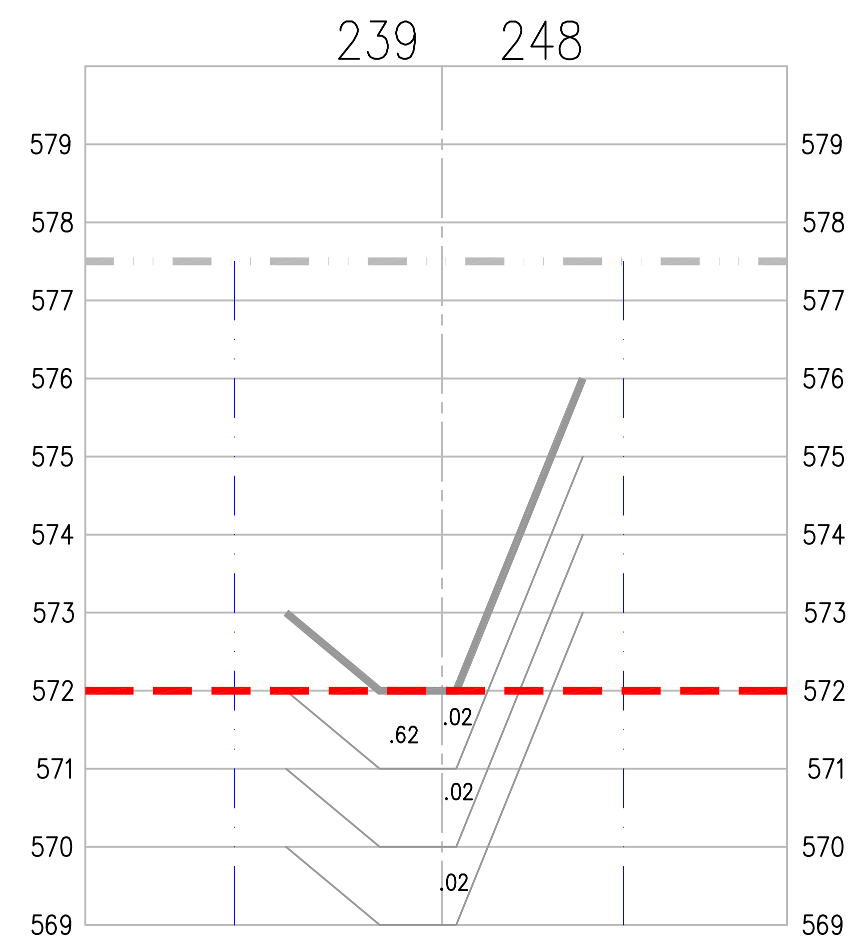

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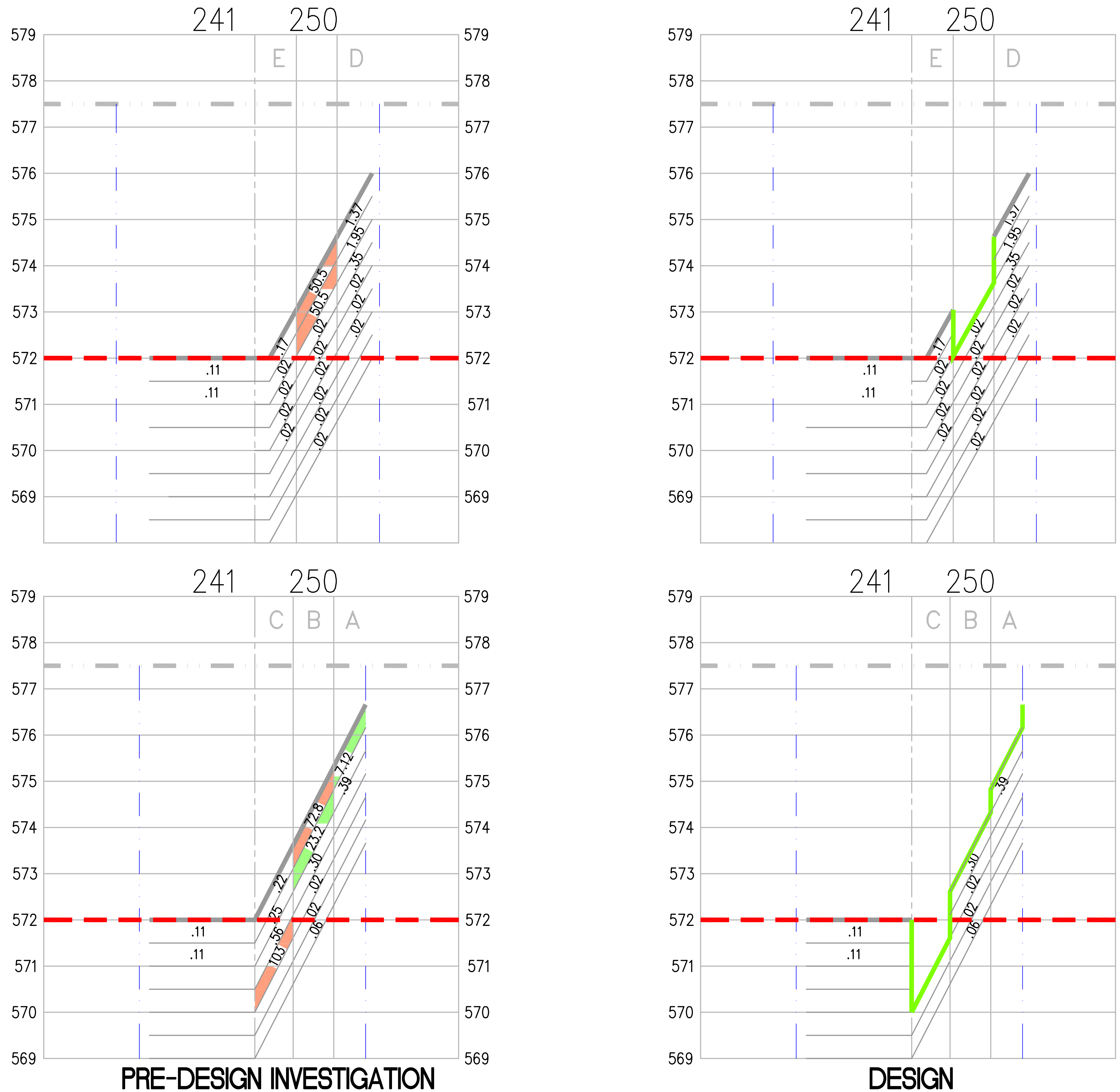
GRID 239 - 248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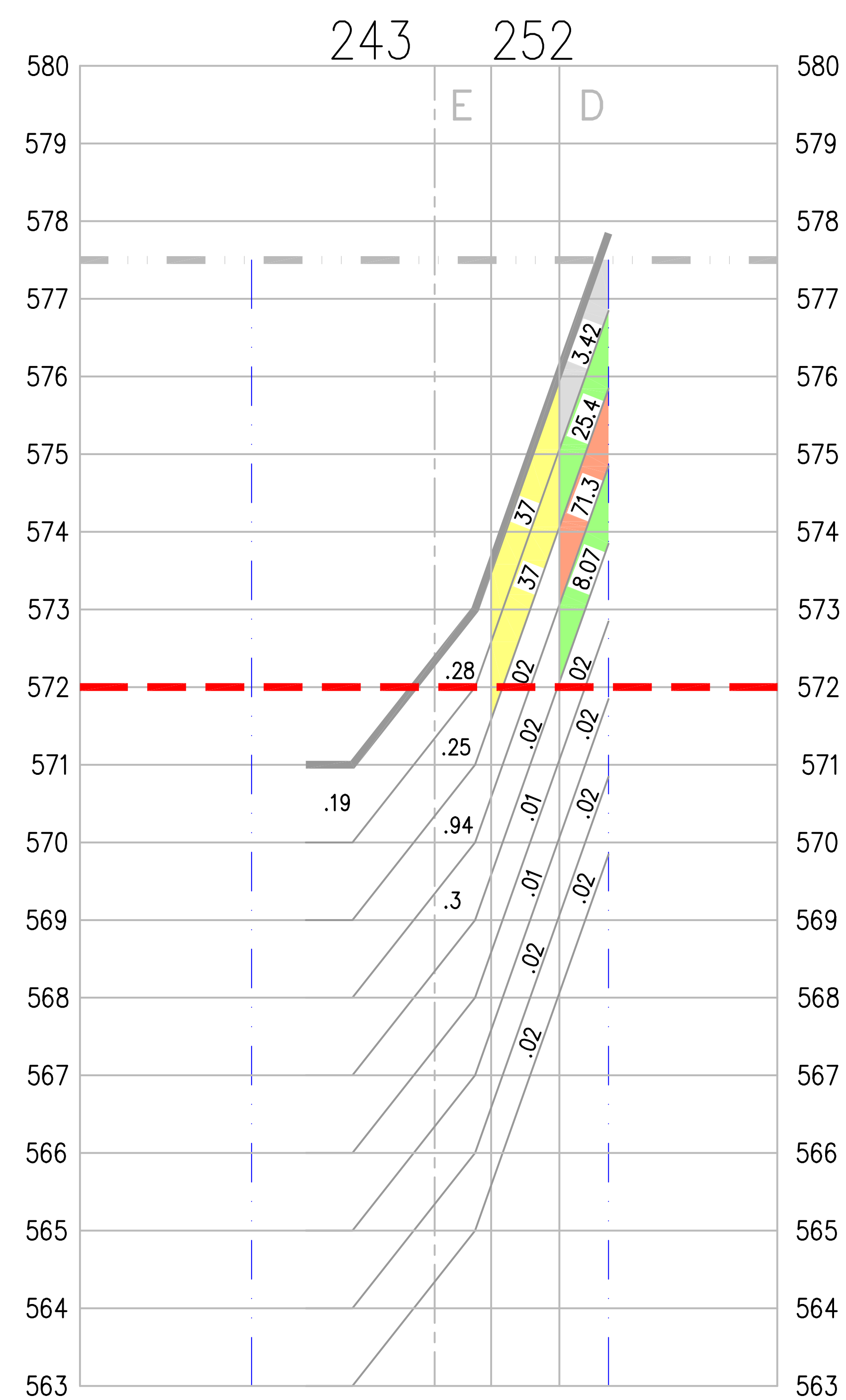
PRE-DESIGN INVESTIGATION
DESIGN

GRID 241 - 250

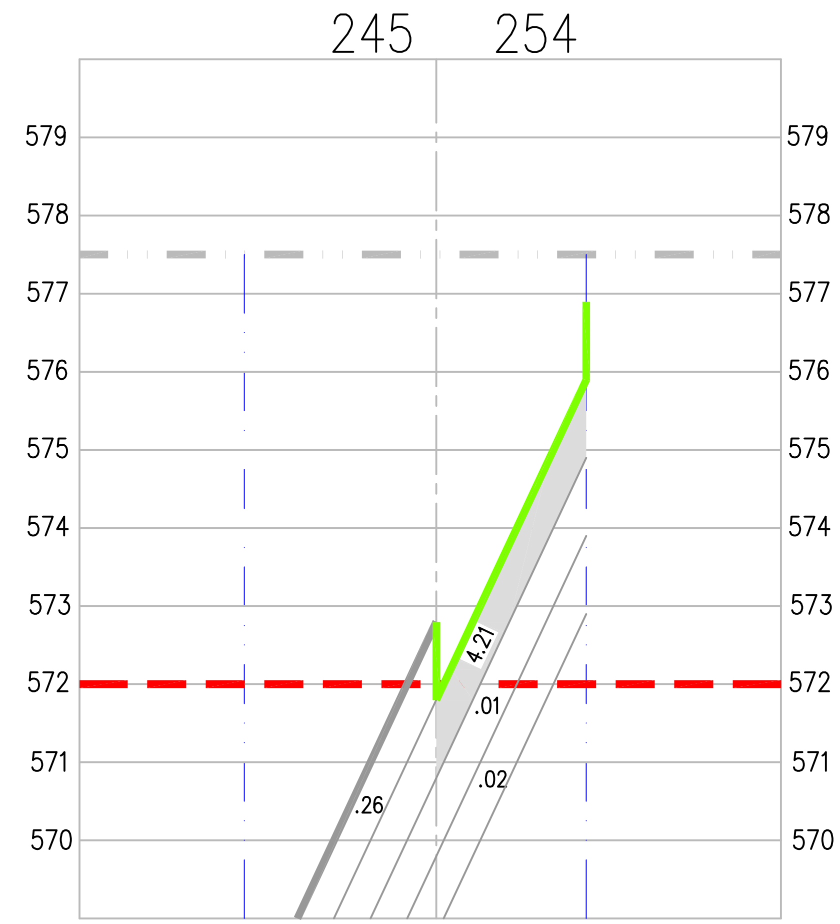


PRE-DESIGN INVESTIGATION

DESIGN

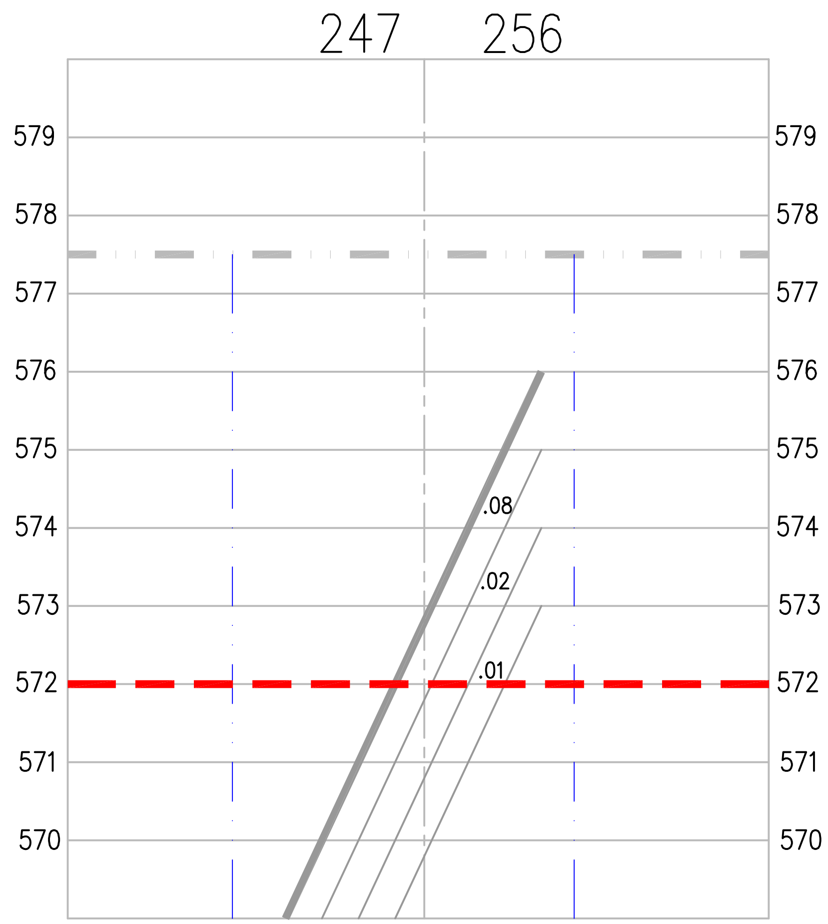
GRID 243 - 252

PRE-DESIGN INVESTIGATION



DESIGN

GRID 245 - 254



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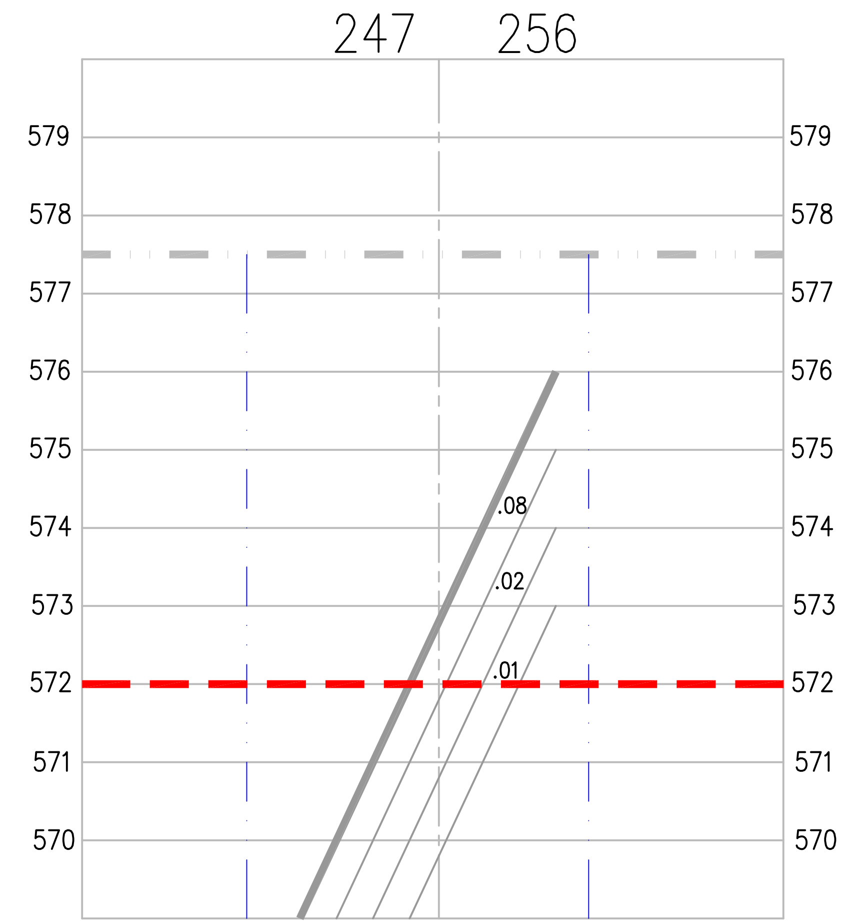

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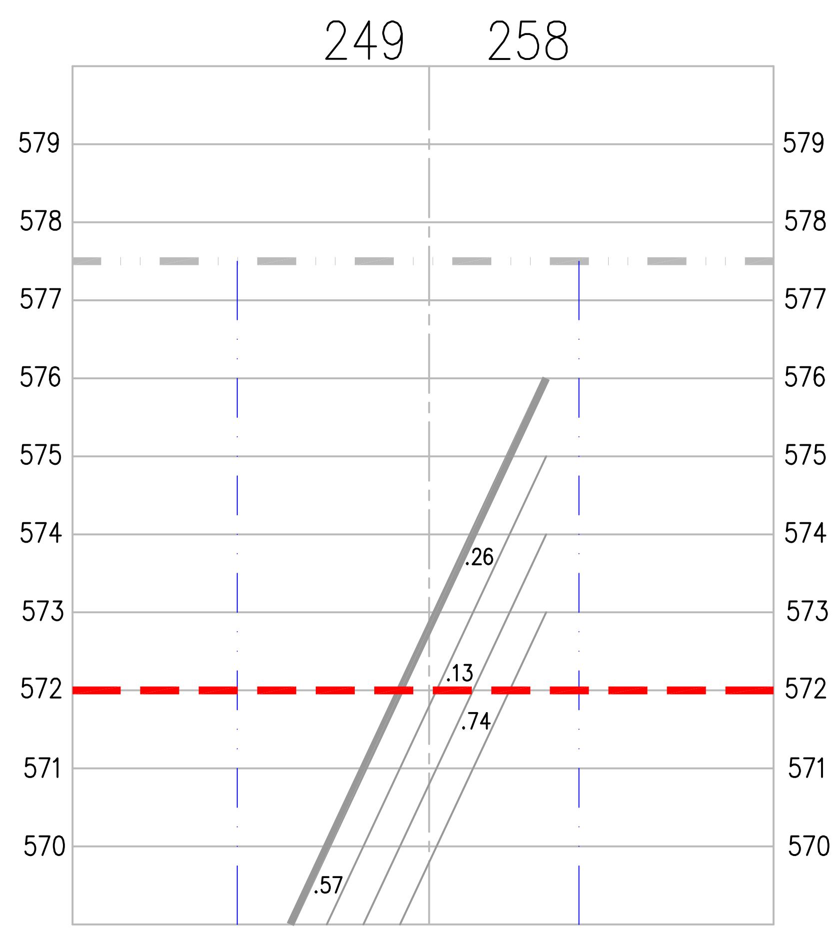

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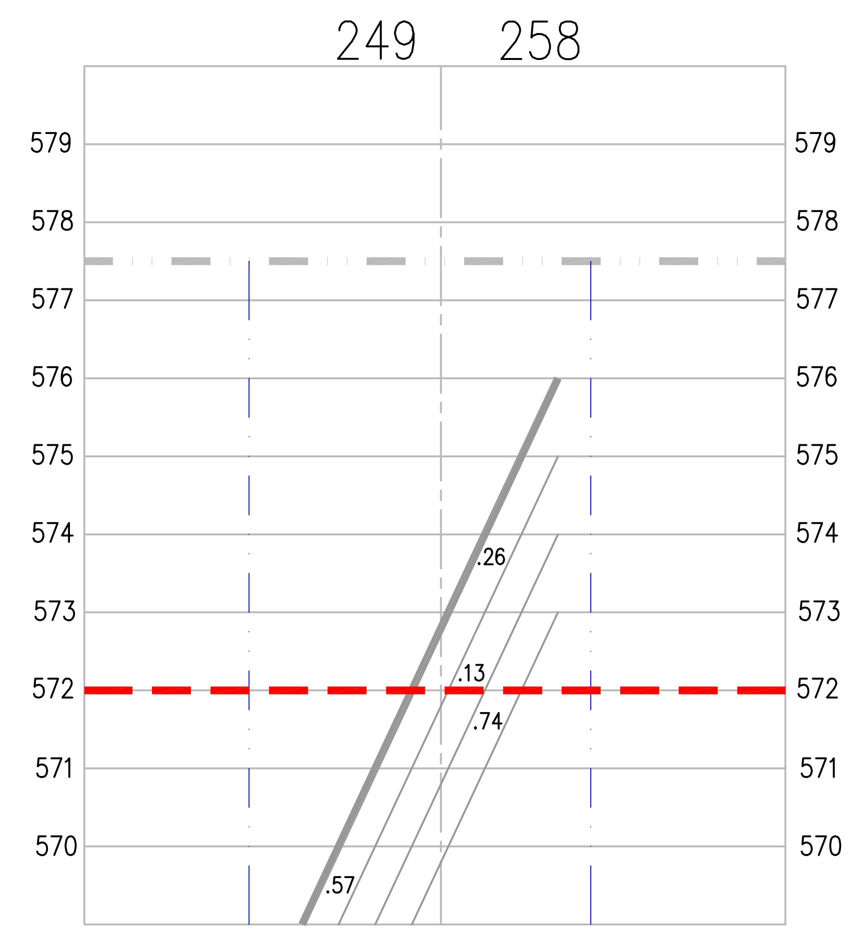

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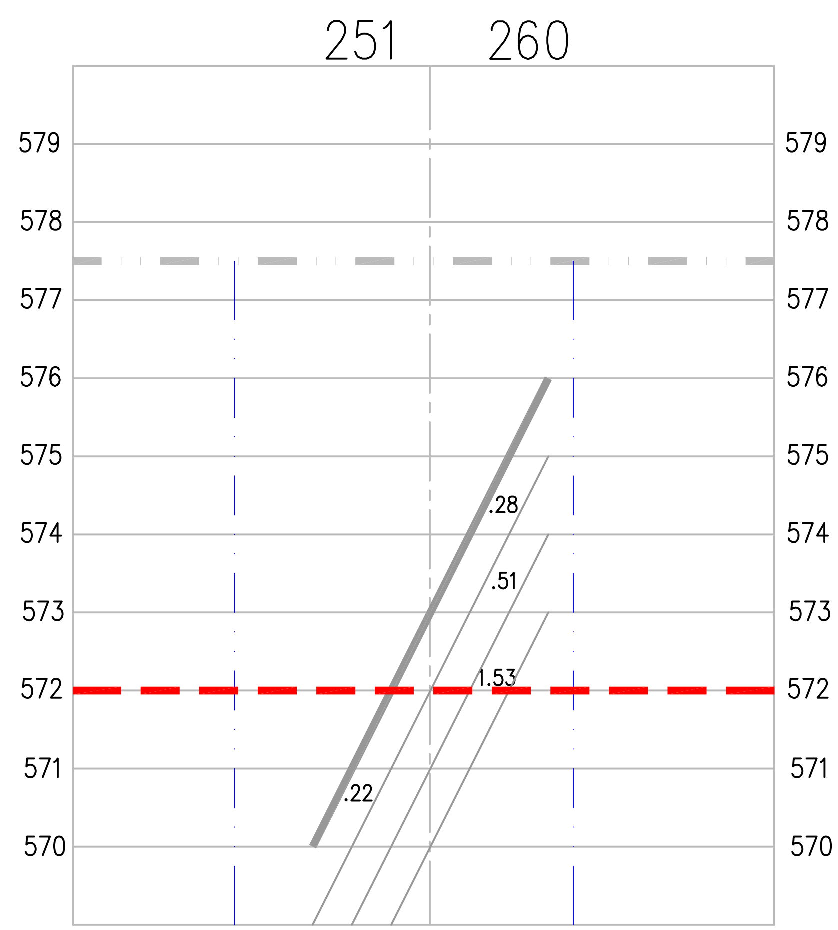

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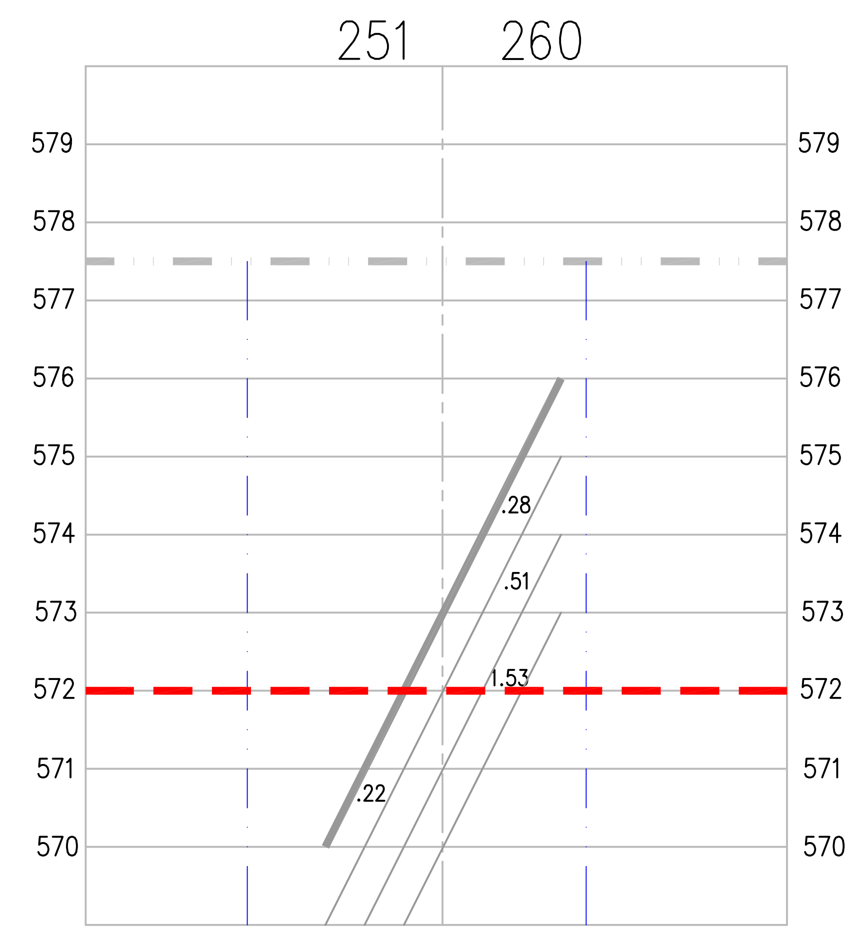

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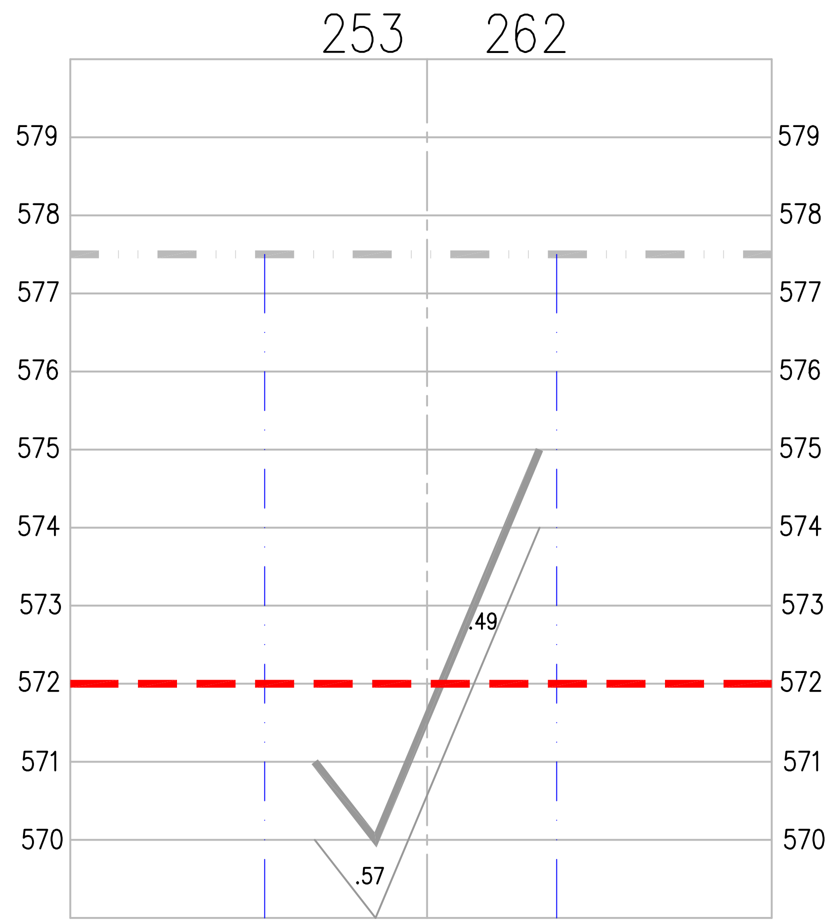

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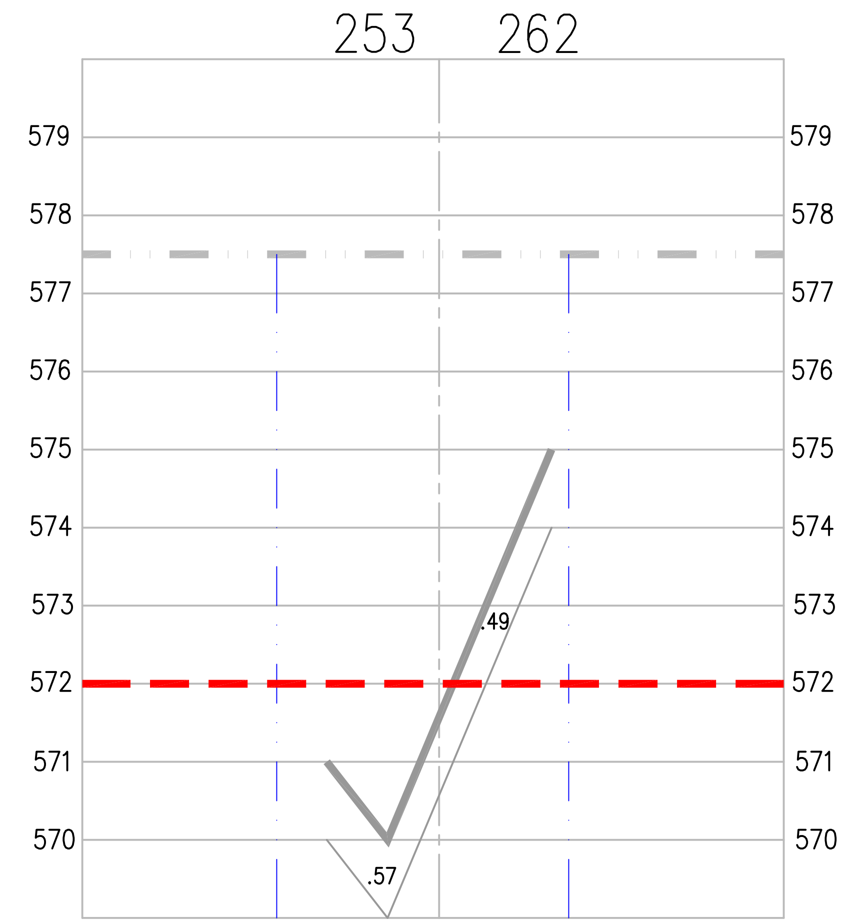

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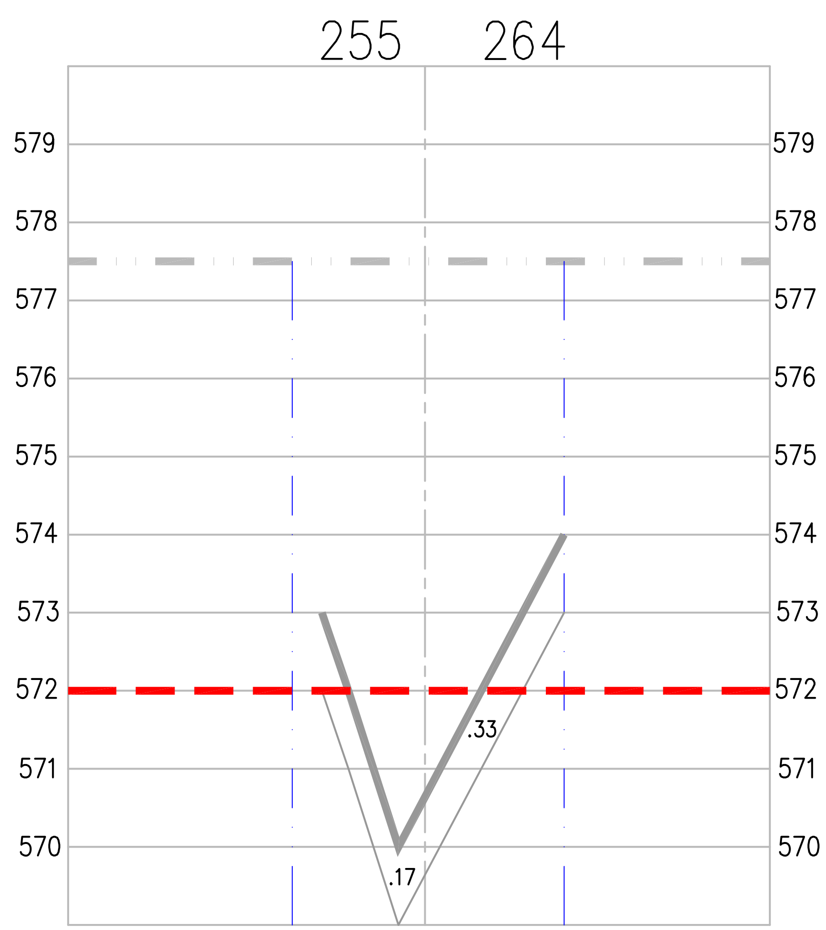

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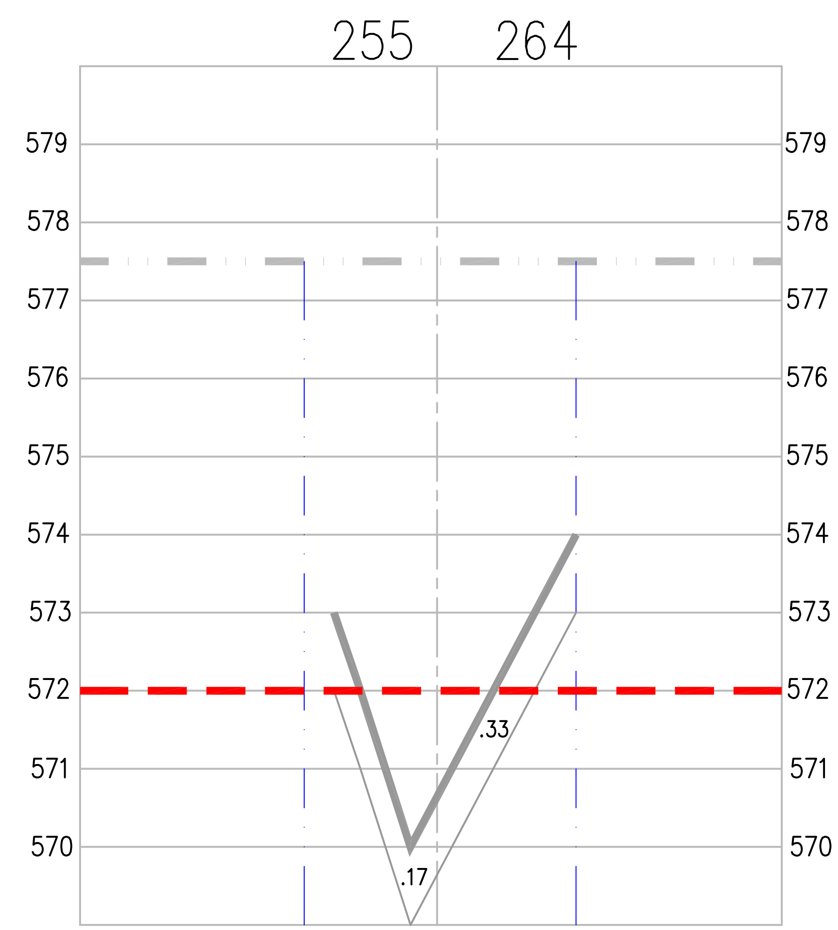

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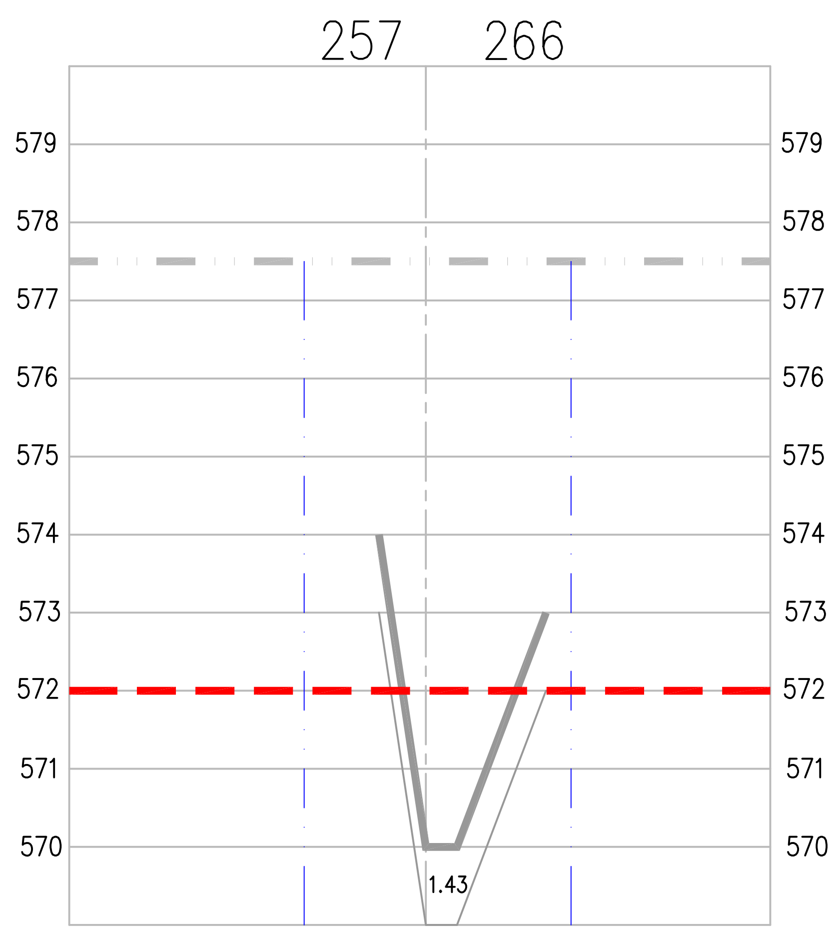

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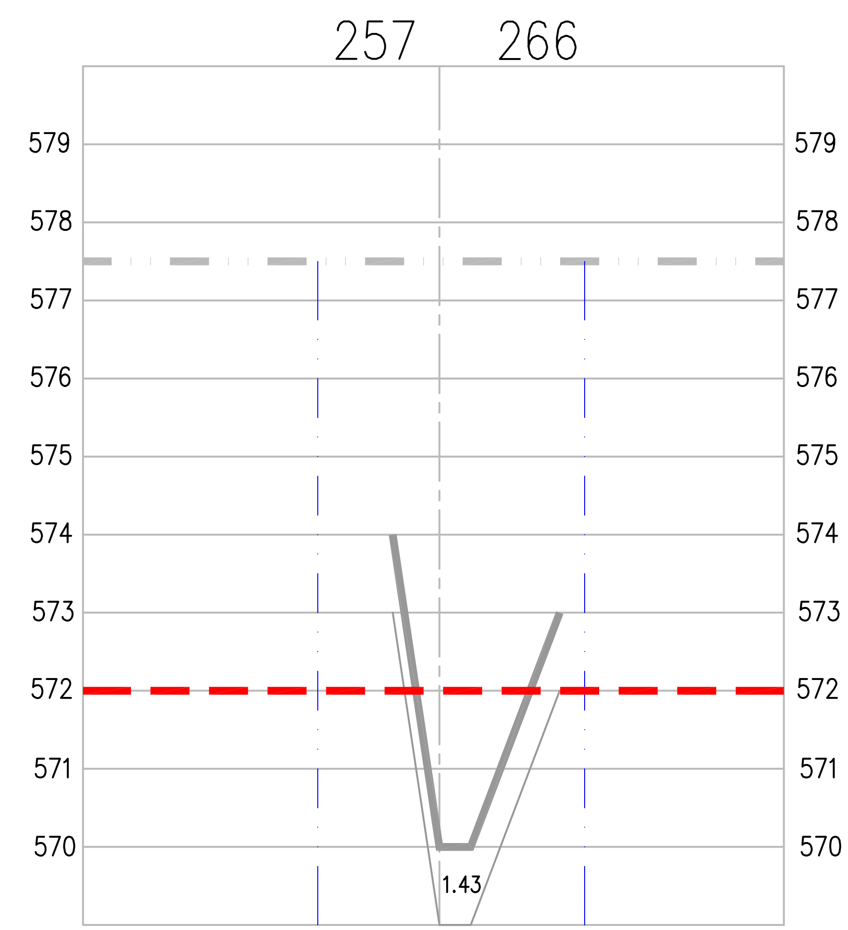

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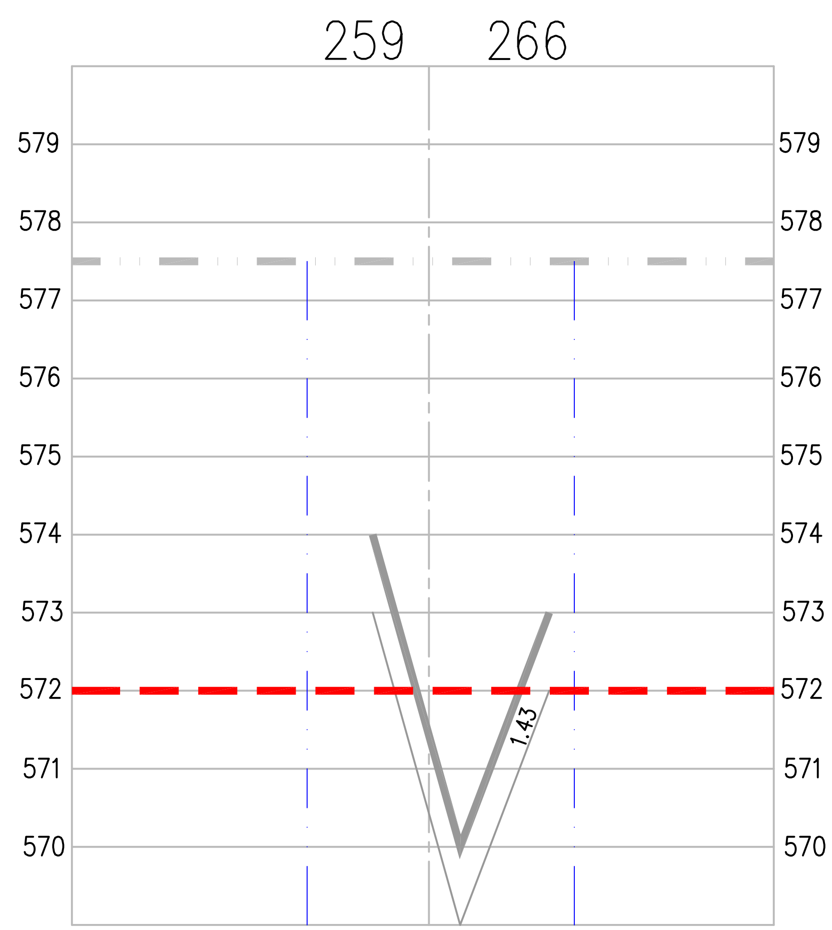

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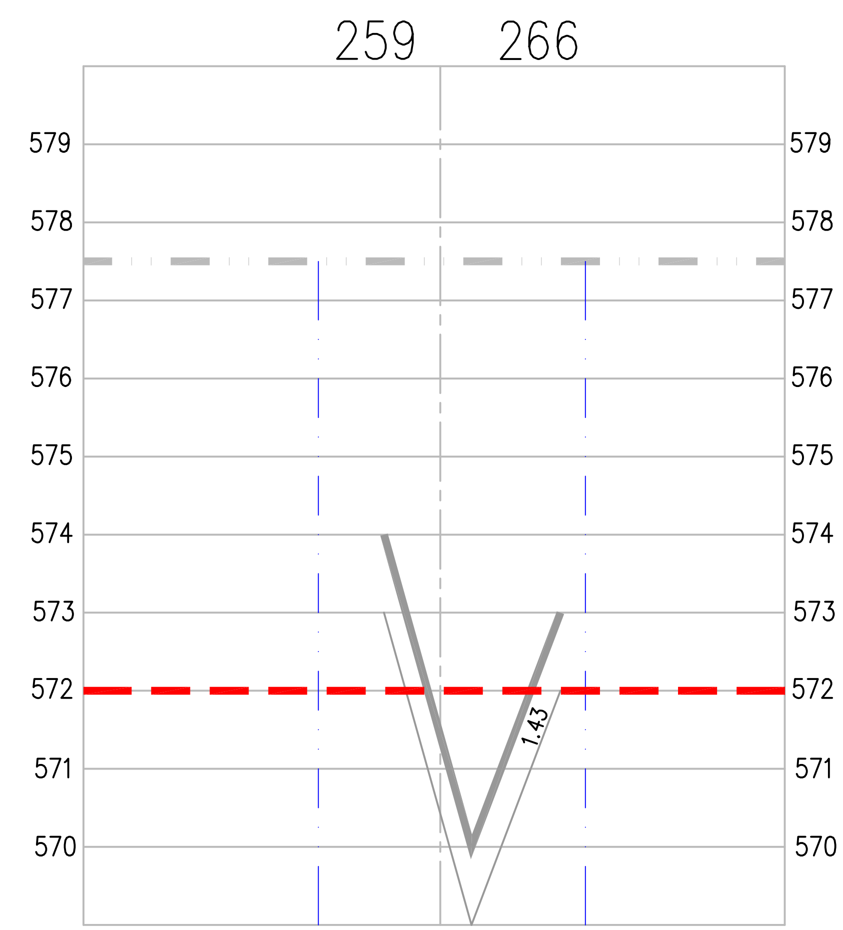

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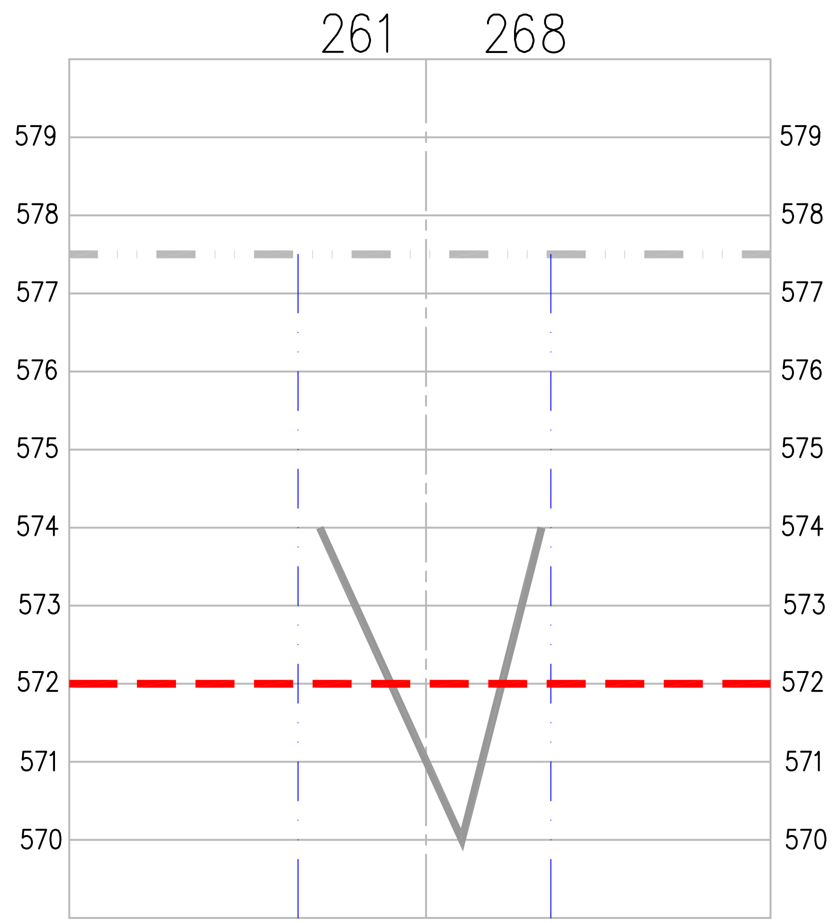

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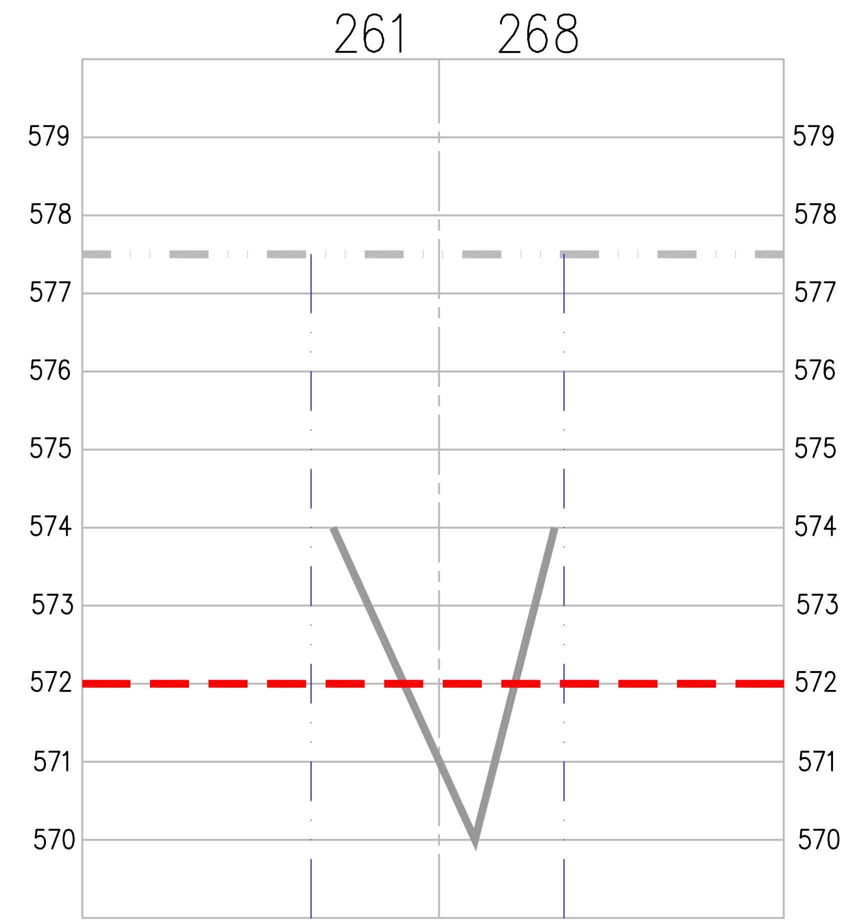

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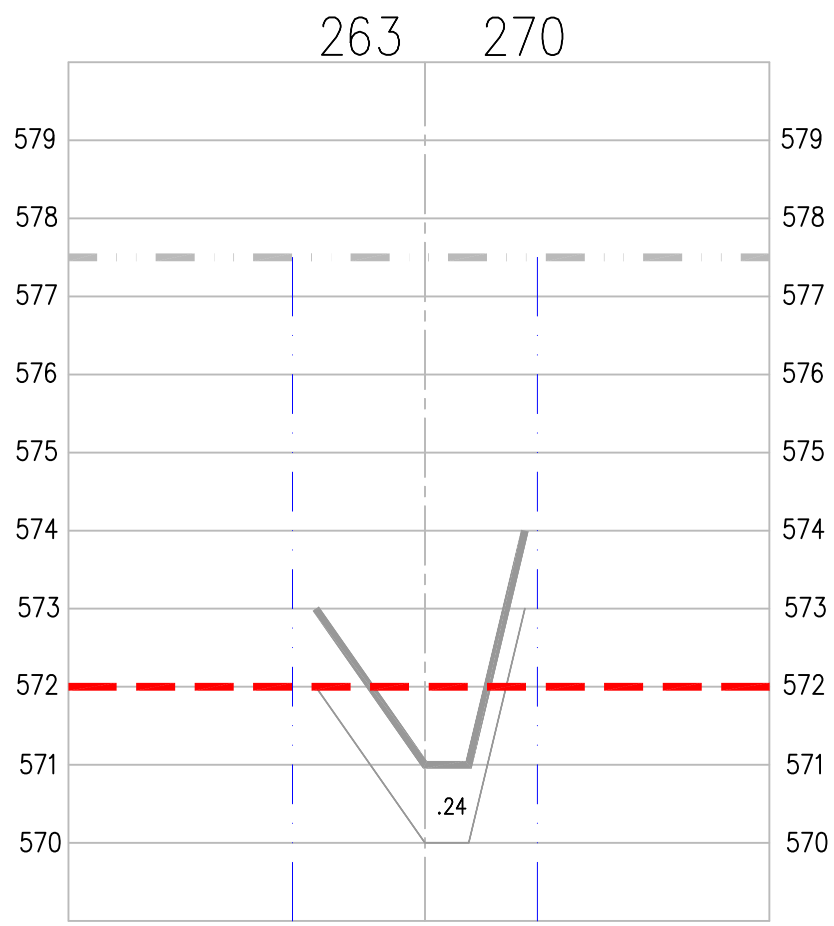

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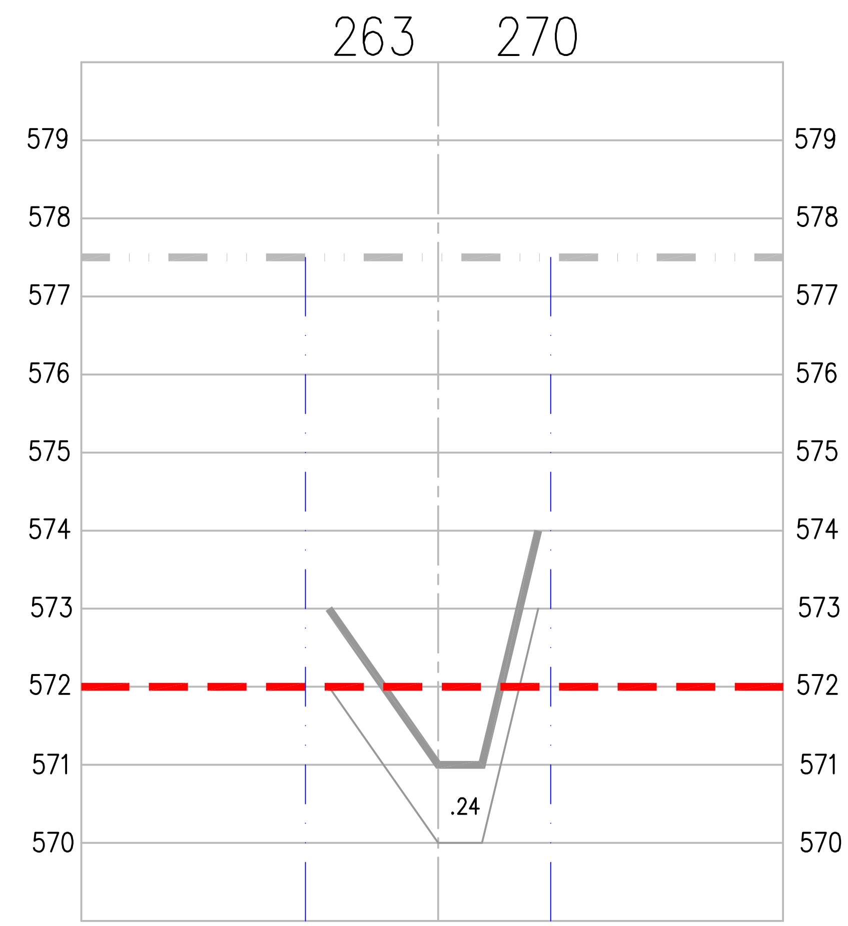

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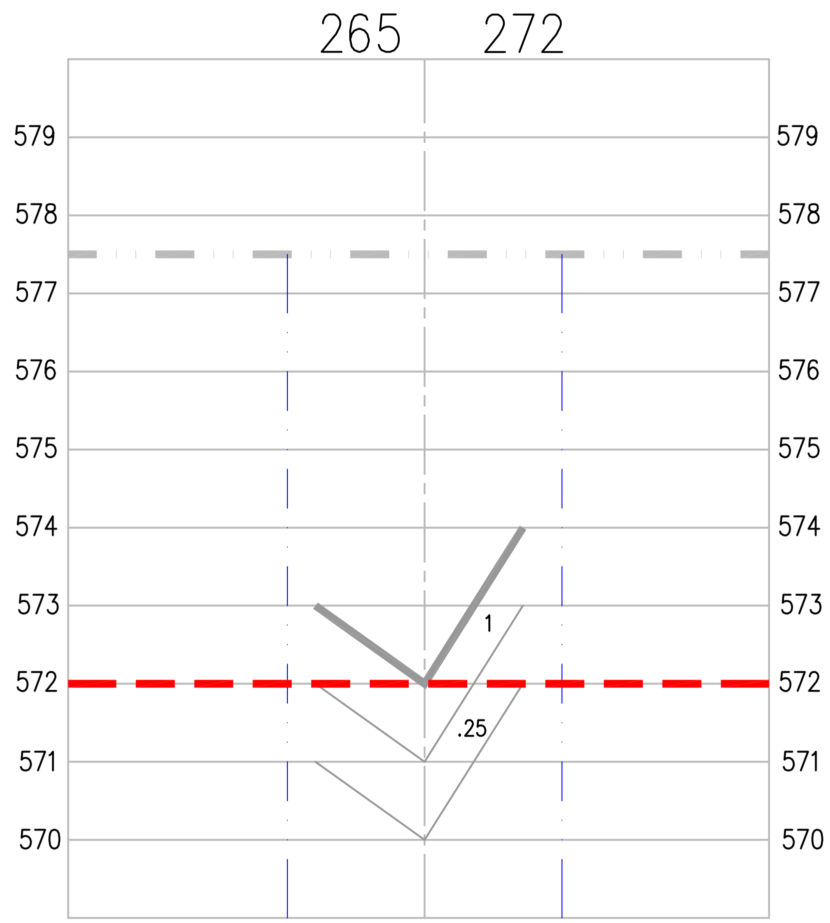

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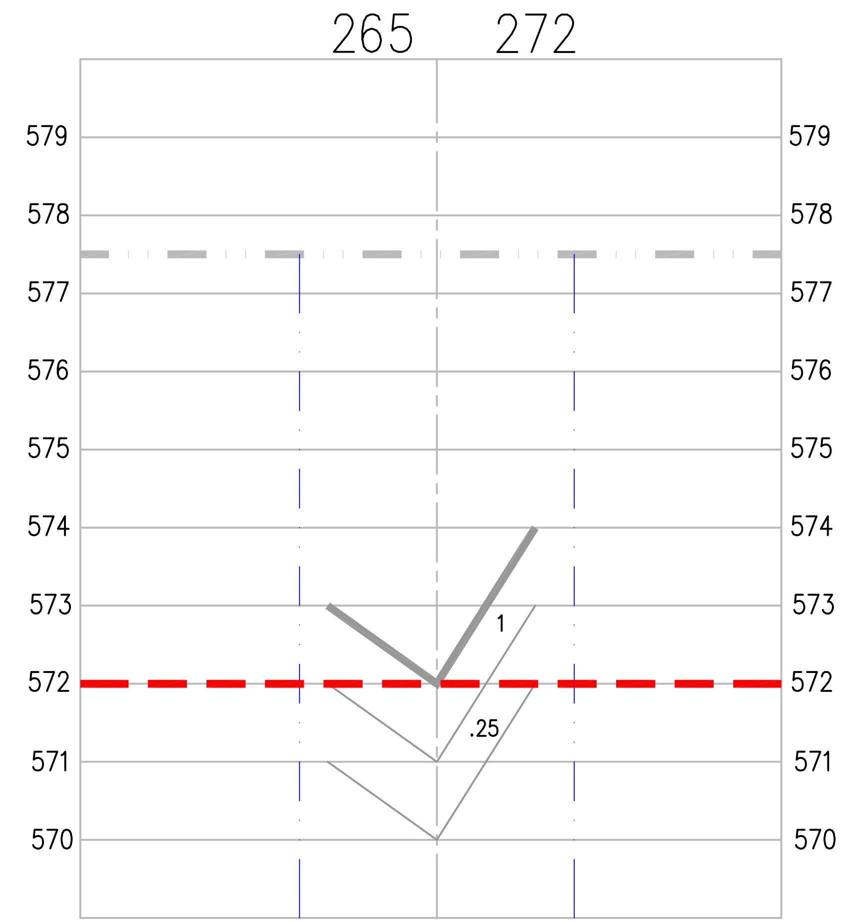

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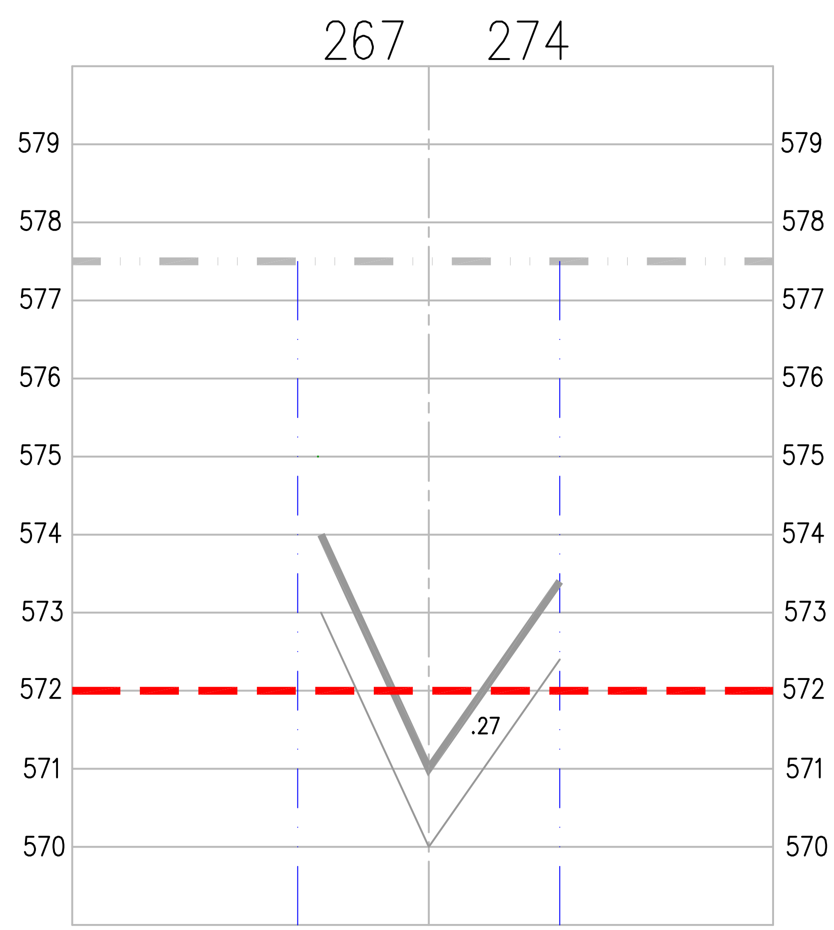

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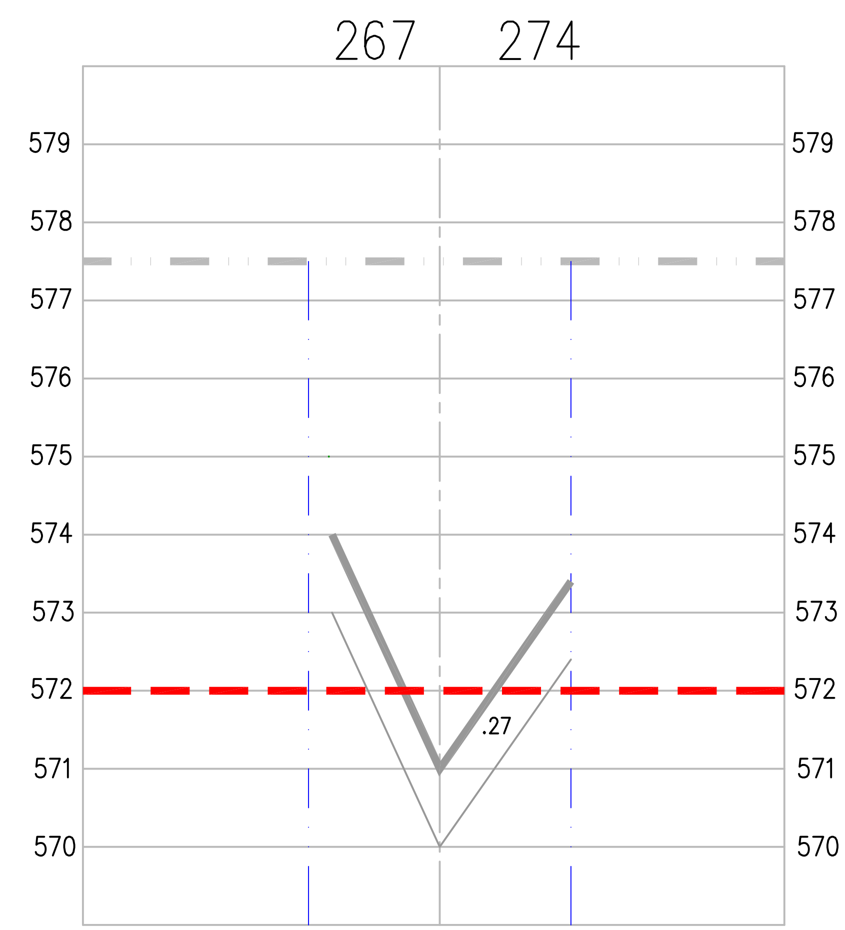

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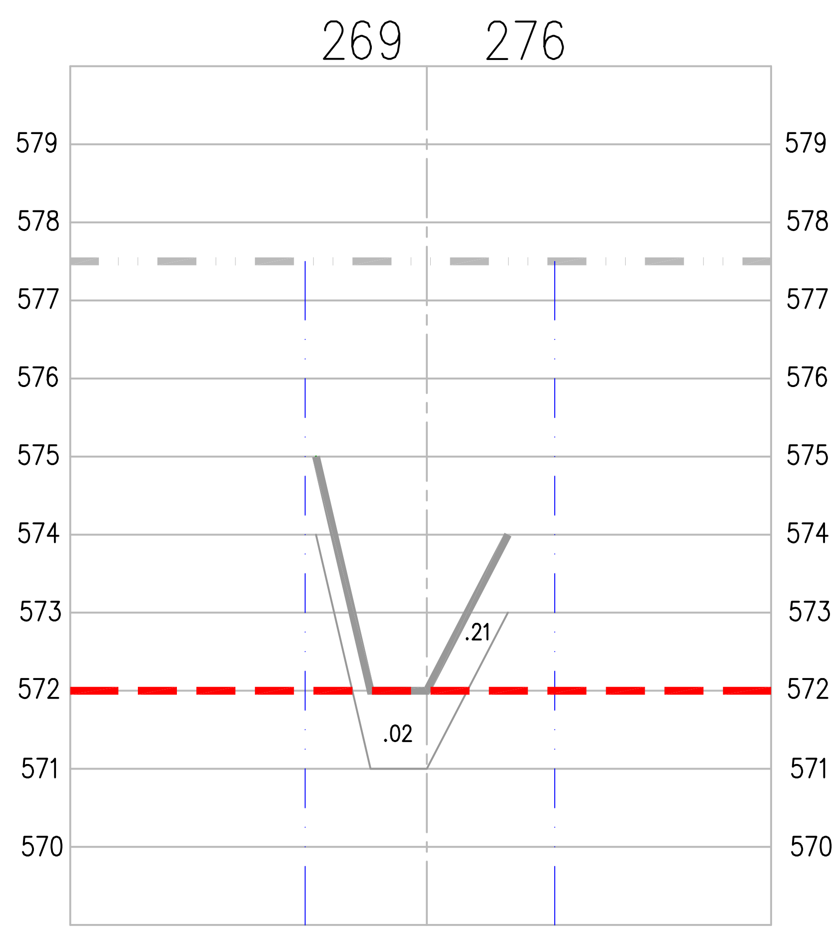

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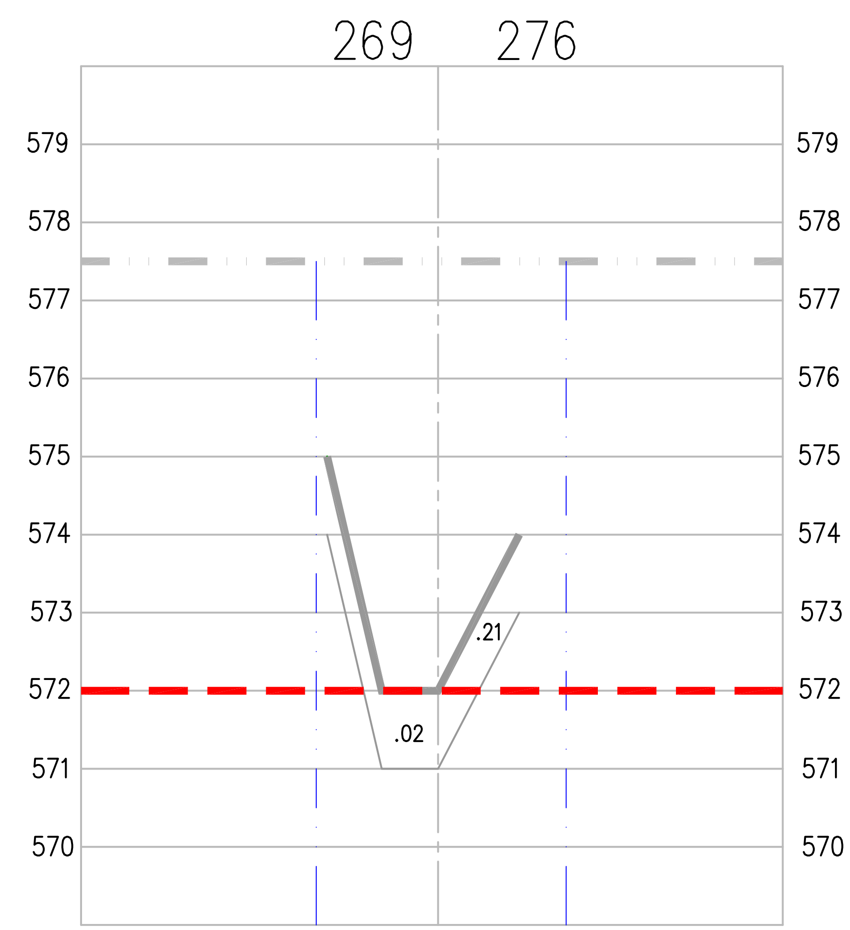

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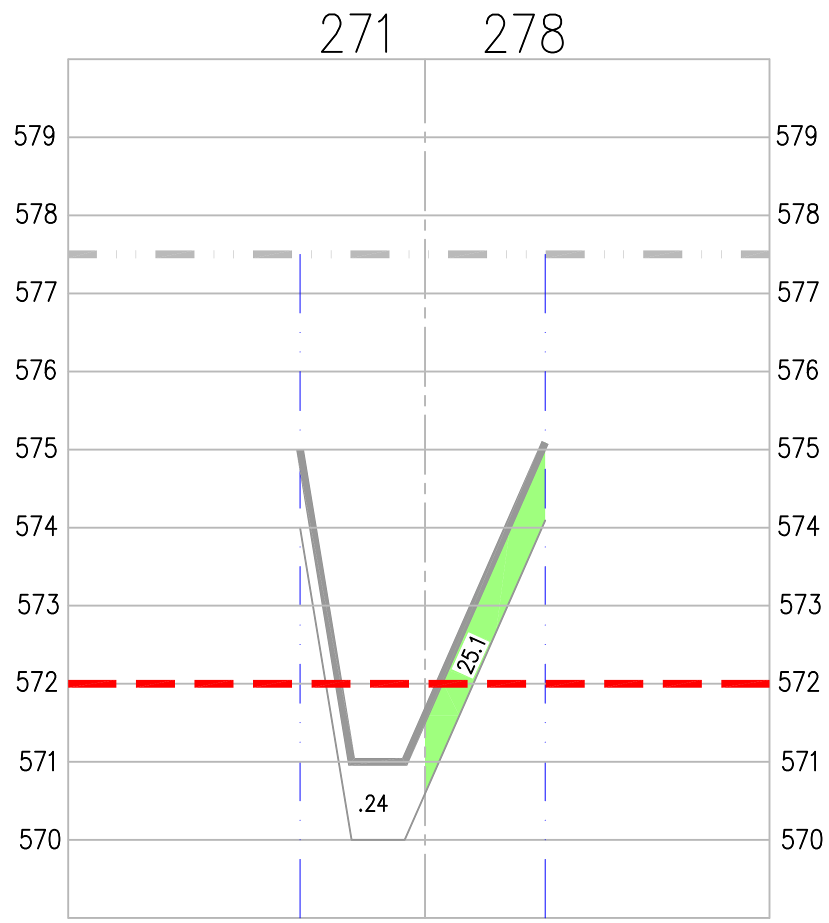

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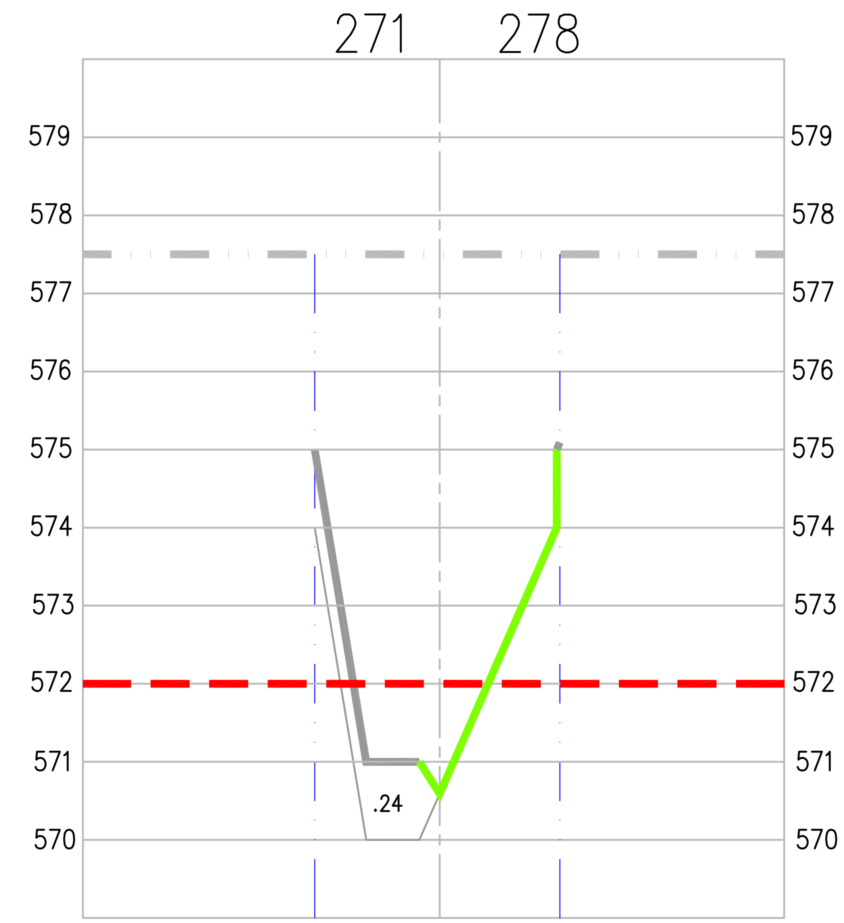

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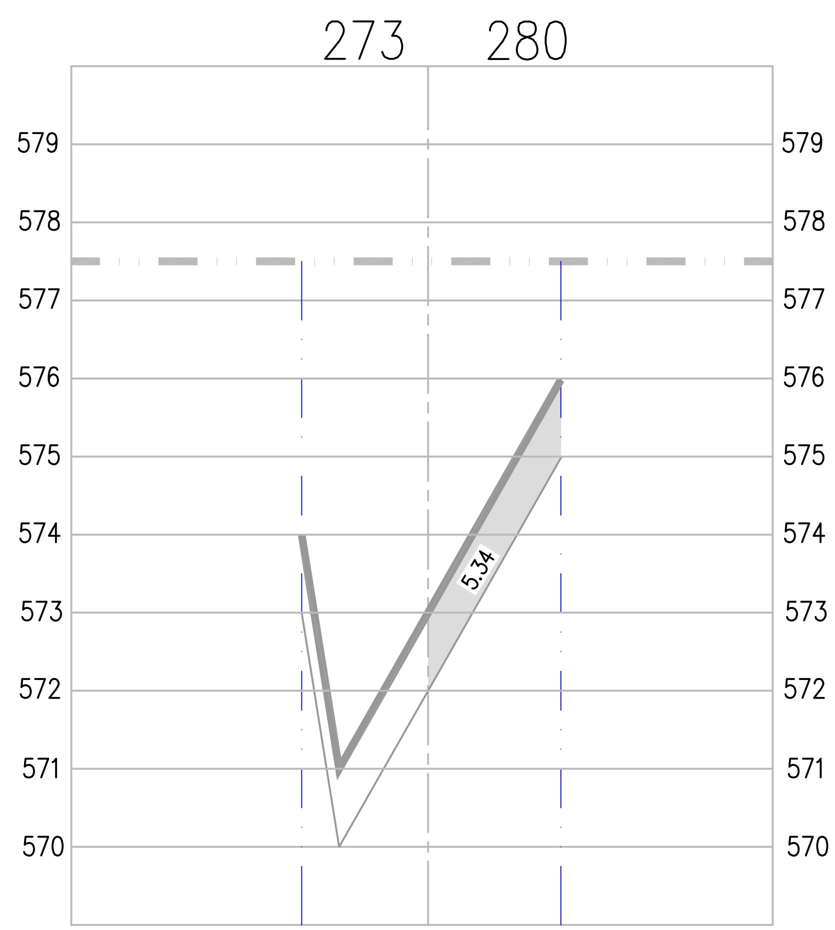

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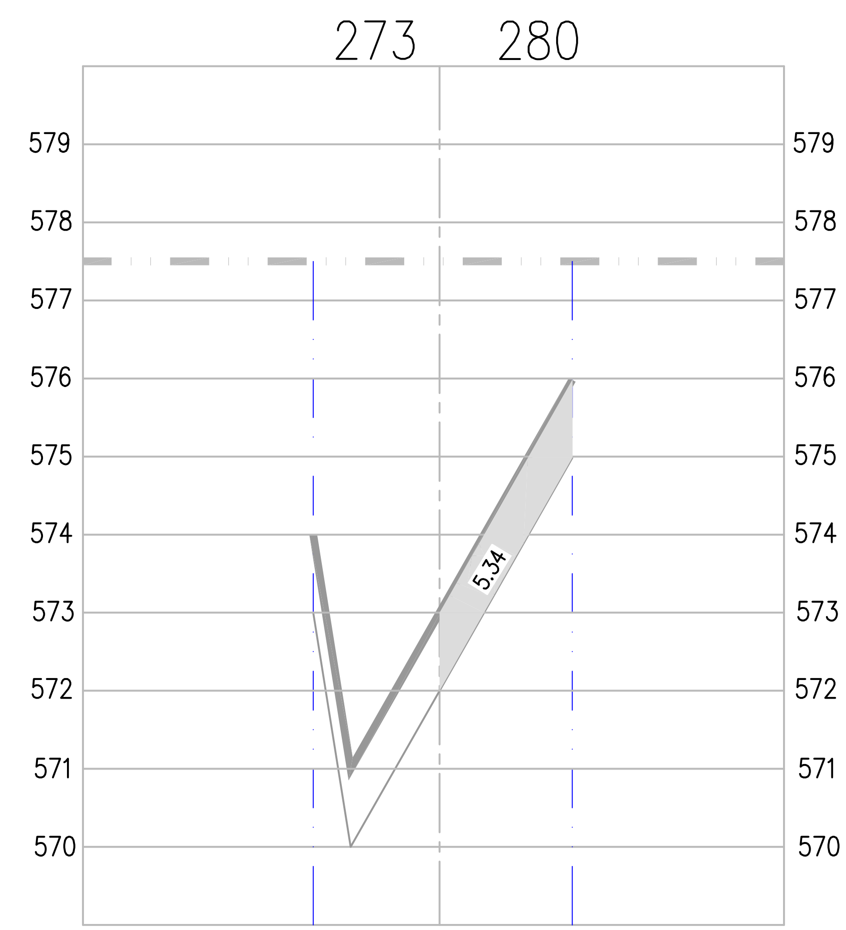

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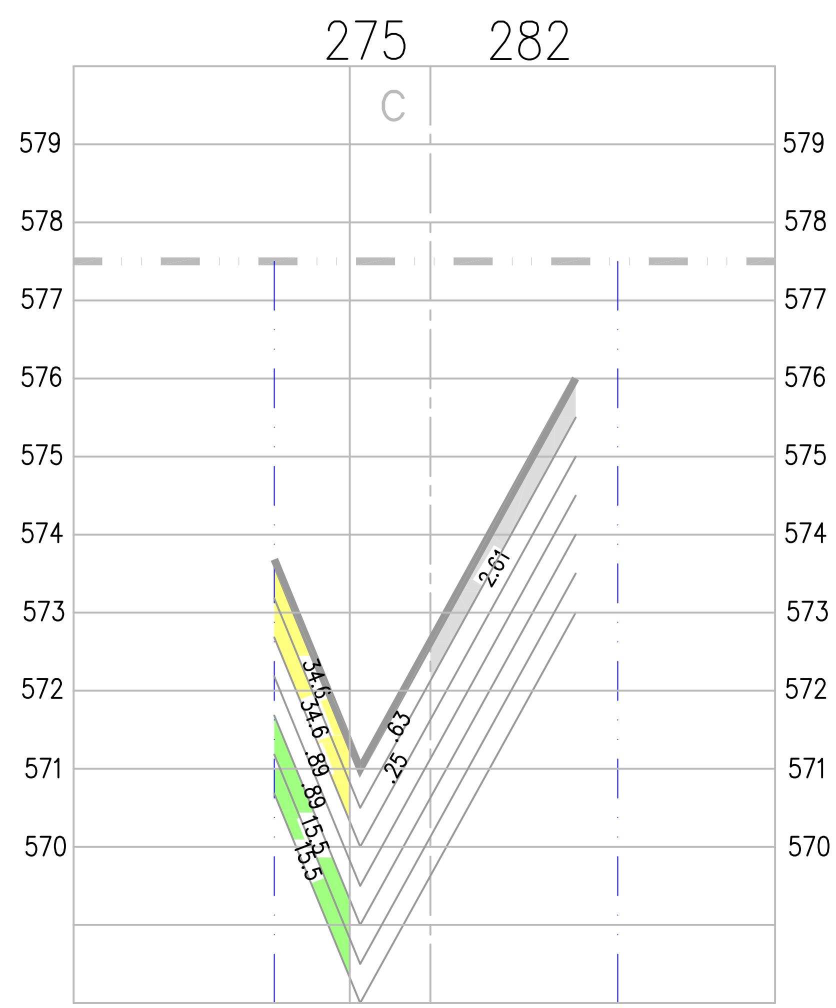

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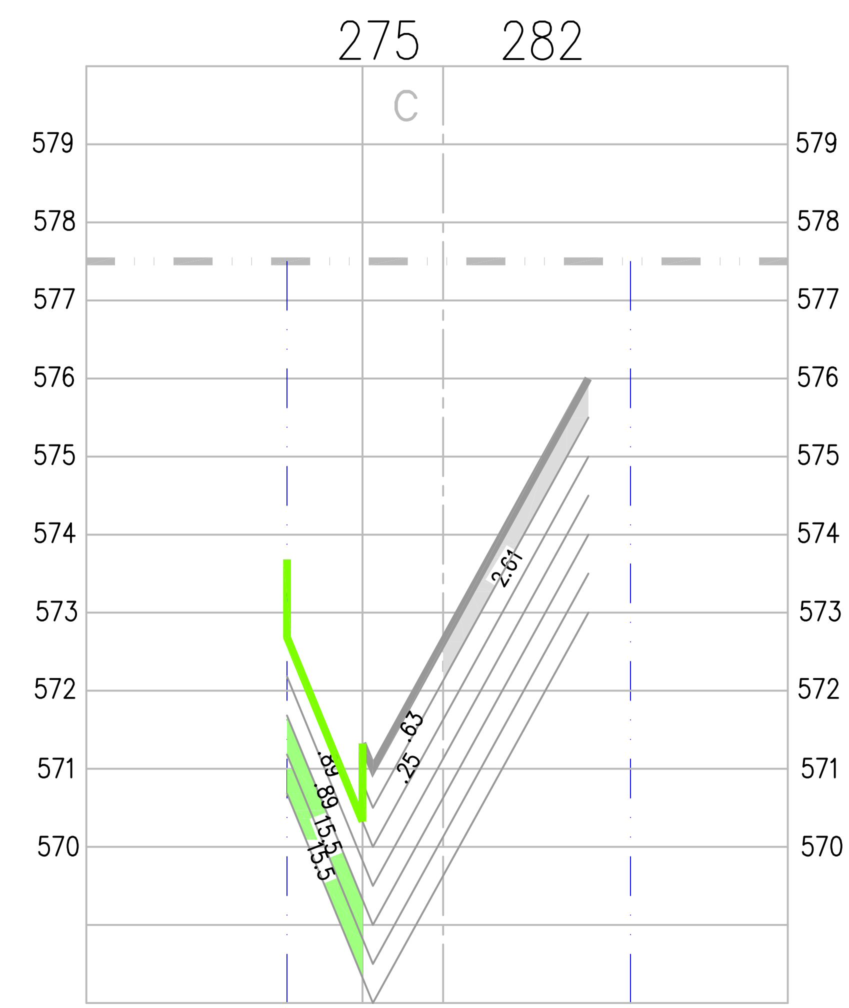

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PRE-DESIGN INVESTIGATION

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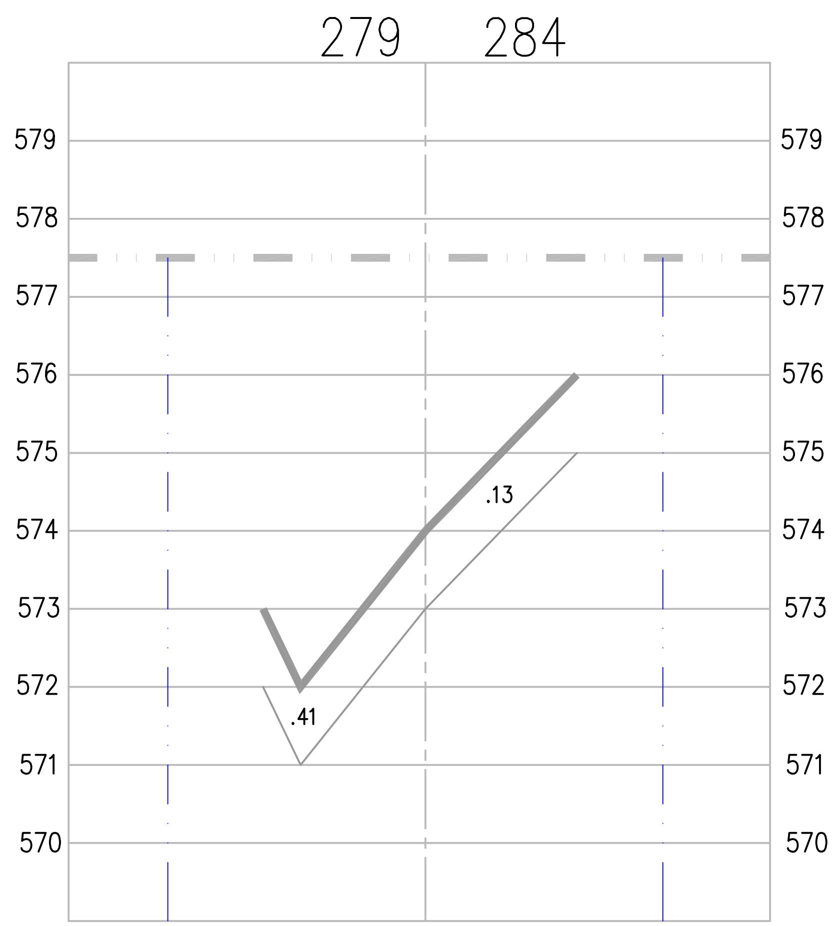

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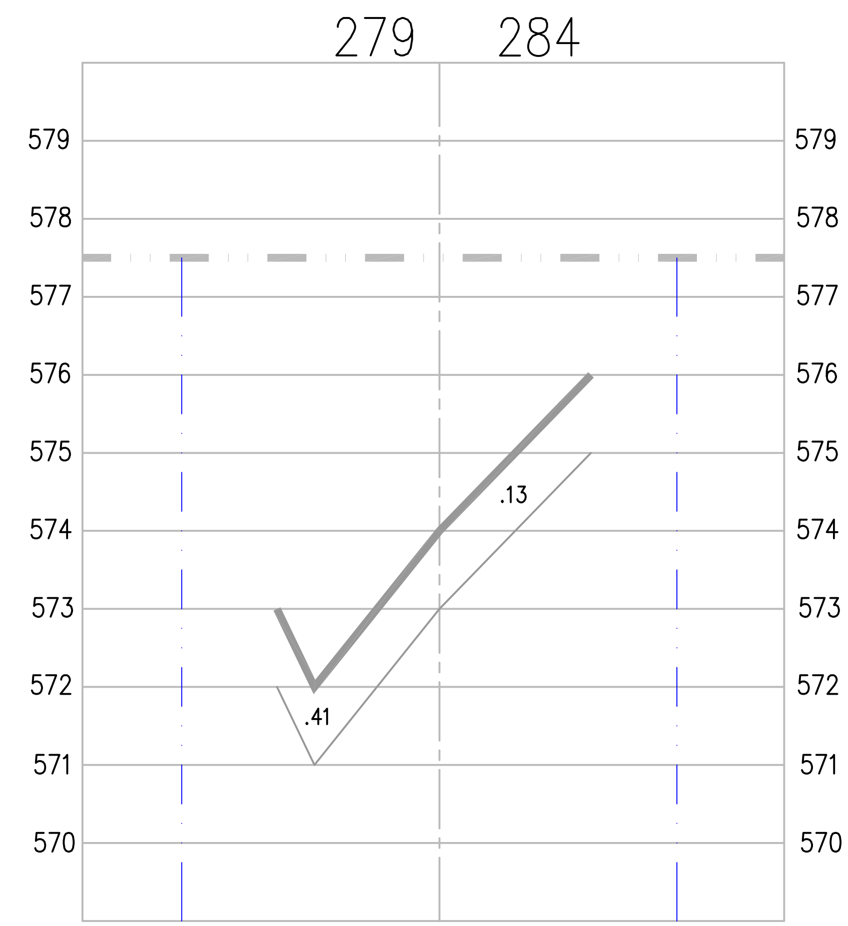

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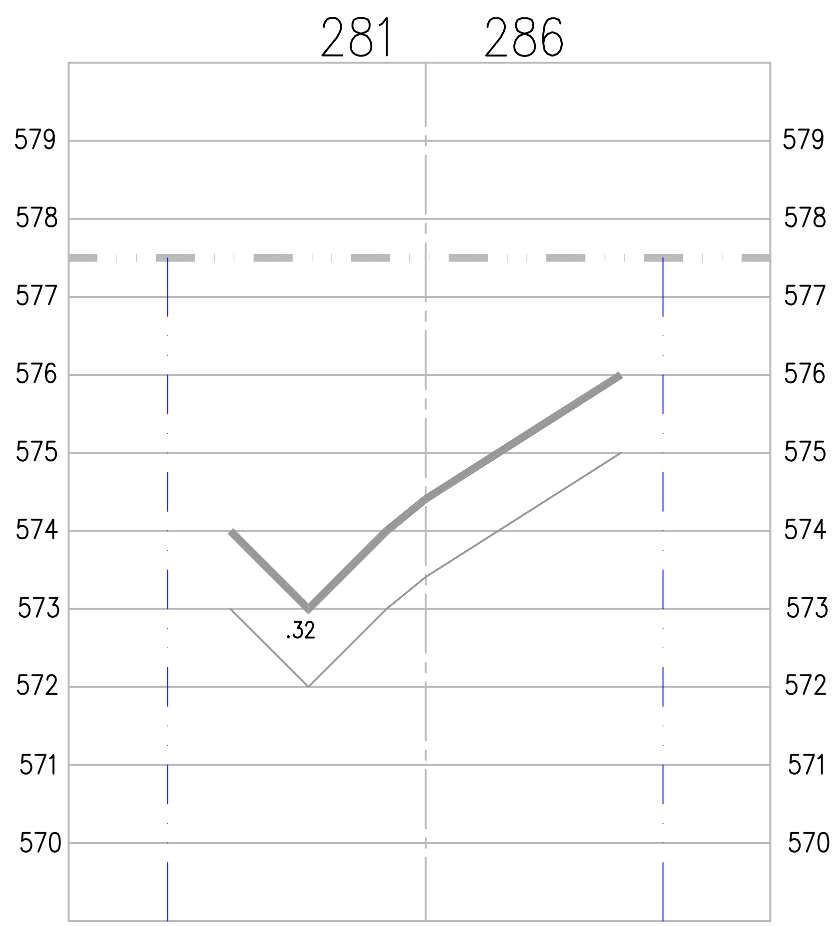

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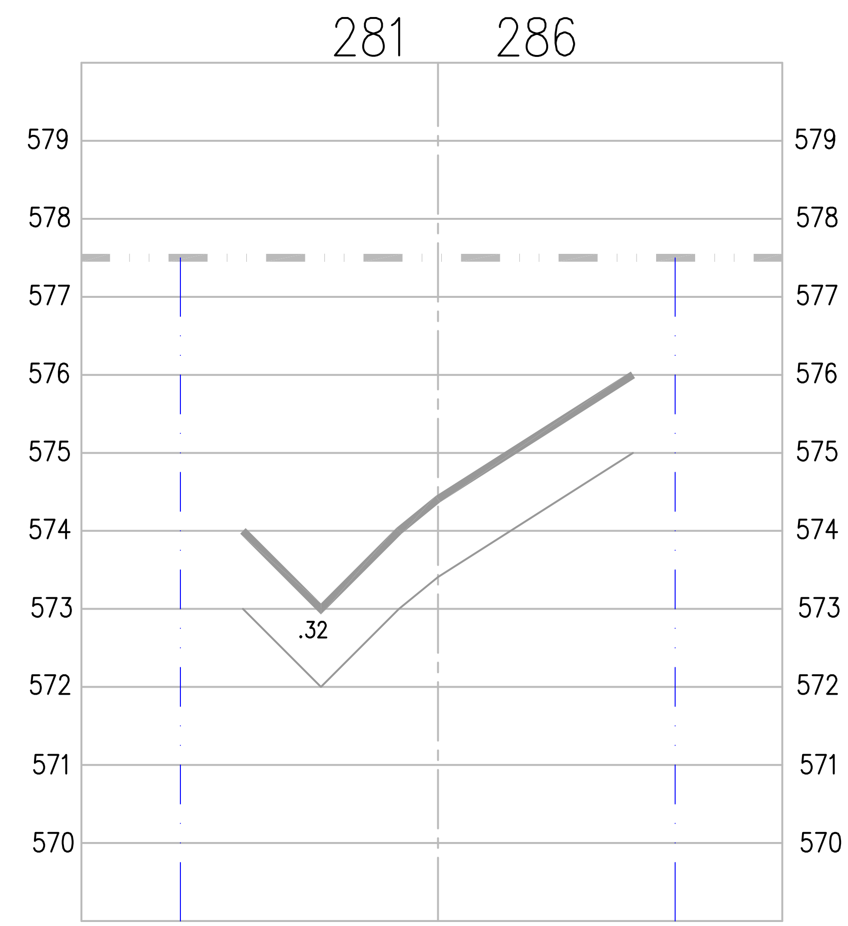

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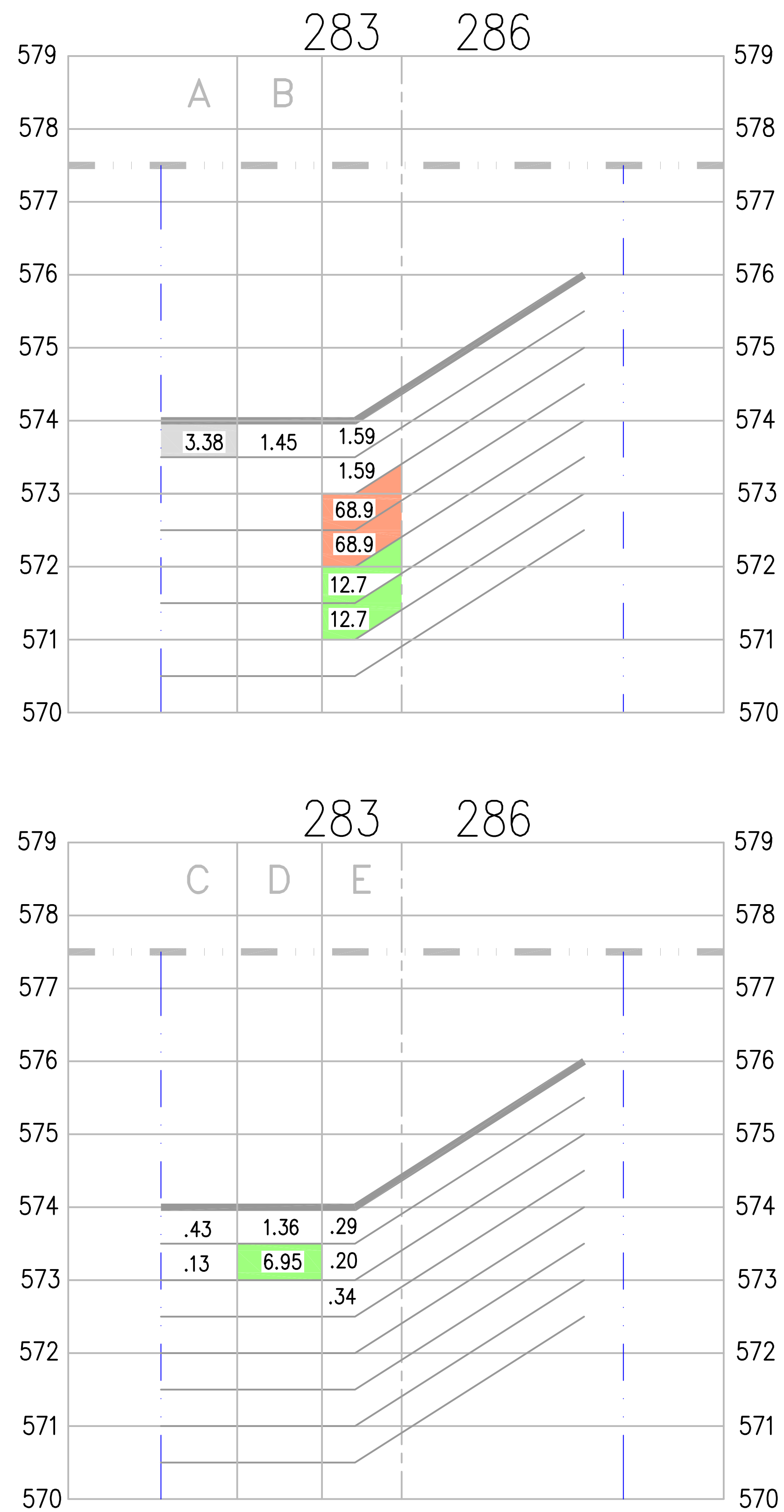

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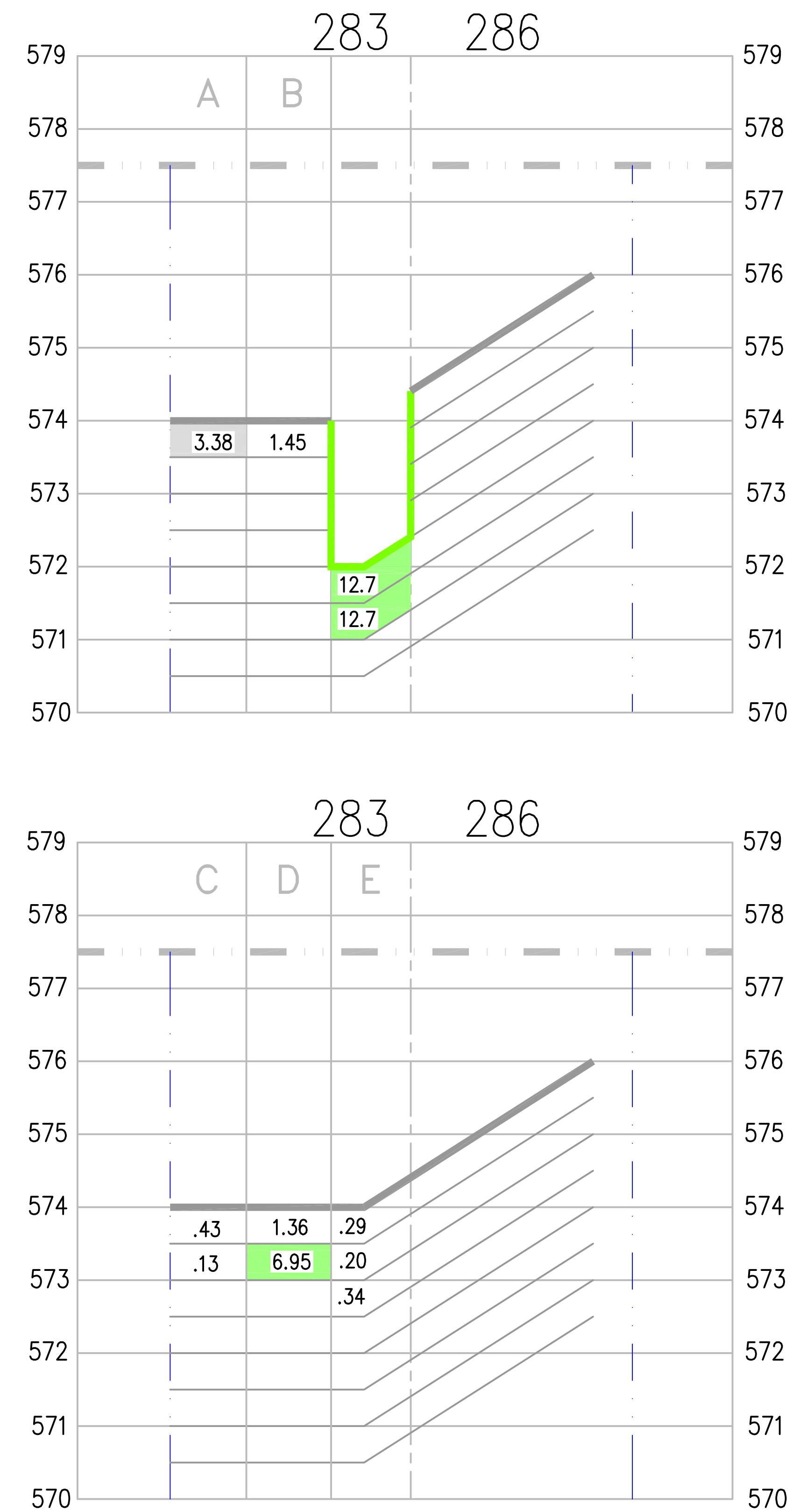

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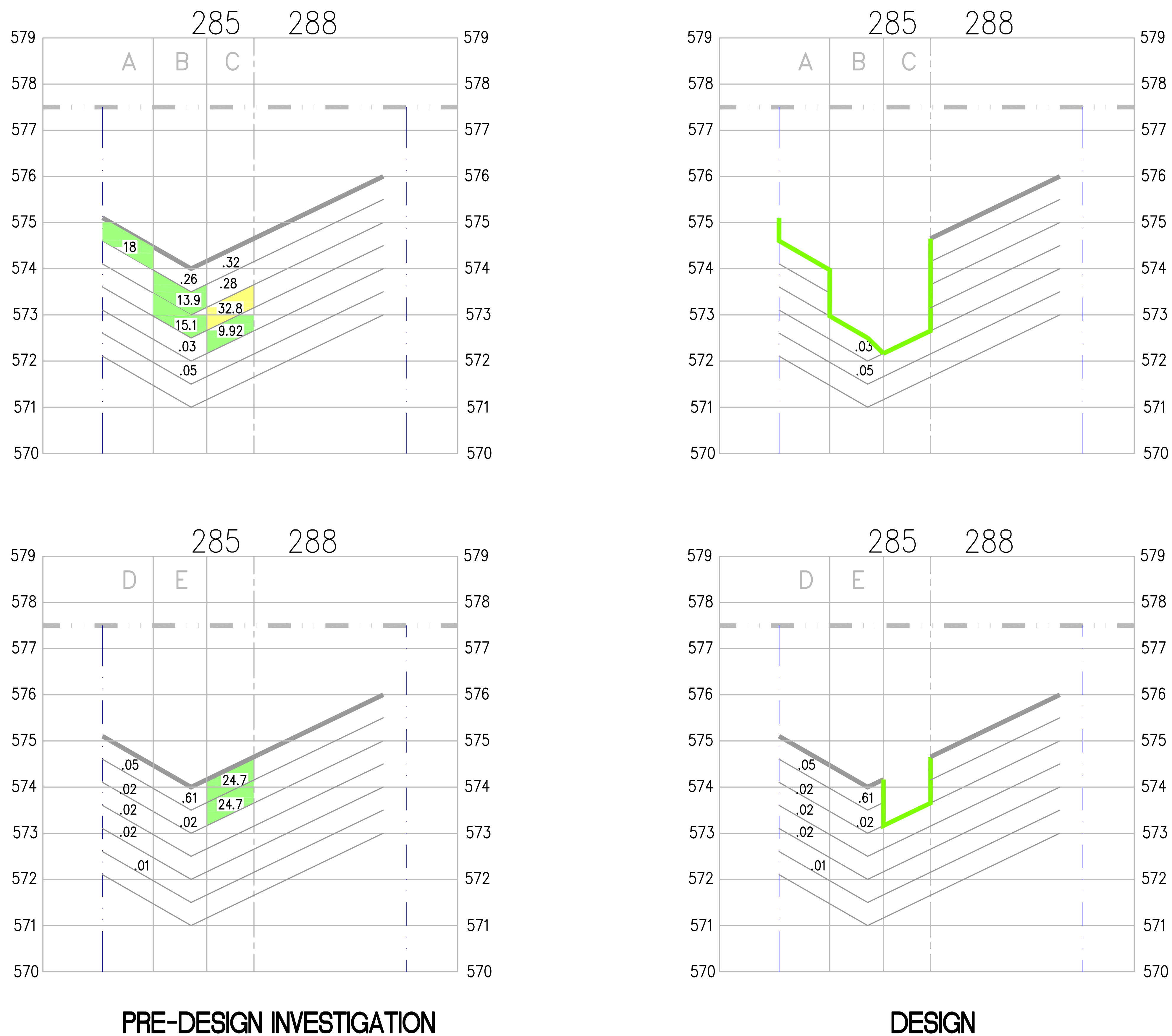
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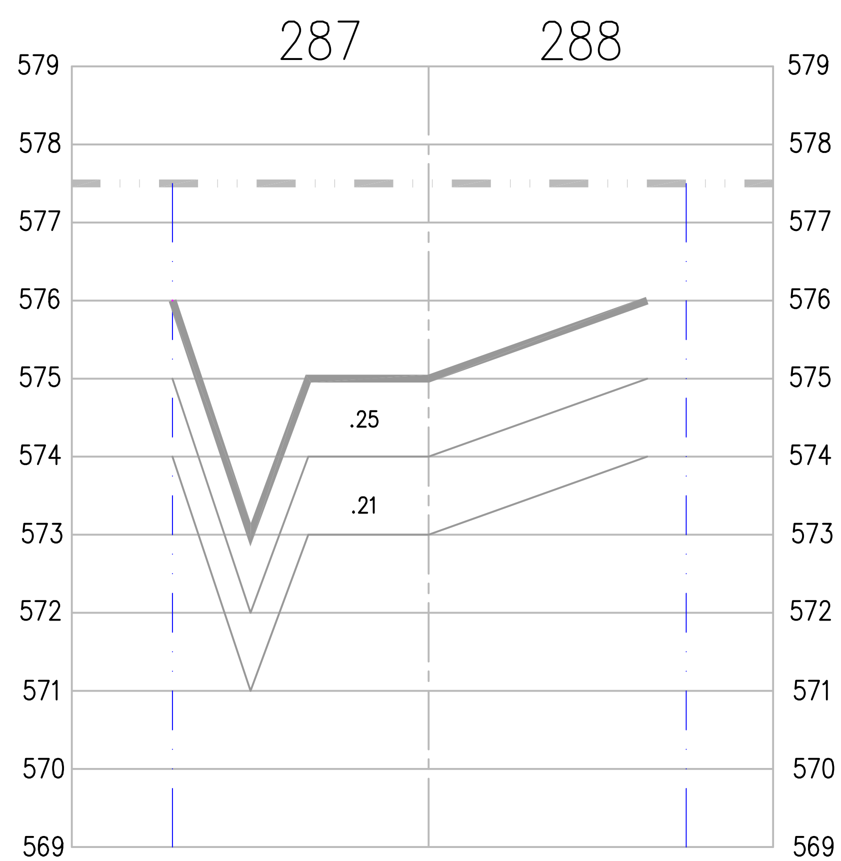

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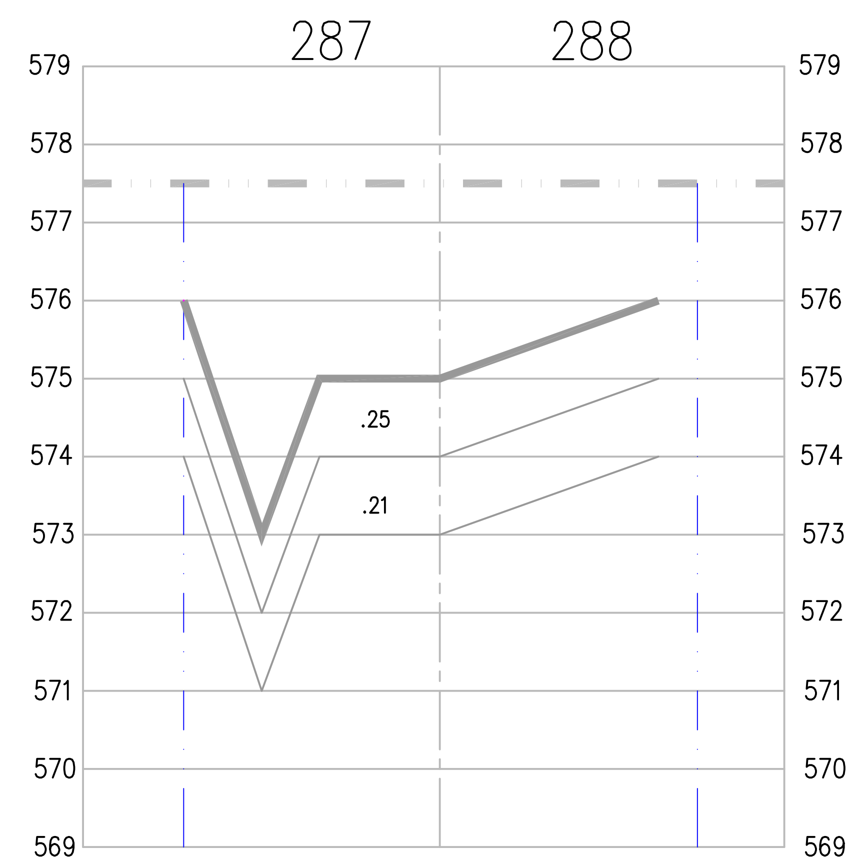

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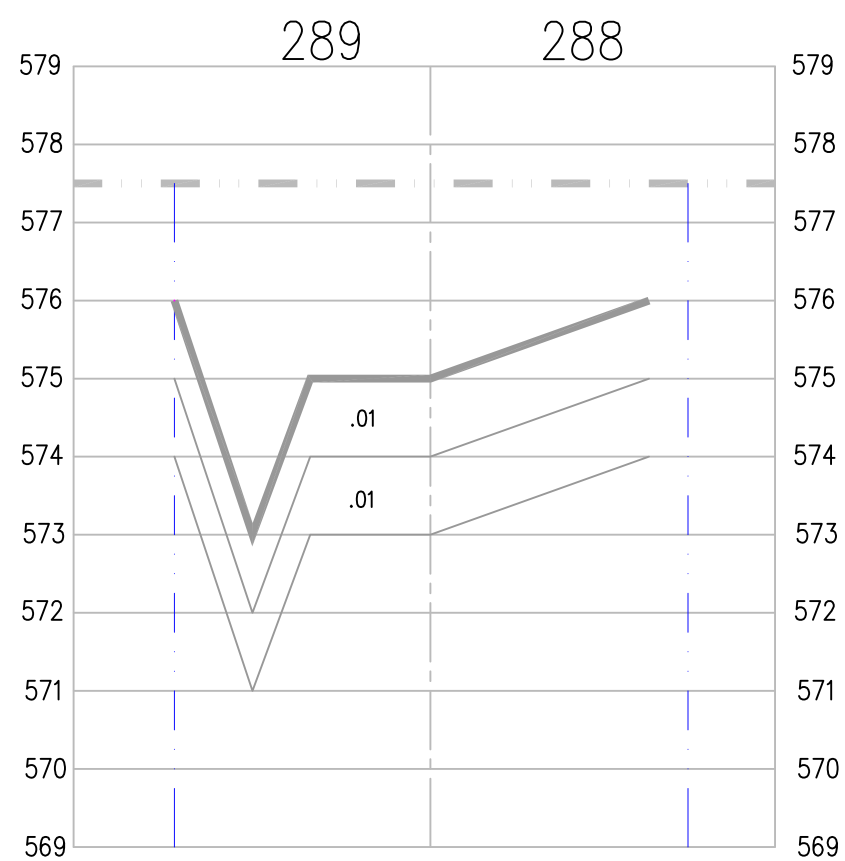

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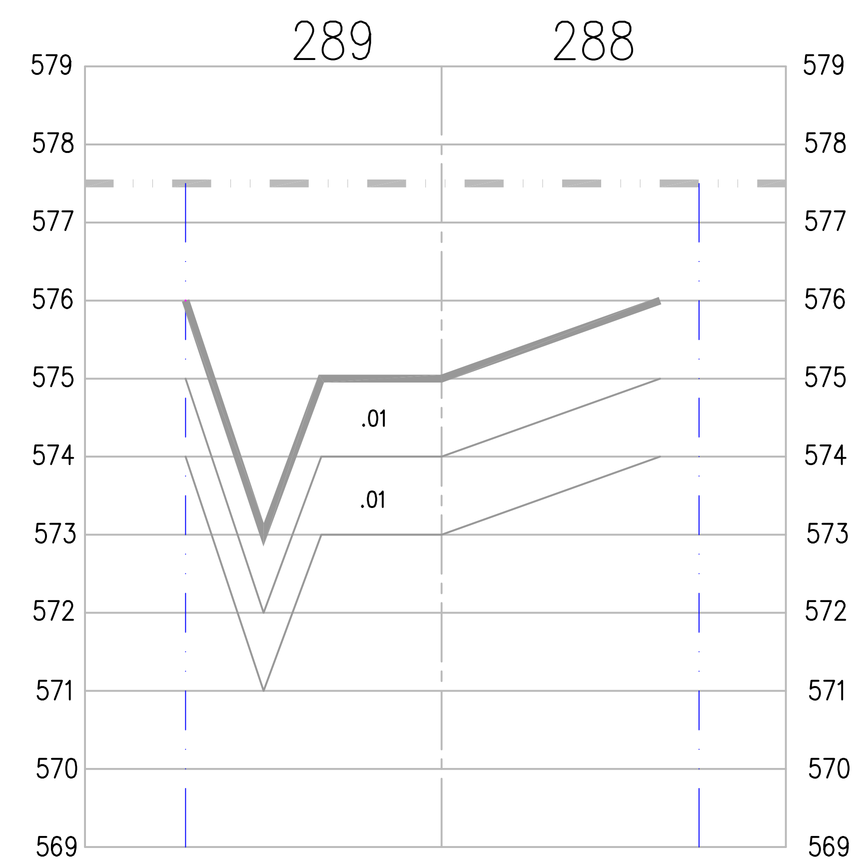

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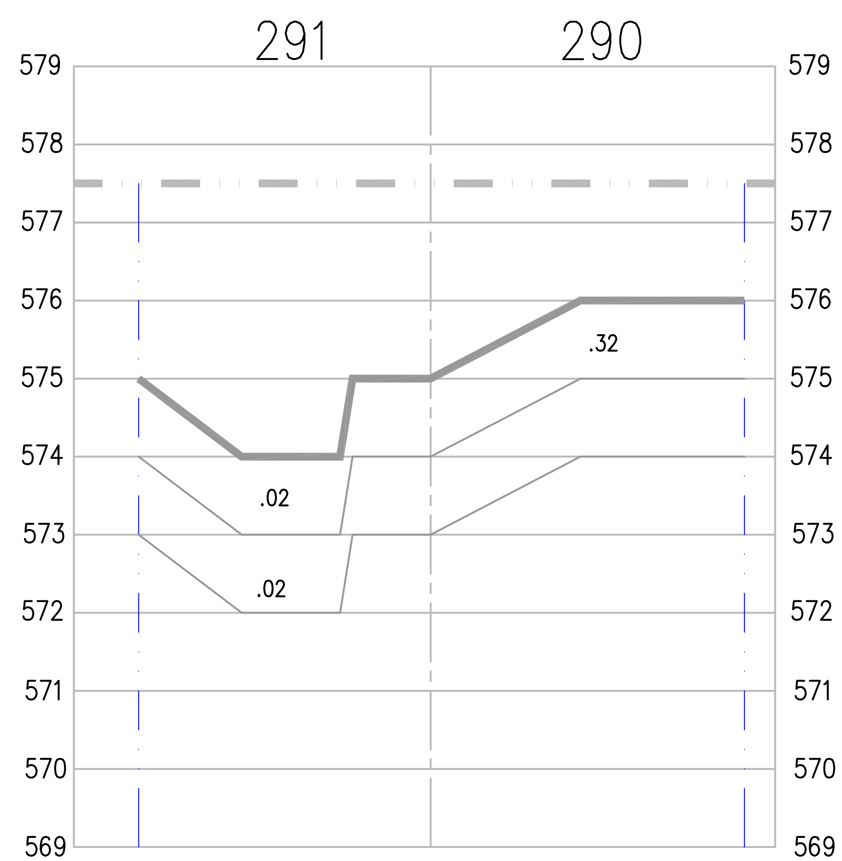

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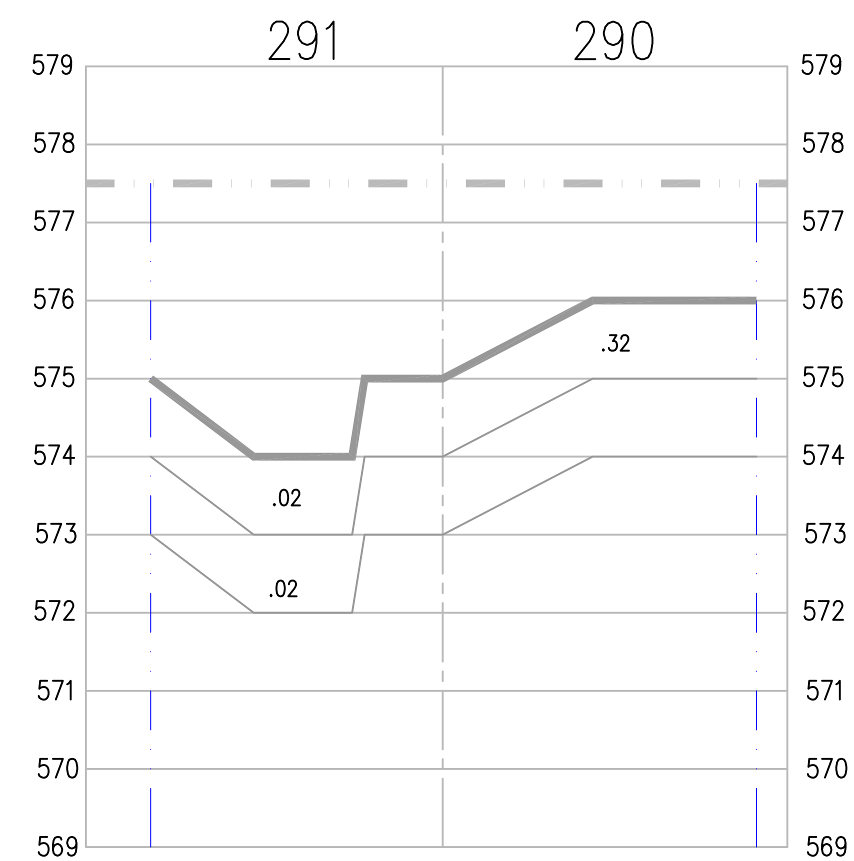

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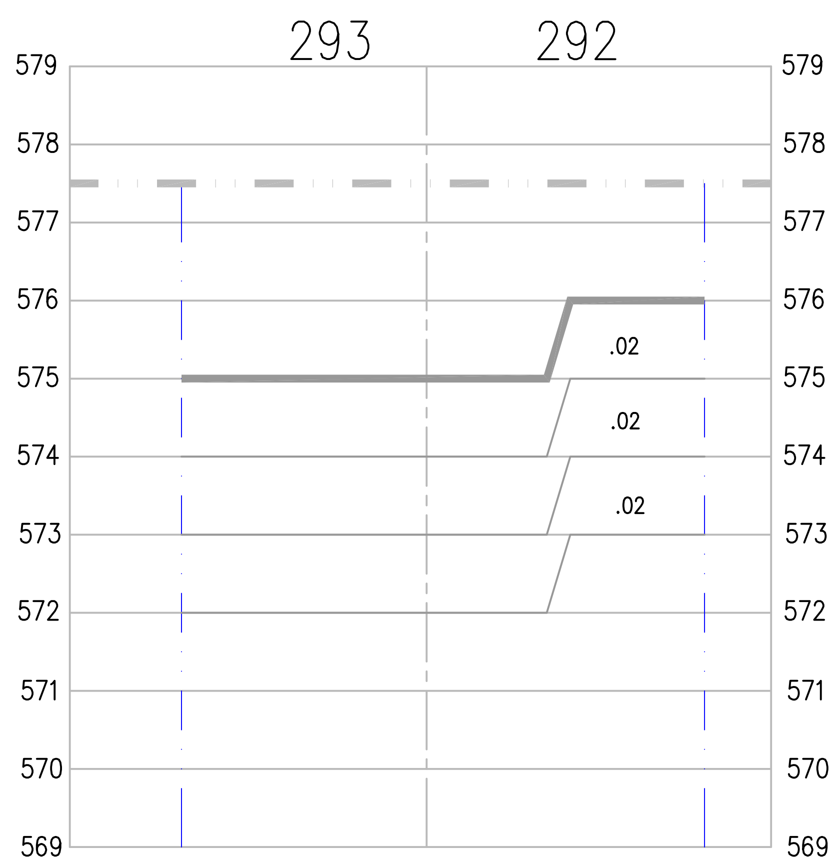

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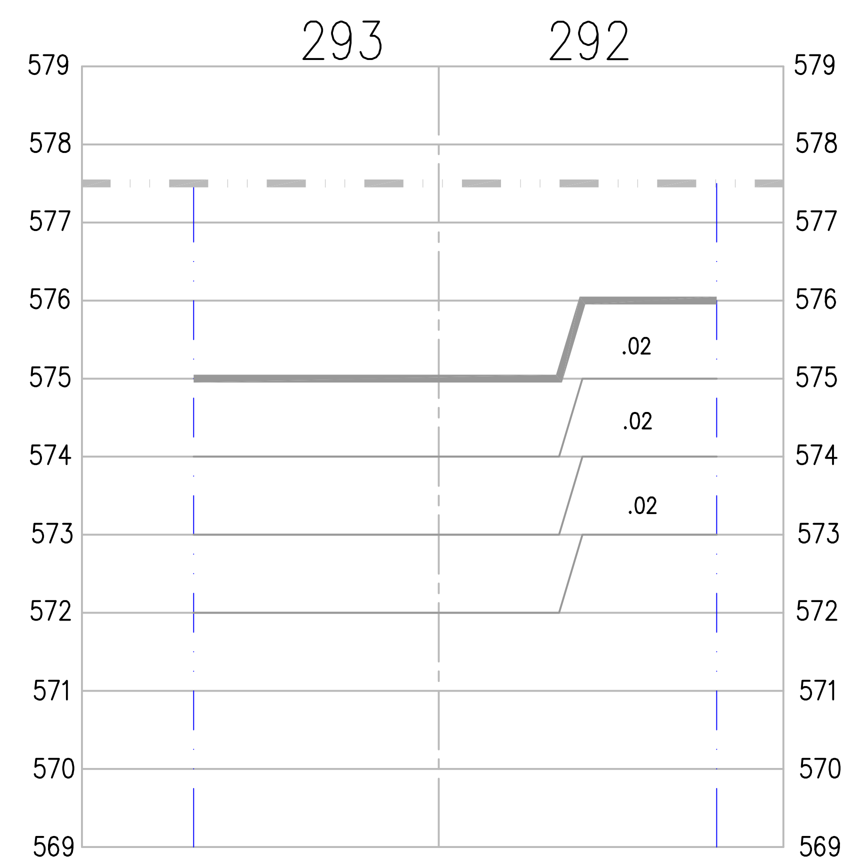

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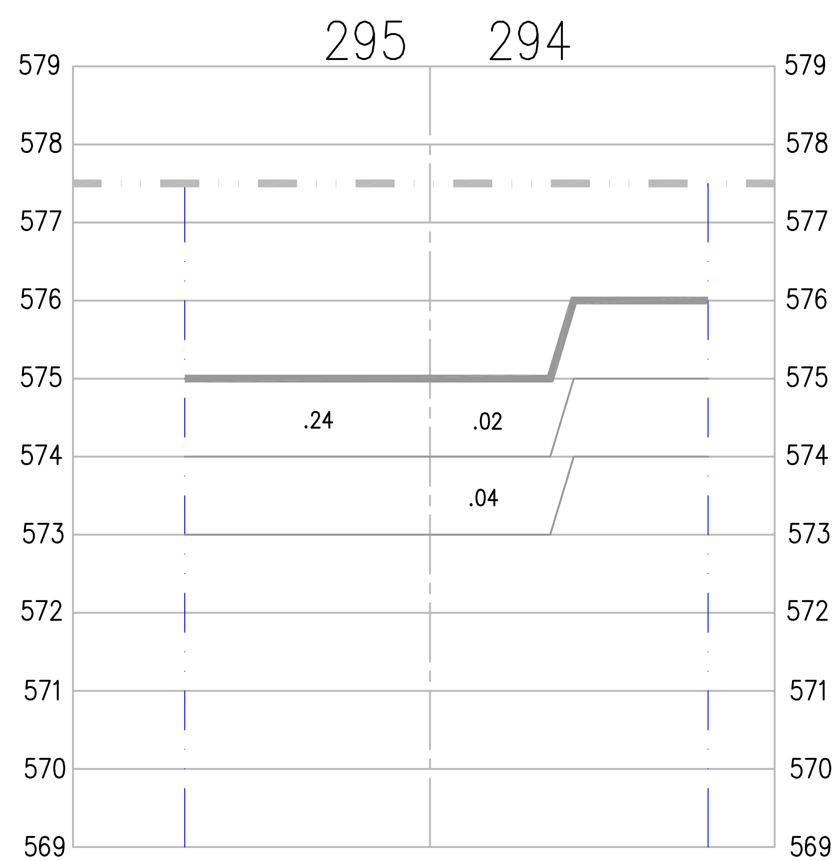

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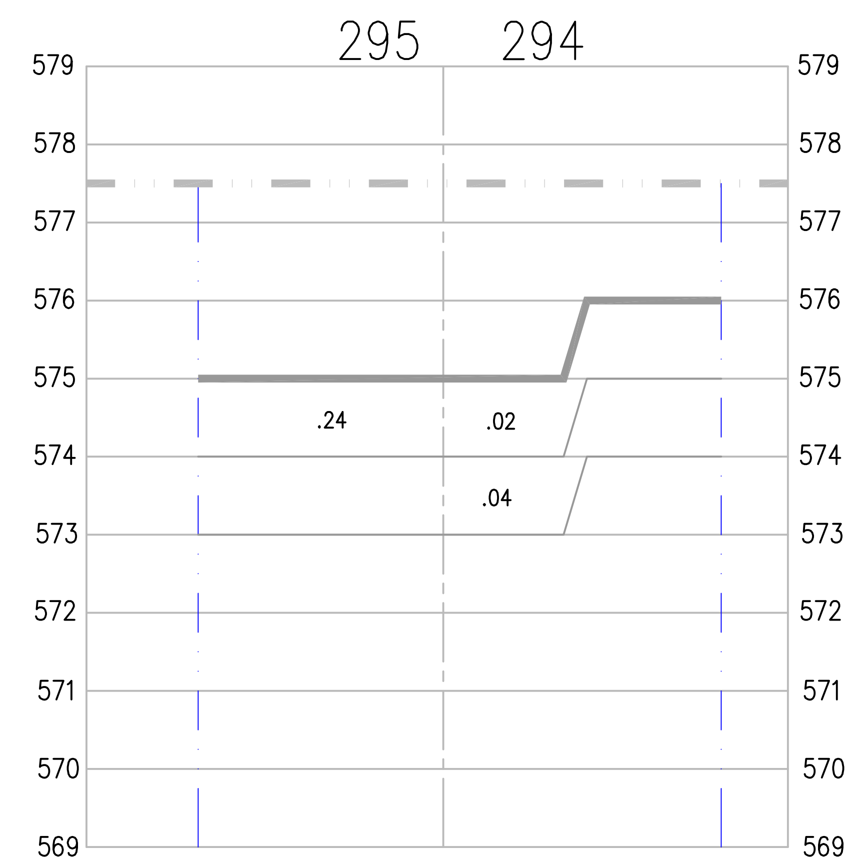

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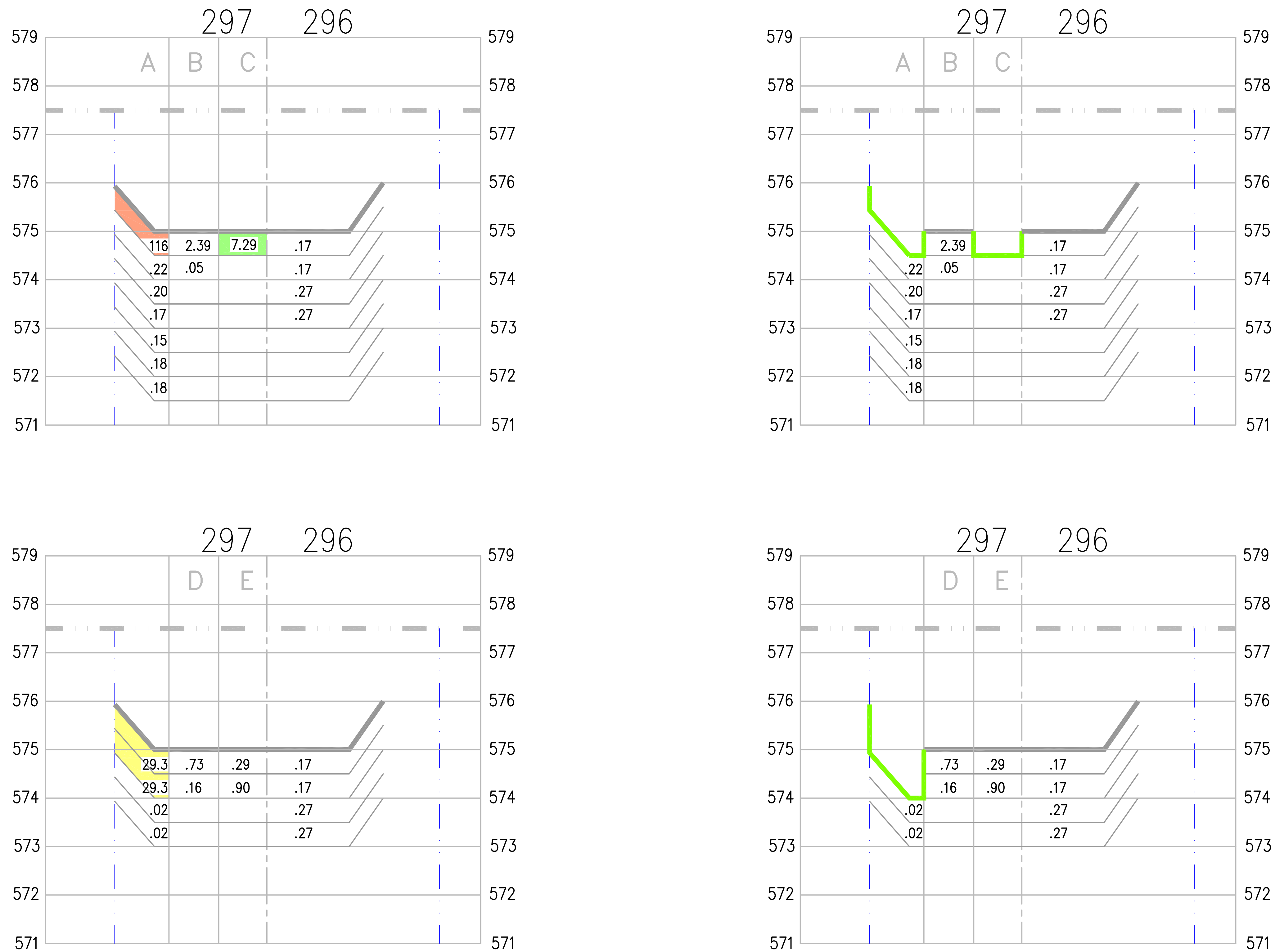

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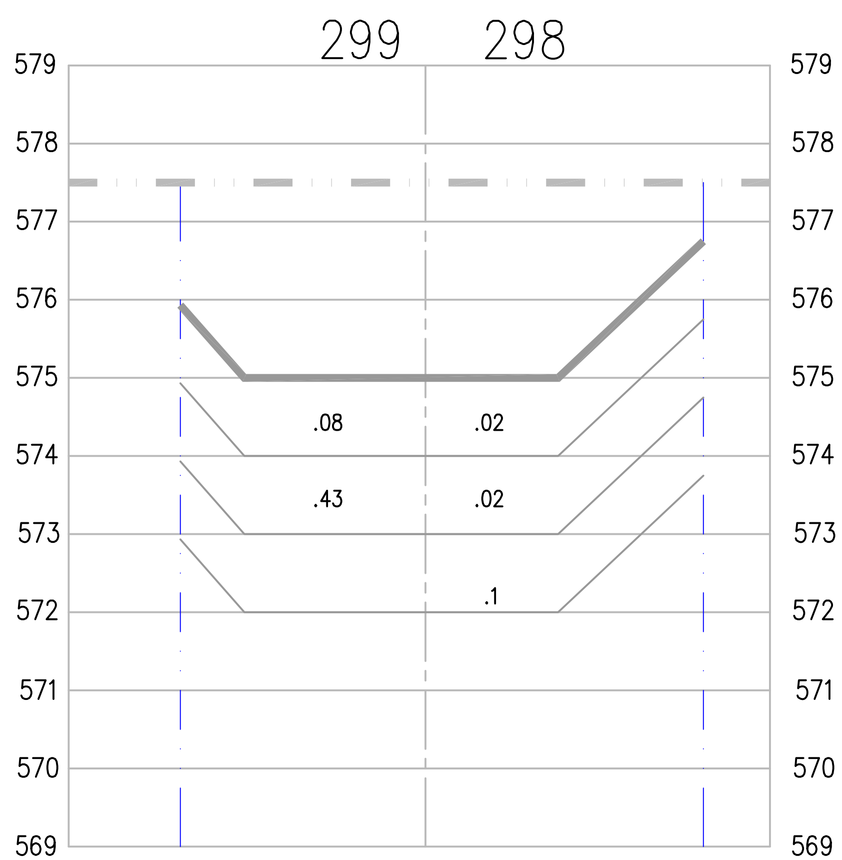

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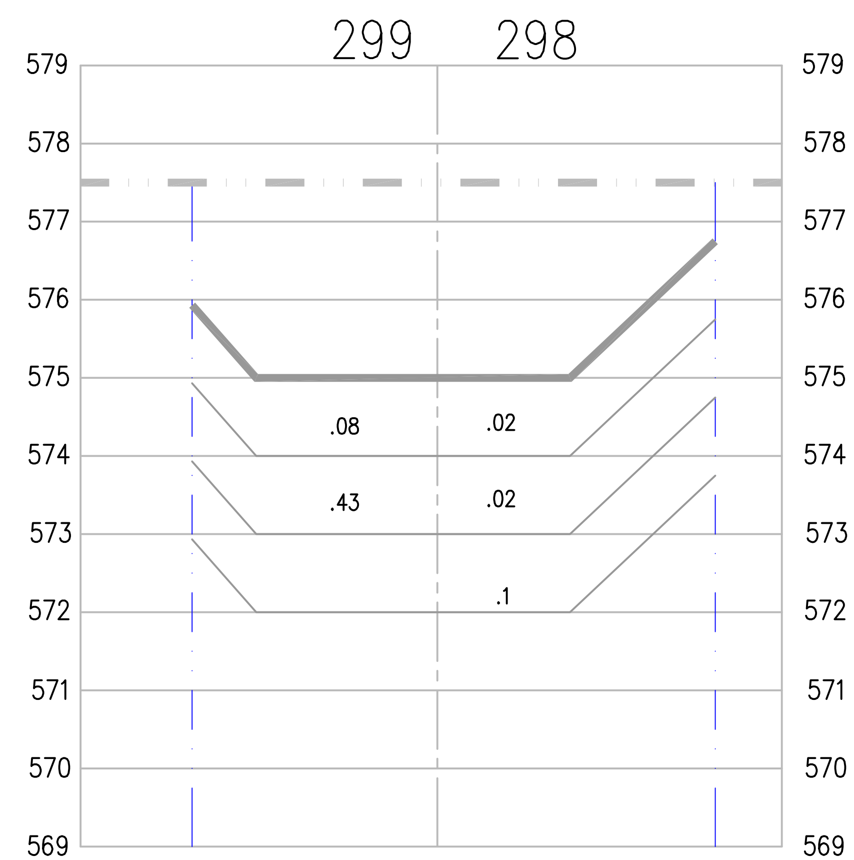

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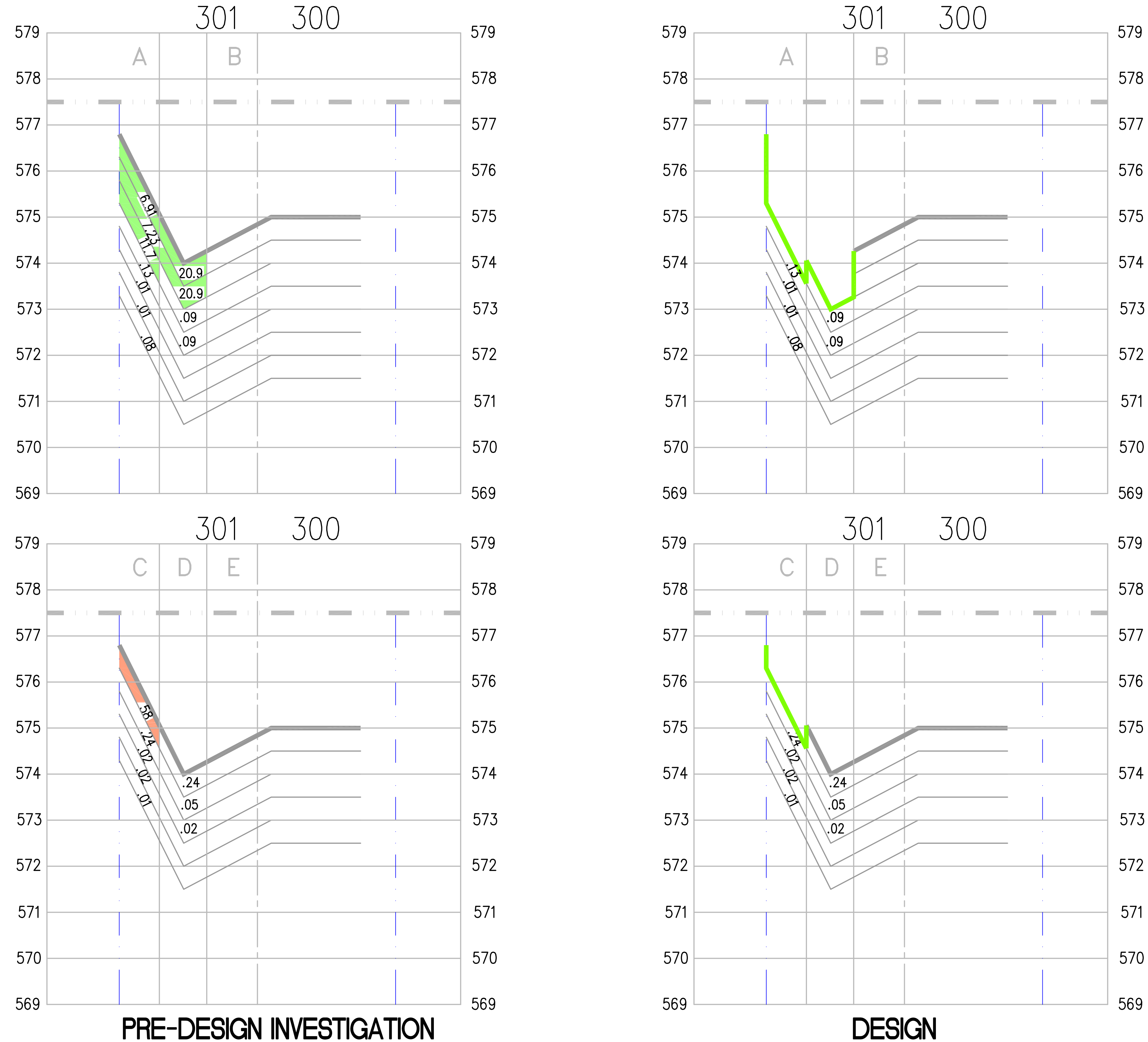
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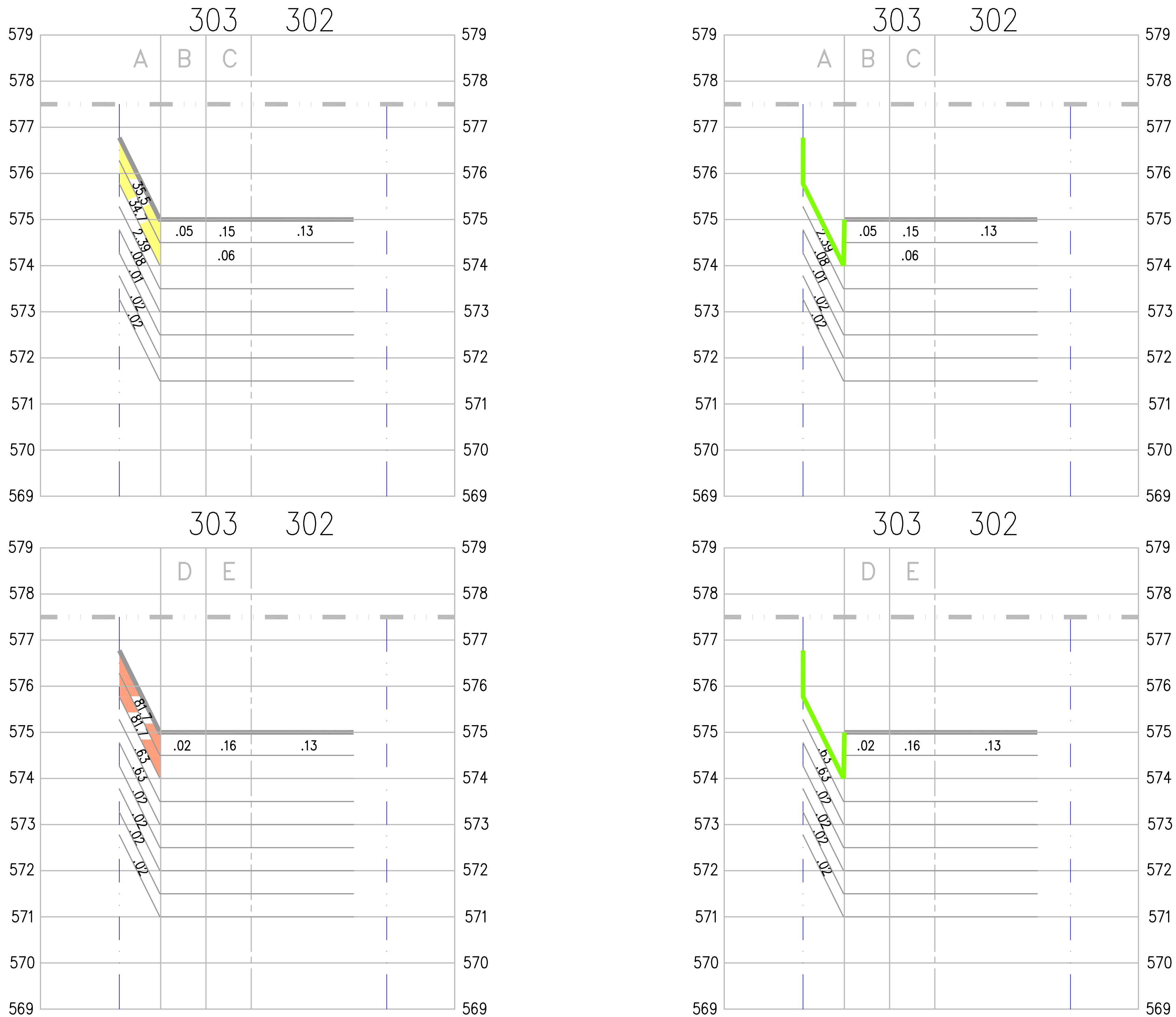

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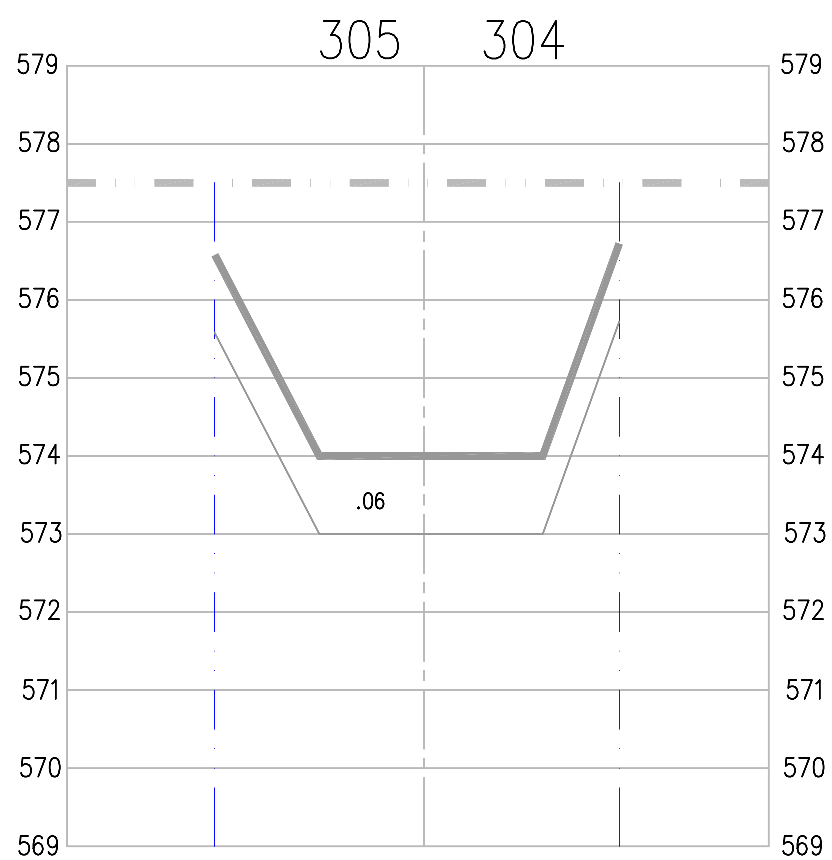

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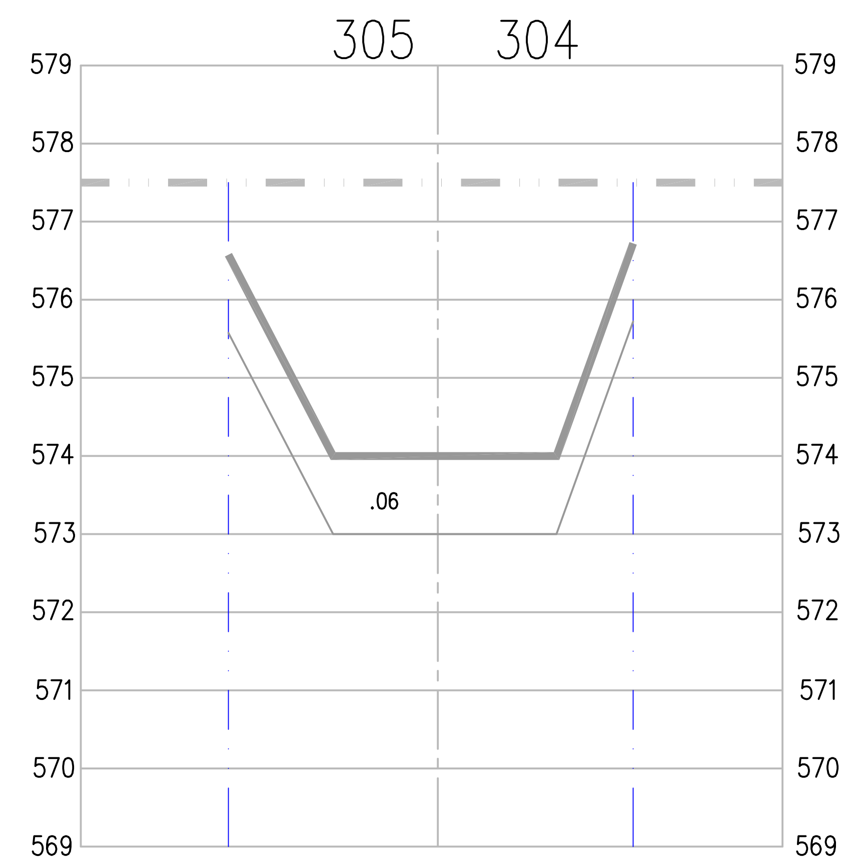

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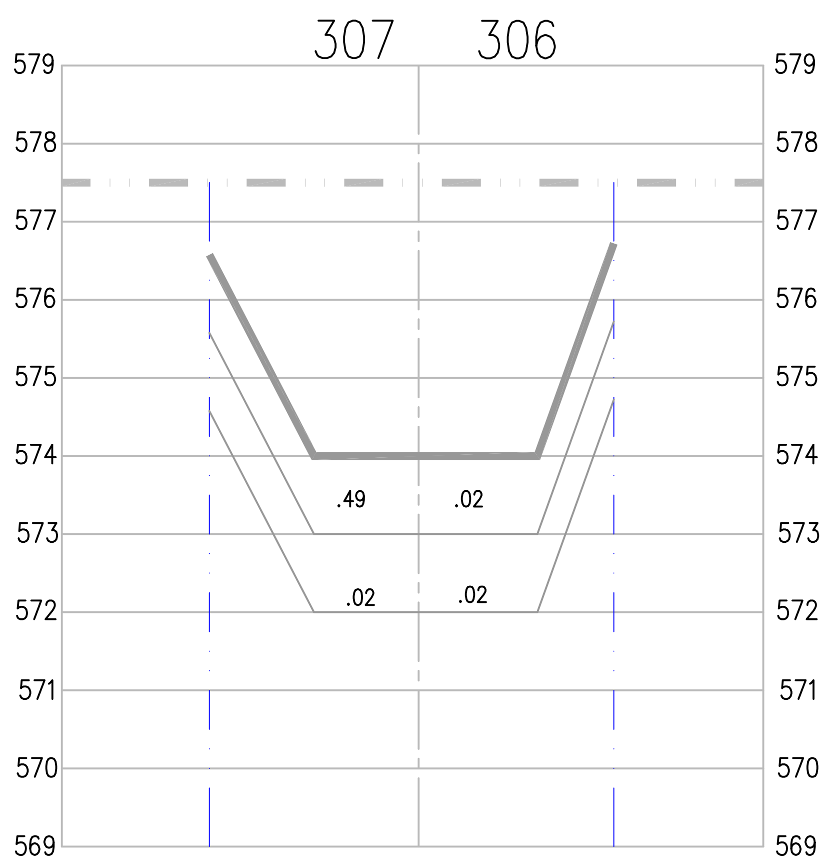

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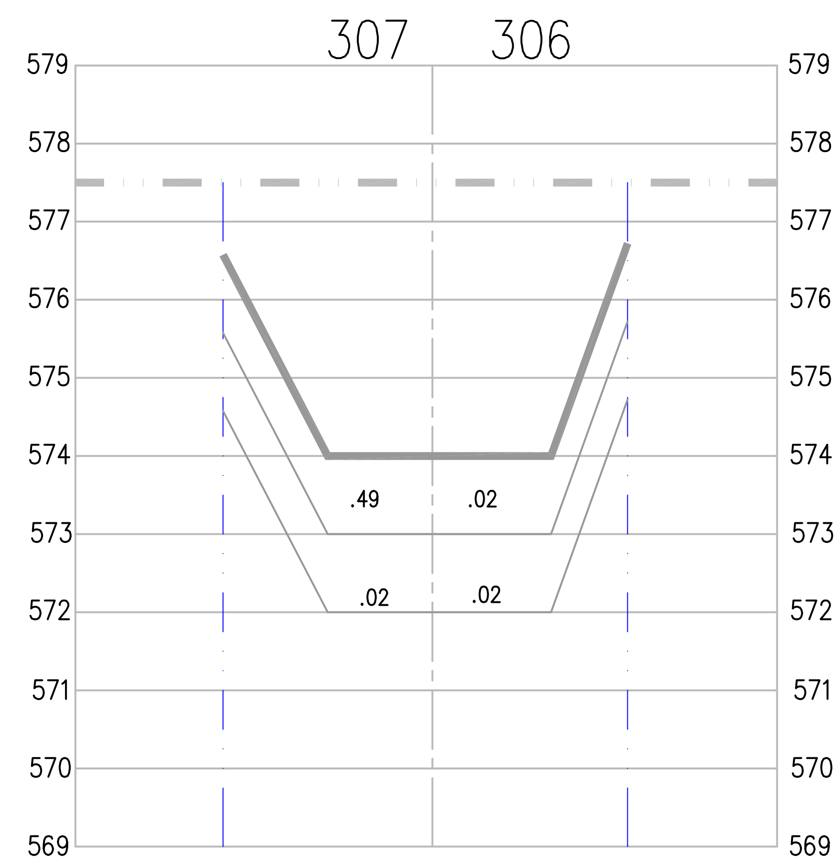

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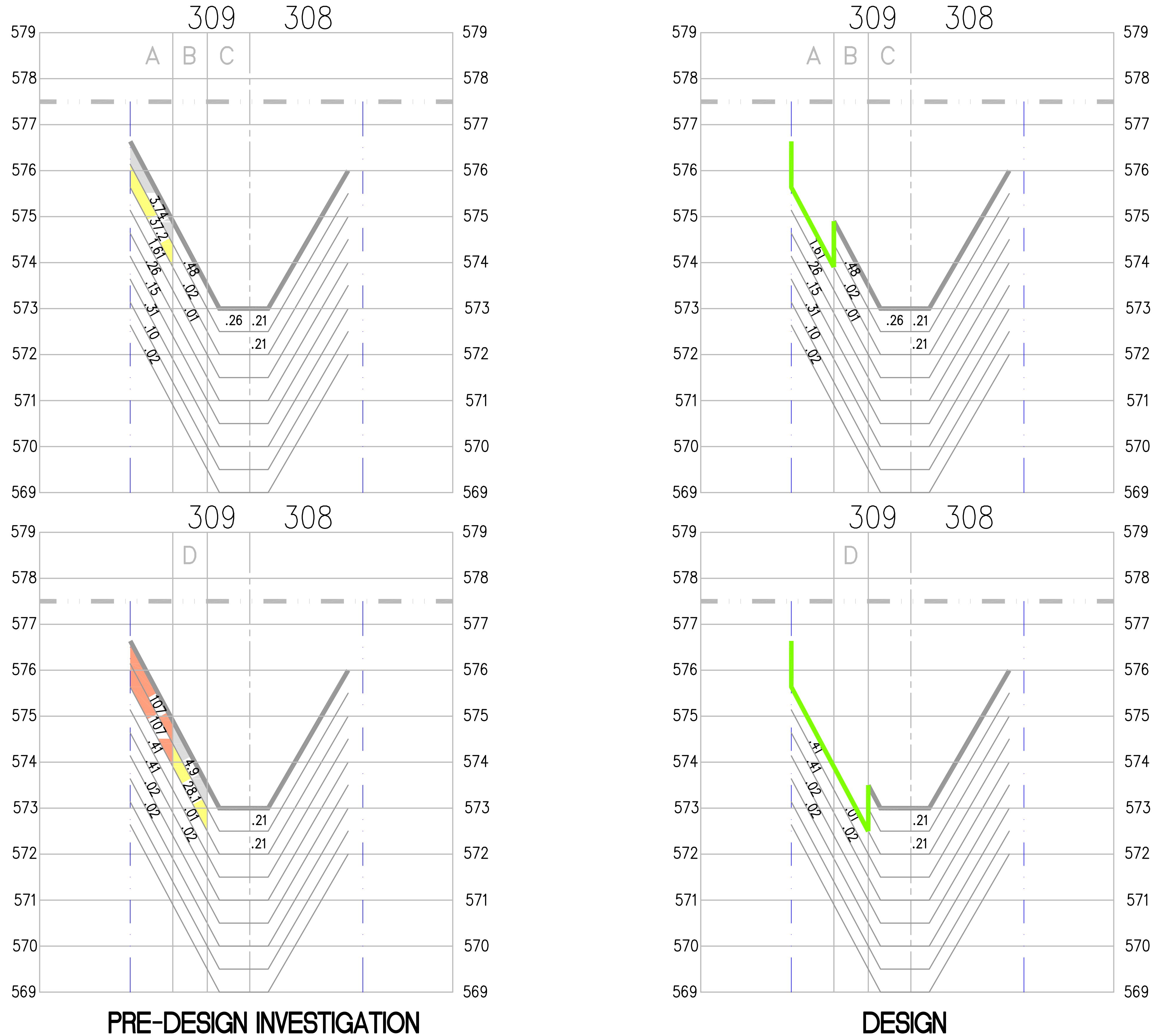

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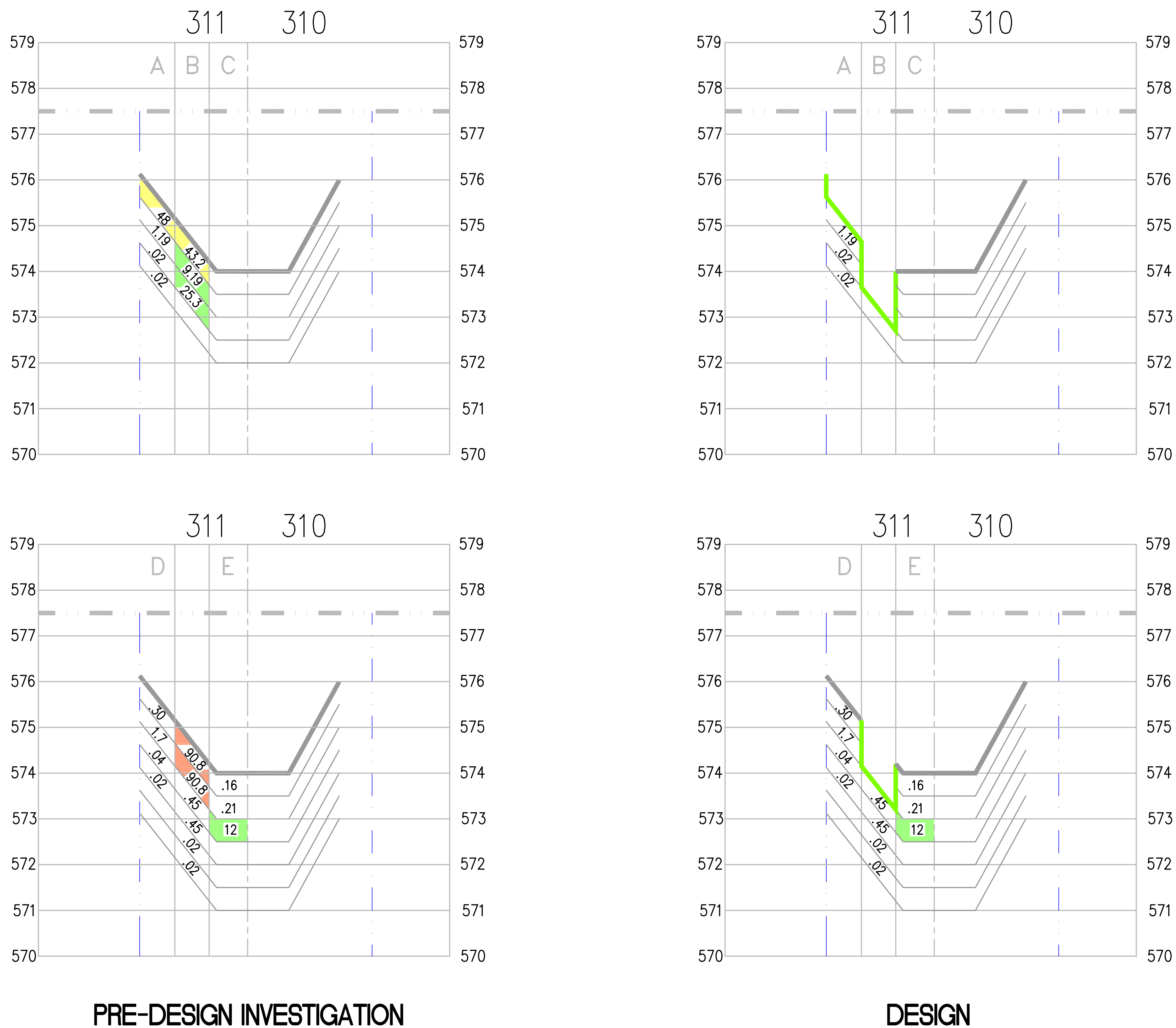

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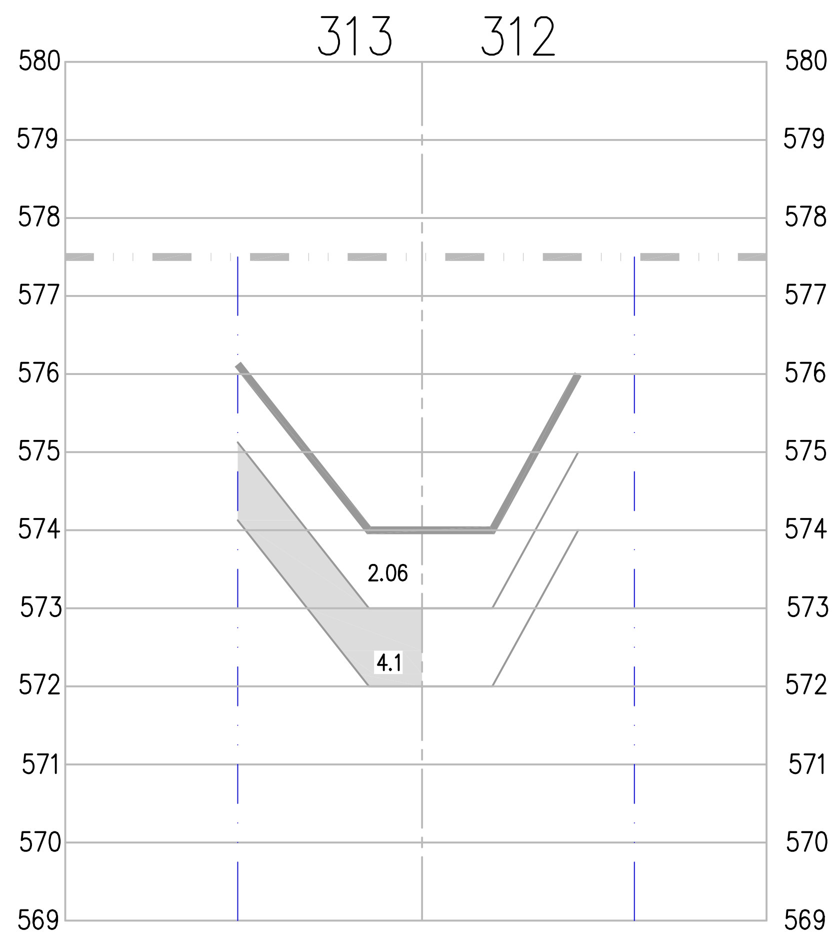

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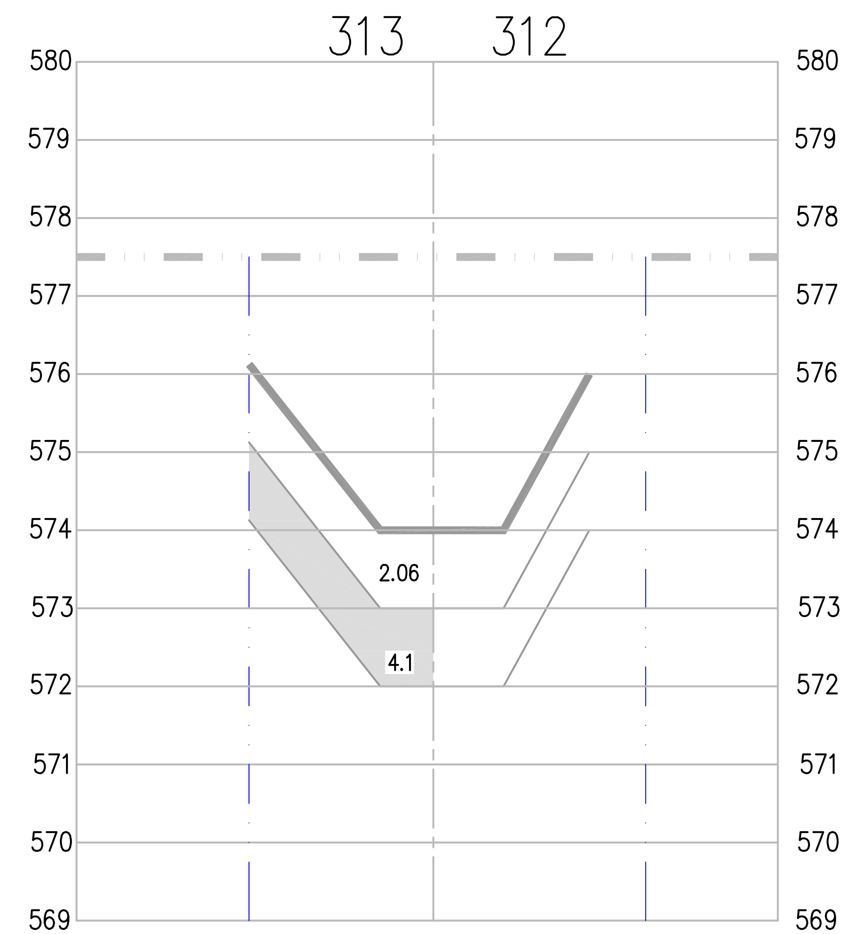

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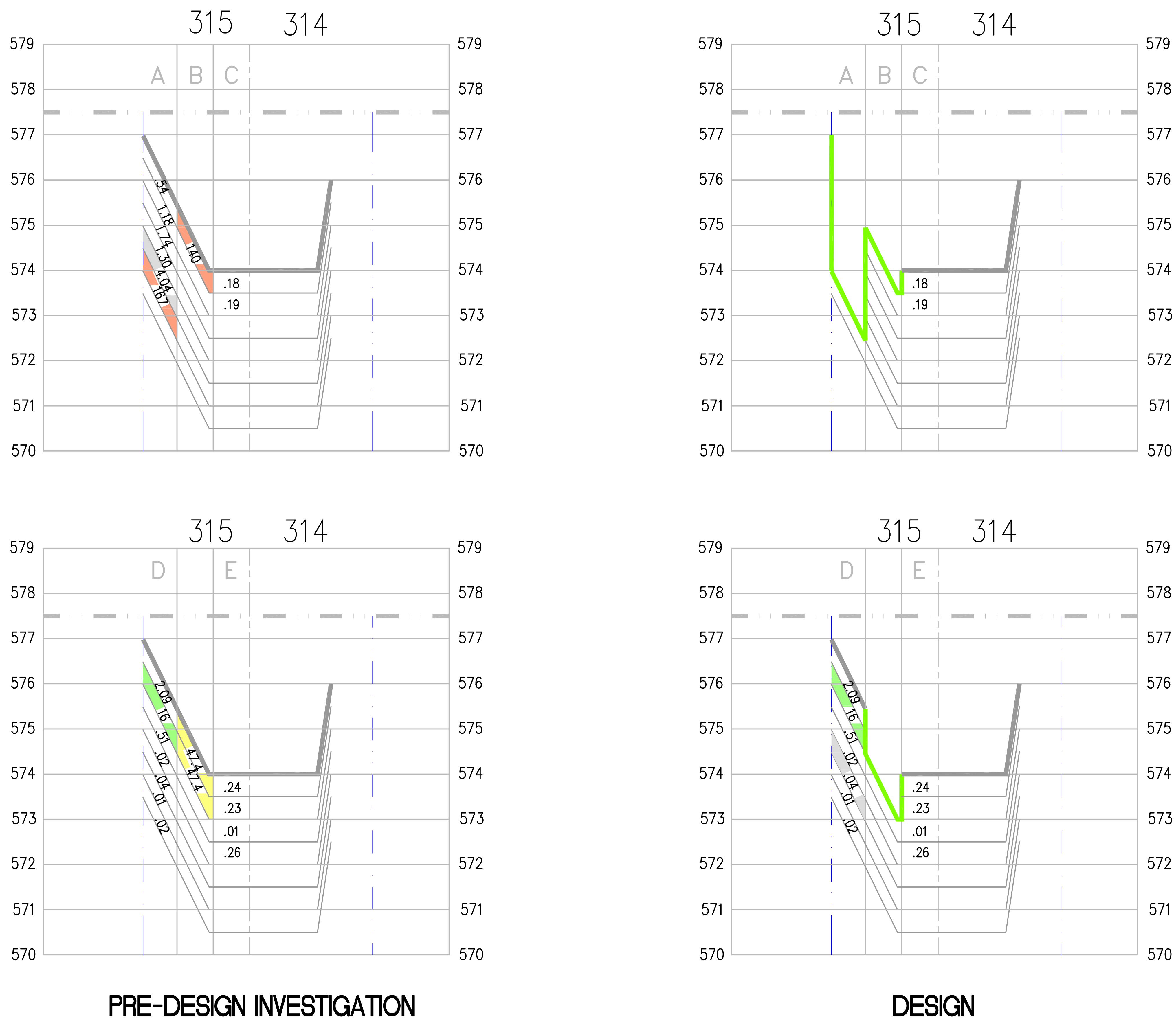
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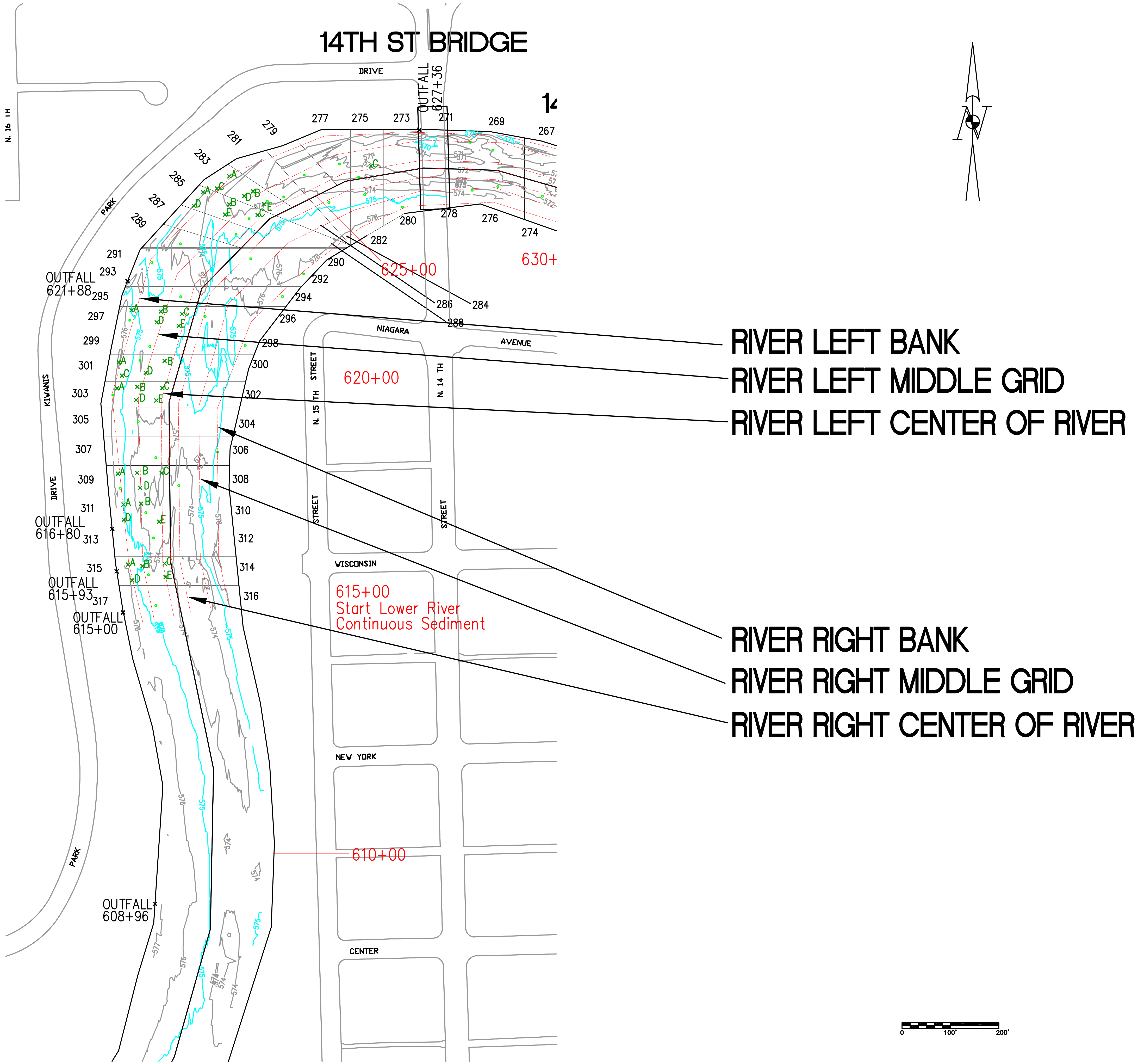


FILE NAME:
DRAWN BY: KDA
DATE: NOV 2008

SIGNATURES
BY | DATE
APPROVED
REVIEWED
DESIGNED

REVISIONS
NO. | BY | DATE

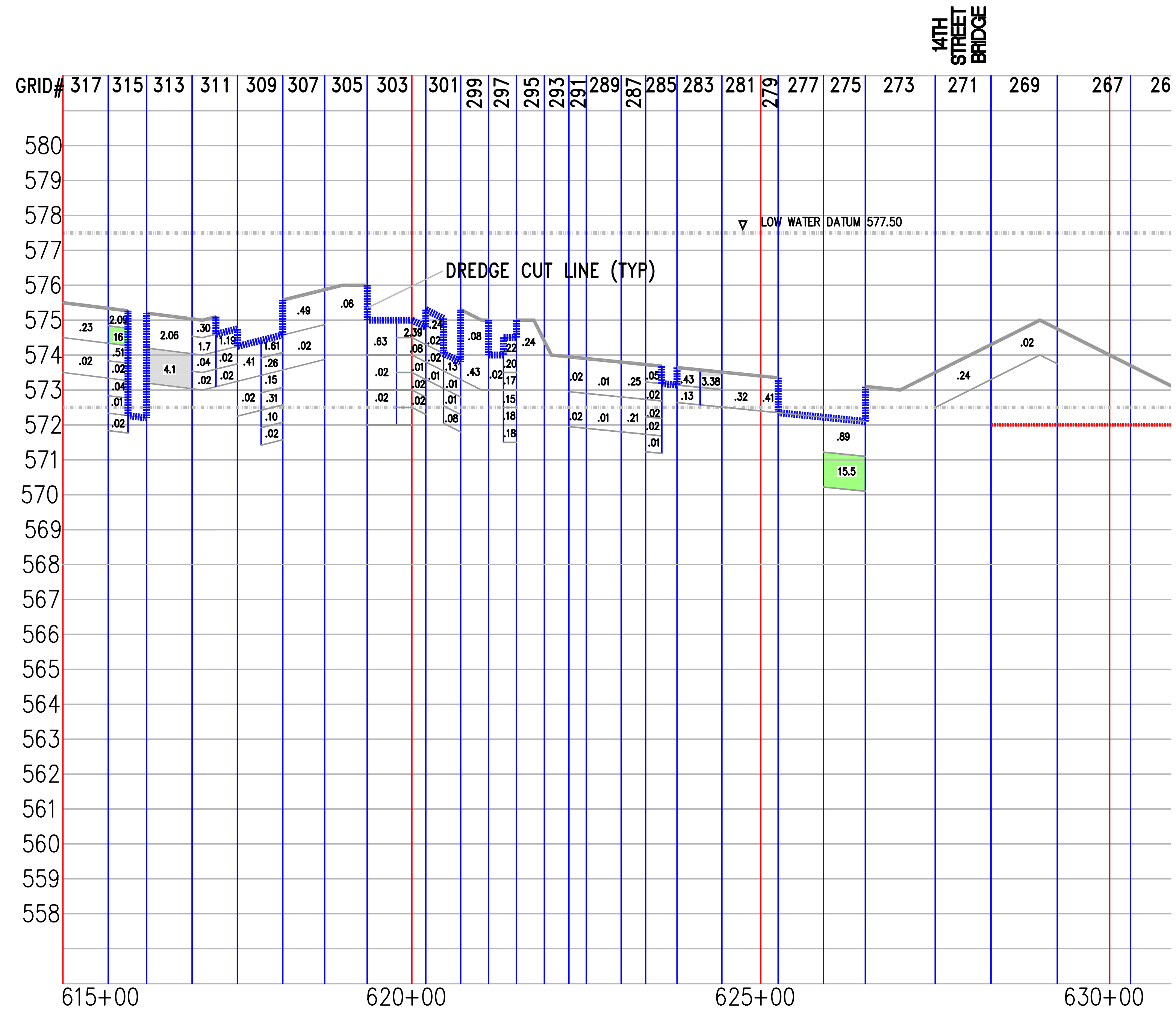
PRS Pollution Risk Services
7870 East Kemper Road, Suite 240
Cincinnati, Ohio 45249
Phone: 513-489-2793
Fax: 513-489-2794

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SHEBOYGAN FALLS, WISCONSIN

KEY MAP

Scale: shown

FIGURE NO. 1



RIVER LEFT BANK

0 100' 200'

FILE NAME:
DRAWN BY: KDA DATE: NOV 2008

SIGNATURES
BY DATE
APPROVED
REVIEWED
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REVISIONS
NO. BY DATE

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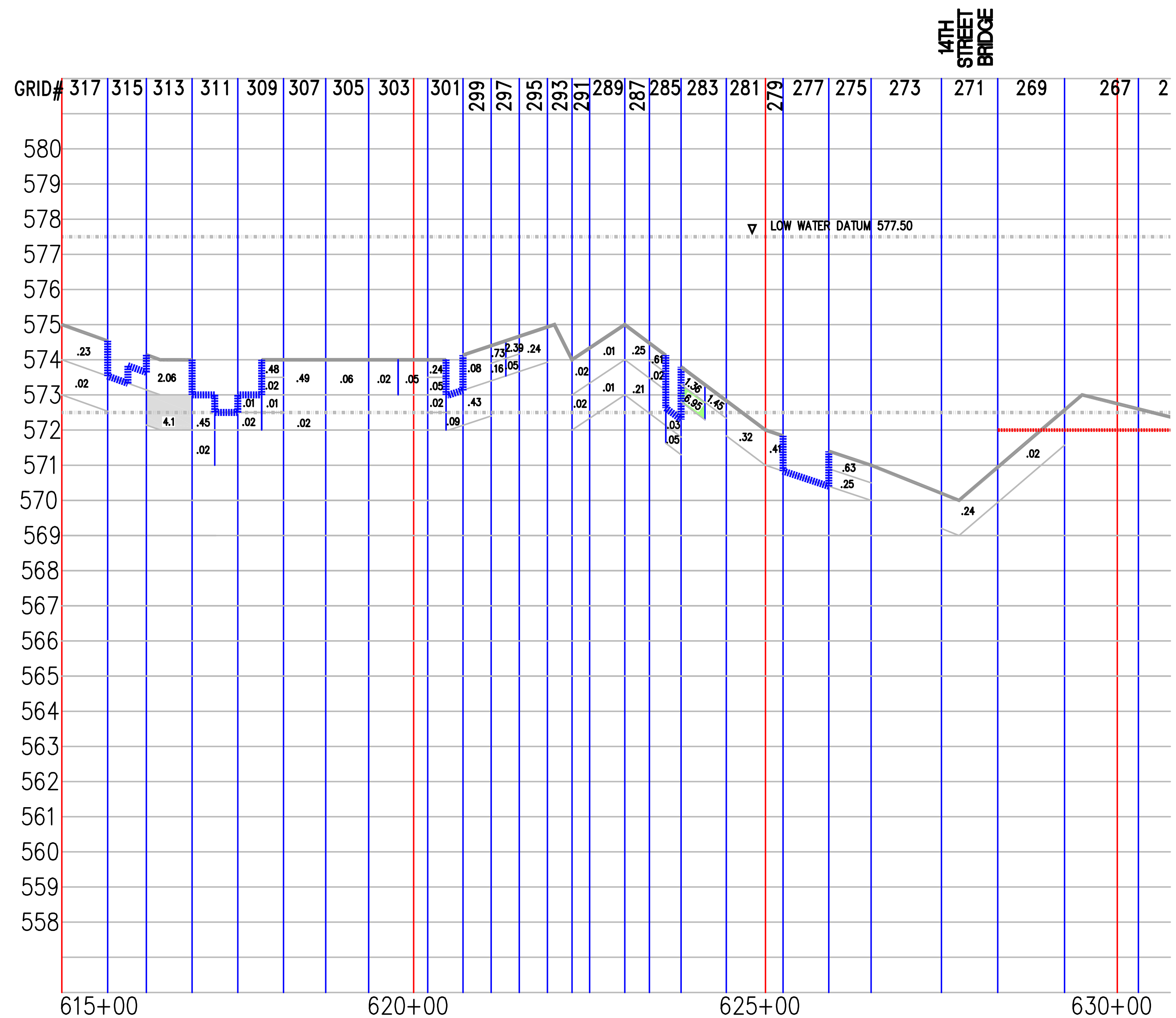
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SHEBOYGAN FALLS, WISCONSIN

PROFILE

Scale: shown

FIGURE NO. 2



RIVER LEFT MIDDLE GRID

0 100' 200'

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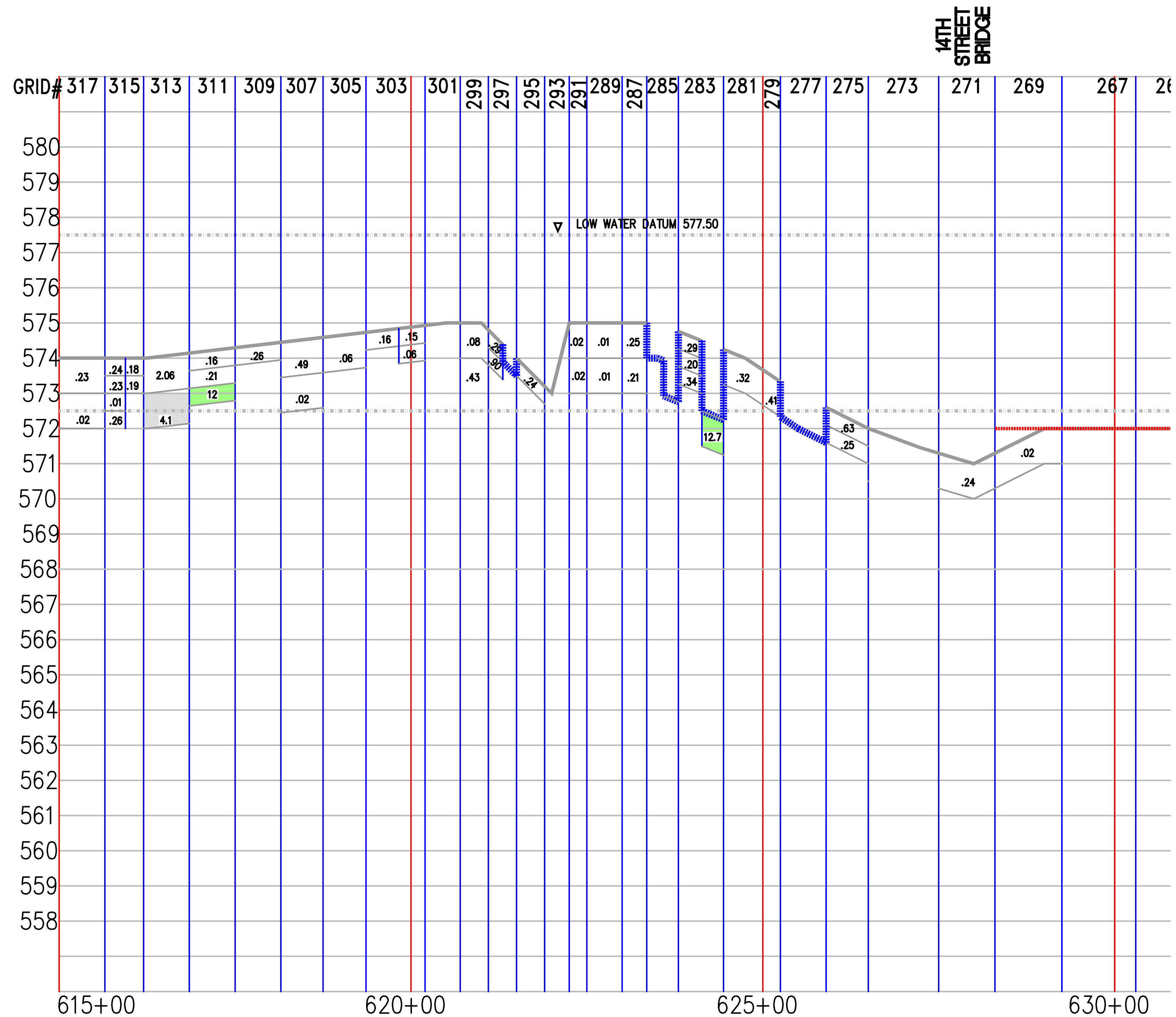
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SHEBOYGAN FALLS, WISCONSIN

PROFILE

Scale: shown

FIGURE NO. 3



RIVER LEFT CENTER OF RIVER

0 100' 200'

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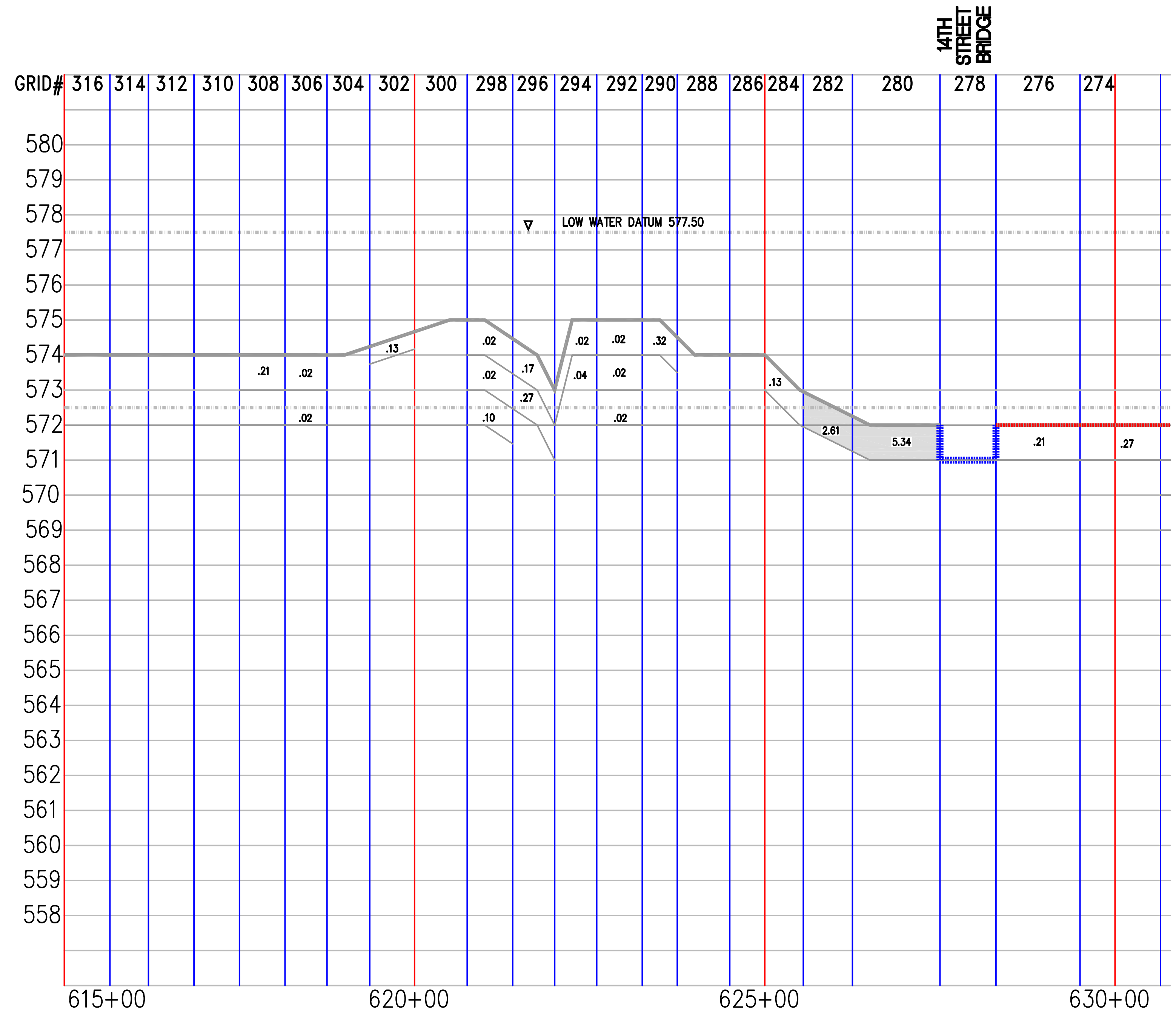
PROFILE

Scale: shown

FIGURE NO.
4



RIVER RIGHT CENTER OF RIVER

0 100' 200'

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SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
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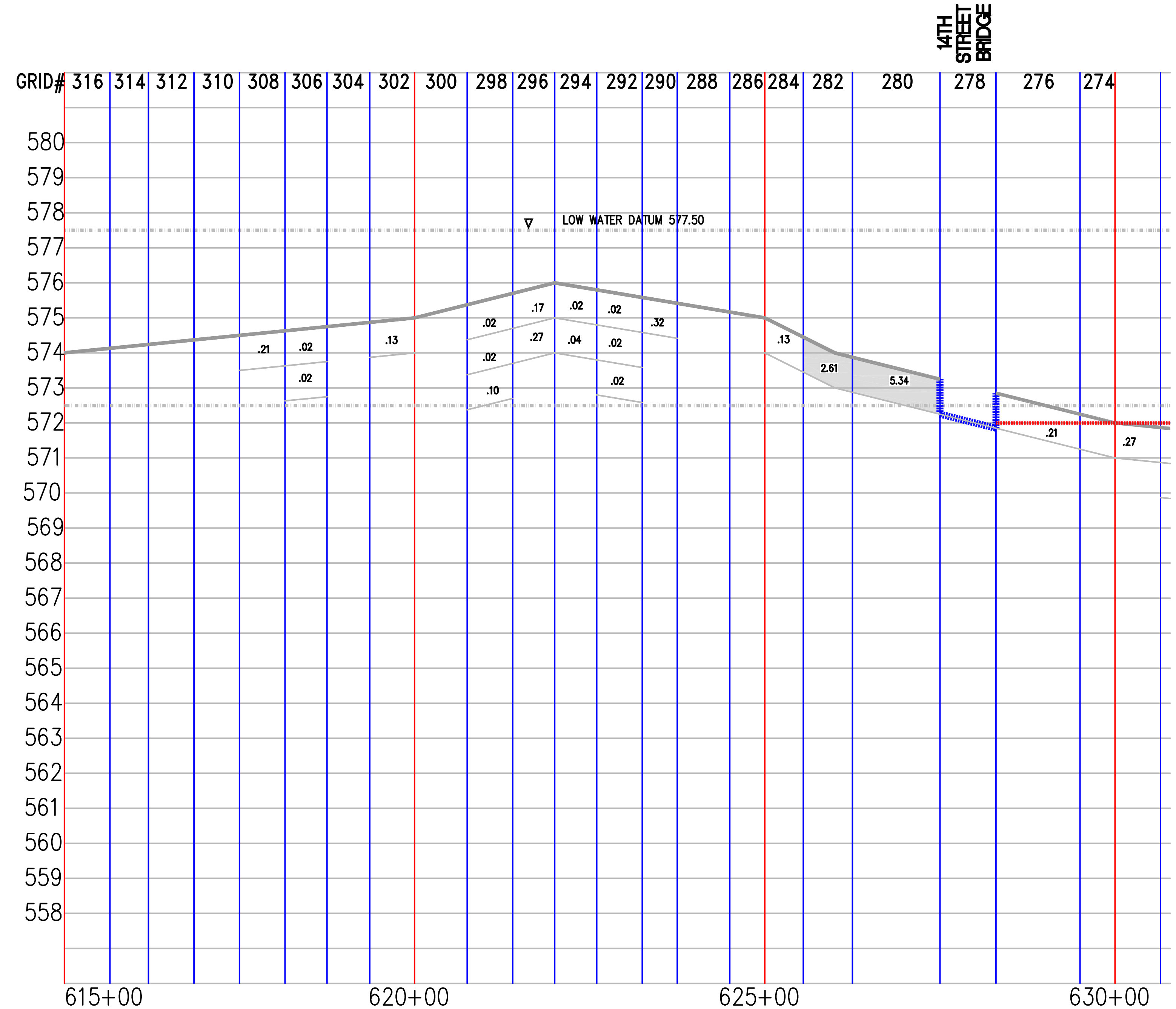
PROFILE

Scale: shown

FIGURE NO.
5



RIVER RIGHT MIDDLE GRID

0 100' 200'

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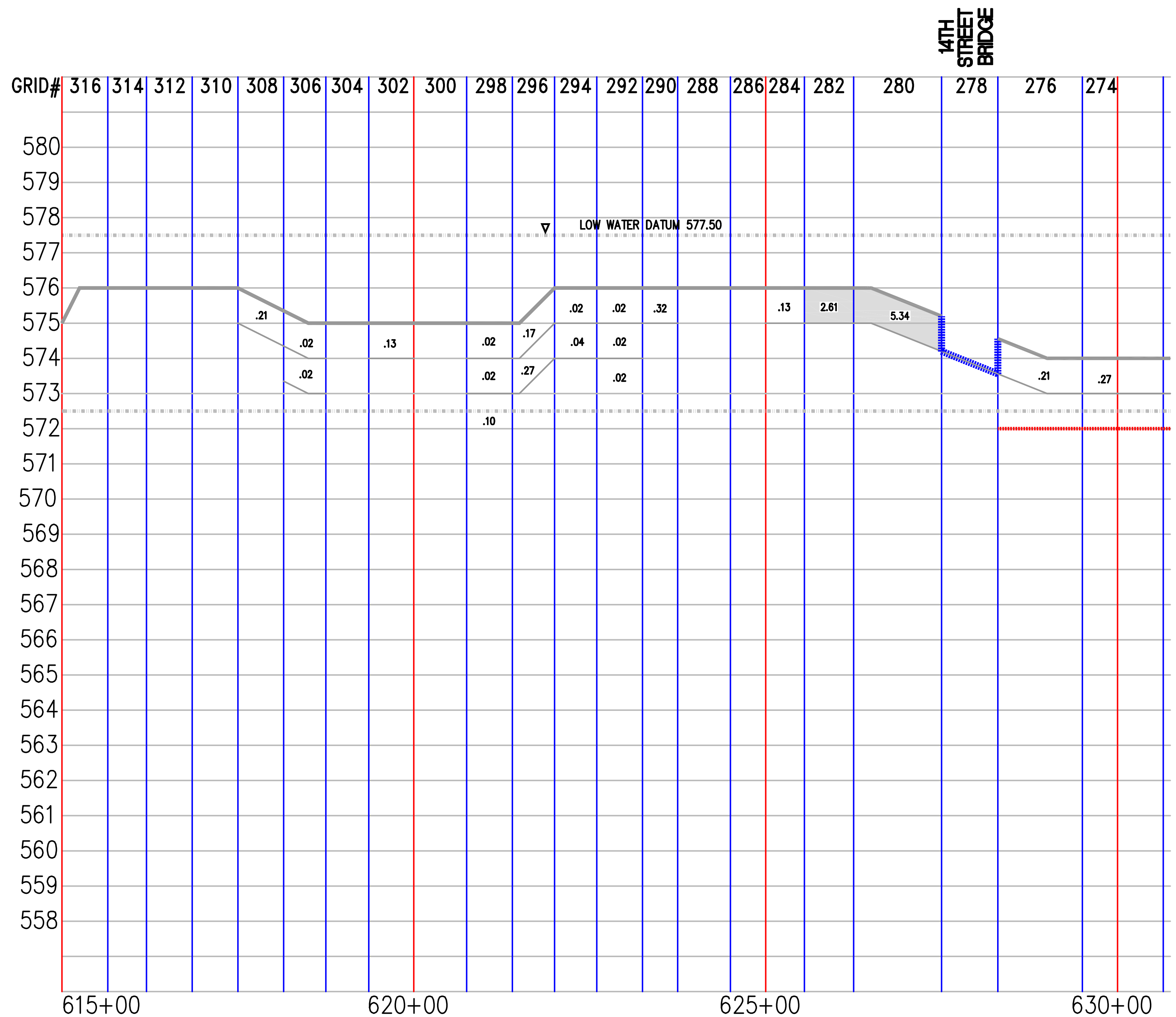
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SHEBOYGAN FALLS, WISCONSIN

PROFILE

Scale: shown

FIGURE NO. 6



RIVER RIGHT BANK

0 100' 200'

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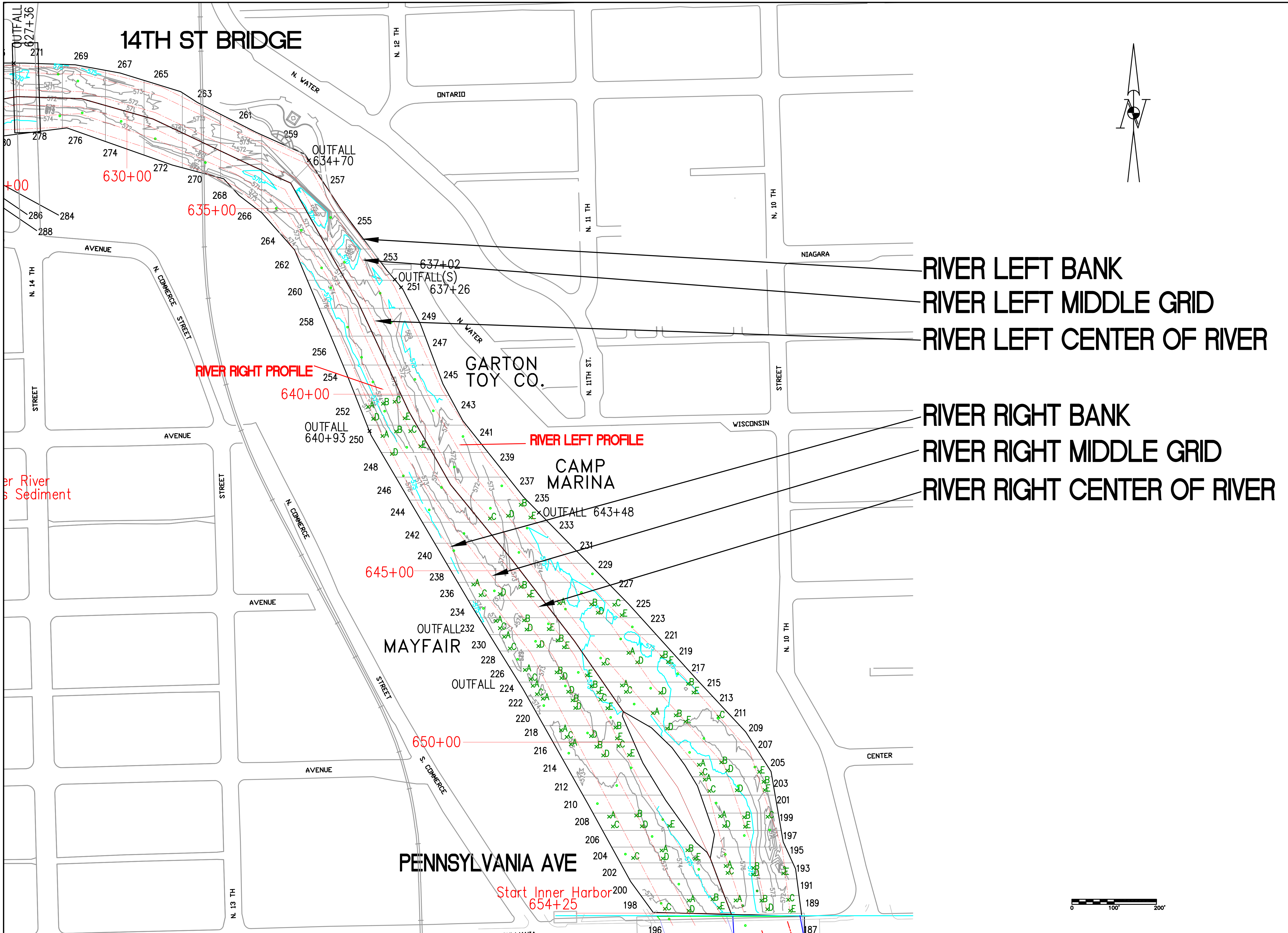
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SHEBOYGAN FALLS, WISCONSIN

PROFILE

Scale: shown

FIGURE NO. 7



SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SHEBOYGAN FALLS, WISCONSIN

KEY MAP

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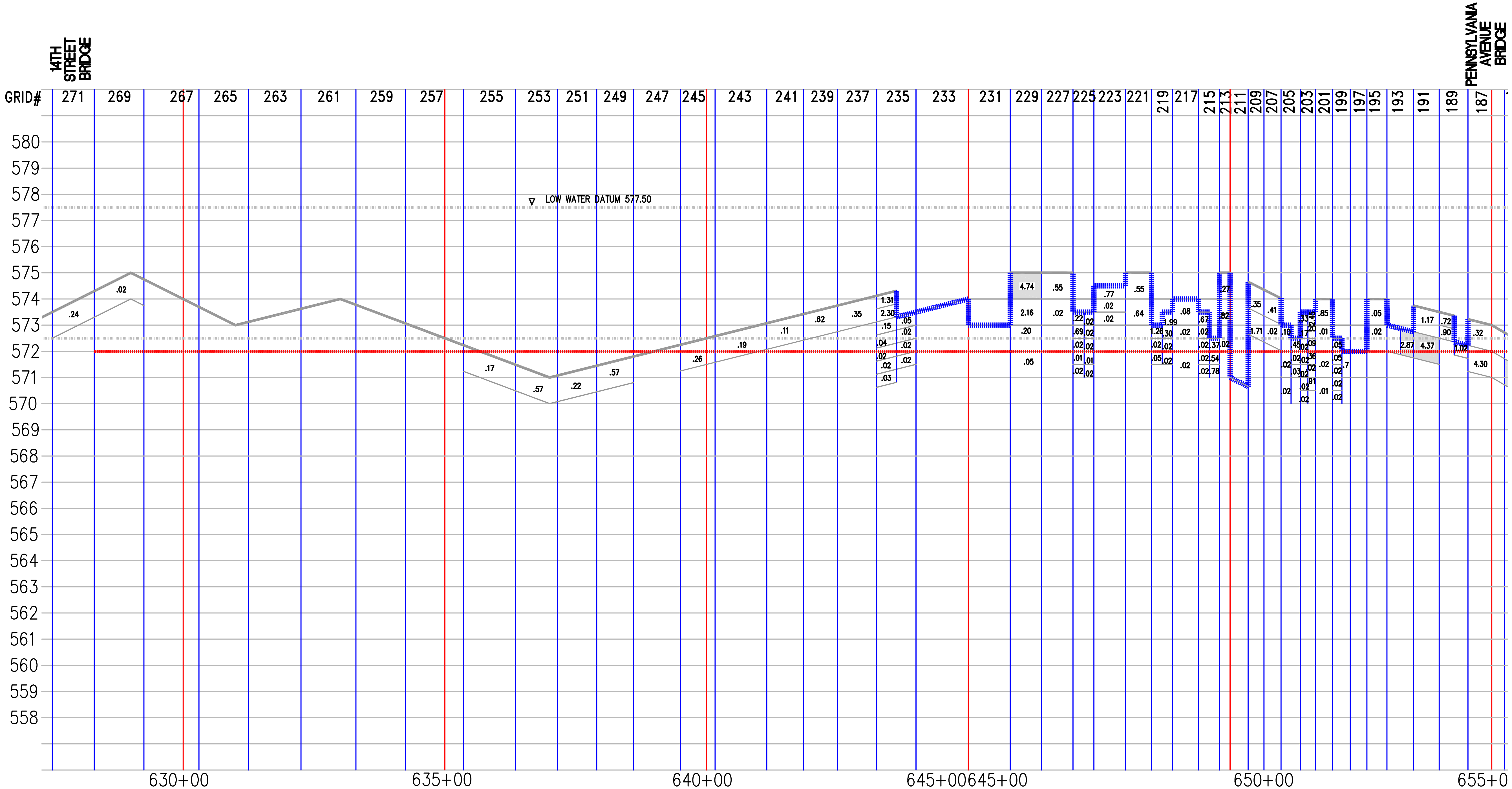
Scale: shown

FIGURE NO. 8



RIVER LEFT BANK

0 100' 200'

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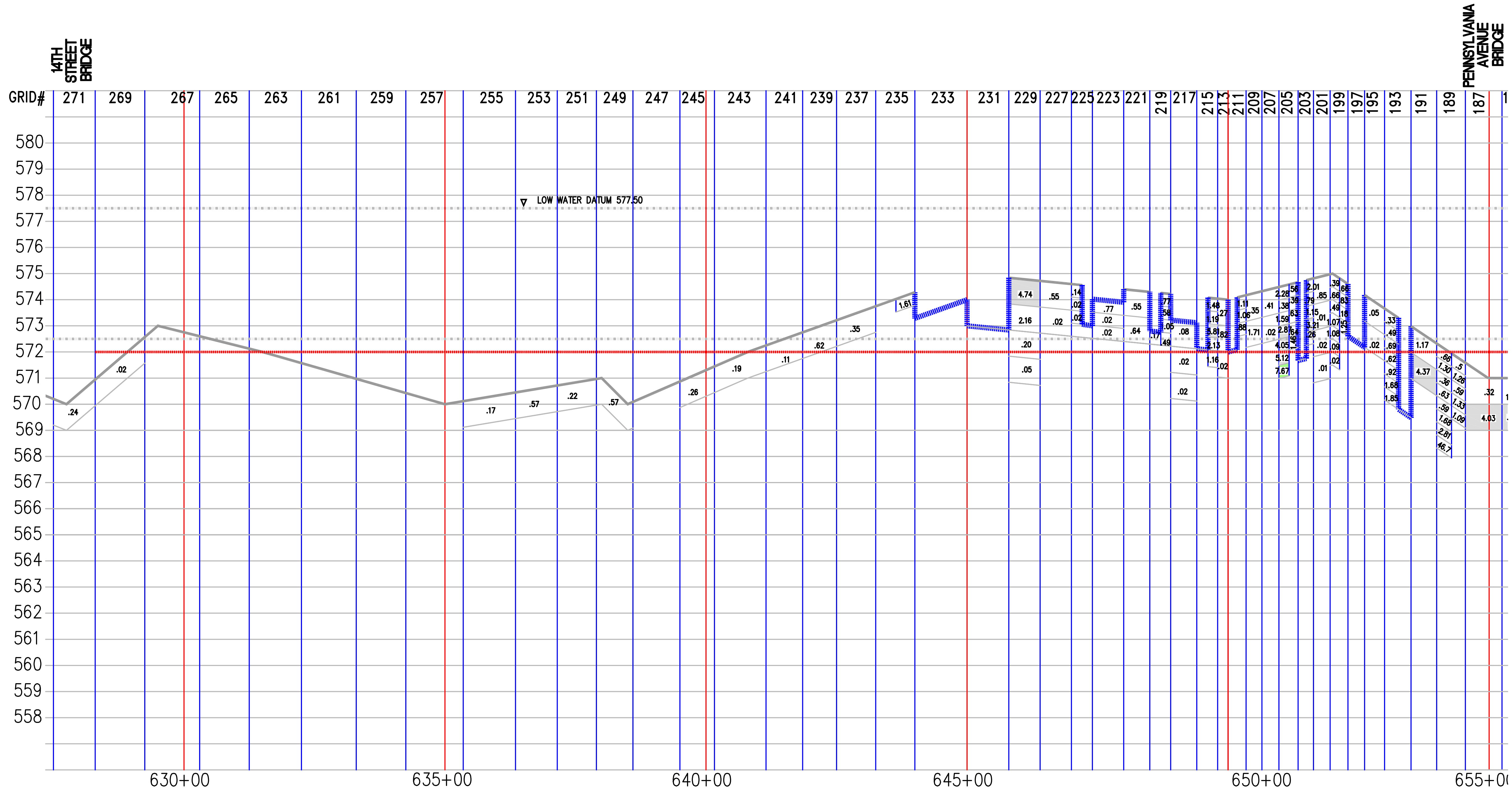
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SHEBOYGAN FALLS, WISCONSIN

PROFILE

Scale: shown

FIGURE NO.
9



RIVER LEFT MIDDLE GRID

0 100' 200'

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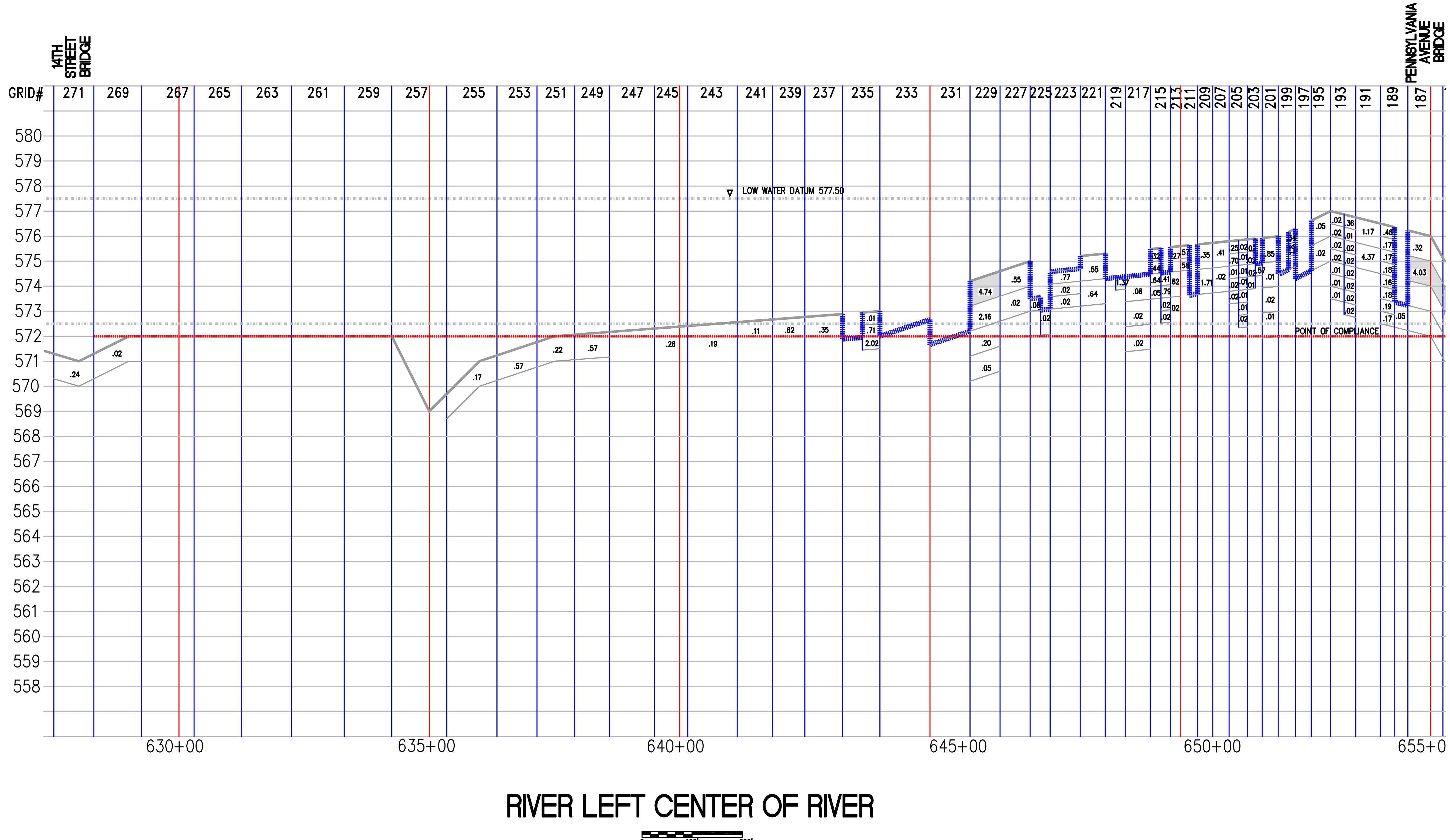
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SHEBOYGAN FALLS, WISCONSIN

PROFILE

Scale: shown

FIGURE NO. 10



RIVER LEFT CENTER OF RIVER

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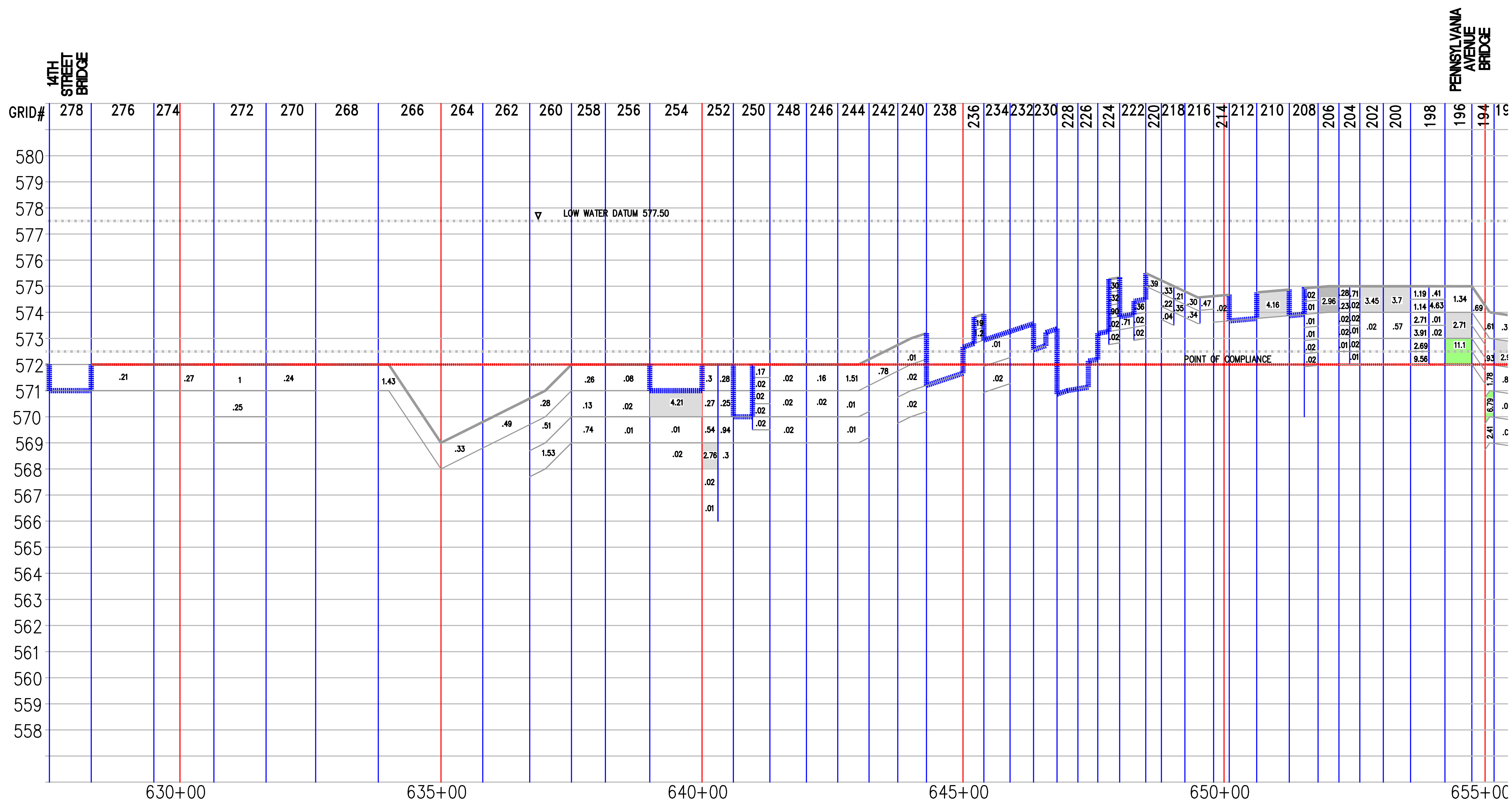
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SHEBOYGAN FALLS, WISCONSIN

PROFILE

Scale: shown

FIGURE NO. 11



RIVER RIGHT CENTER OF RIVER

0 100' 200'

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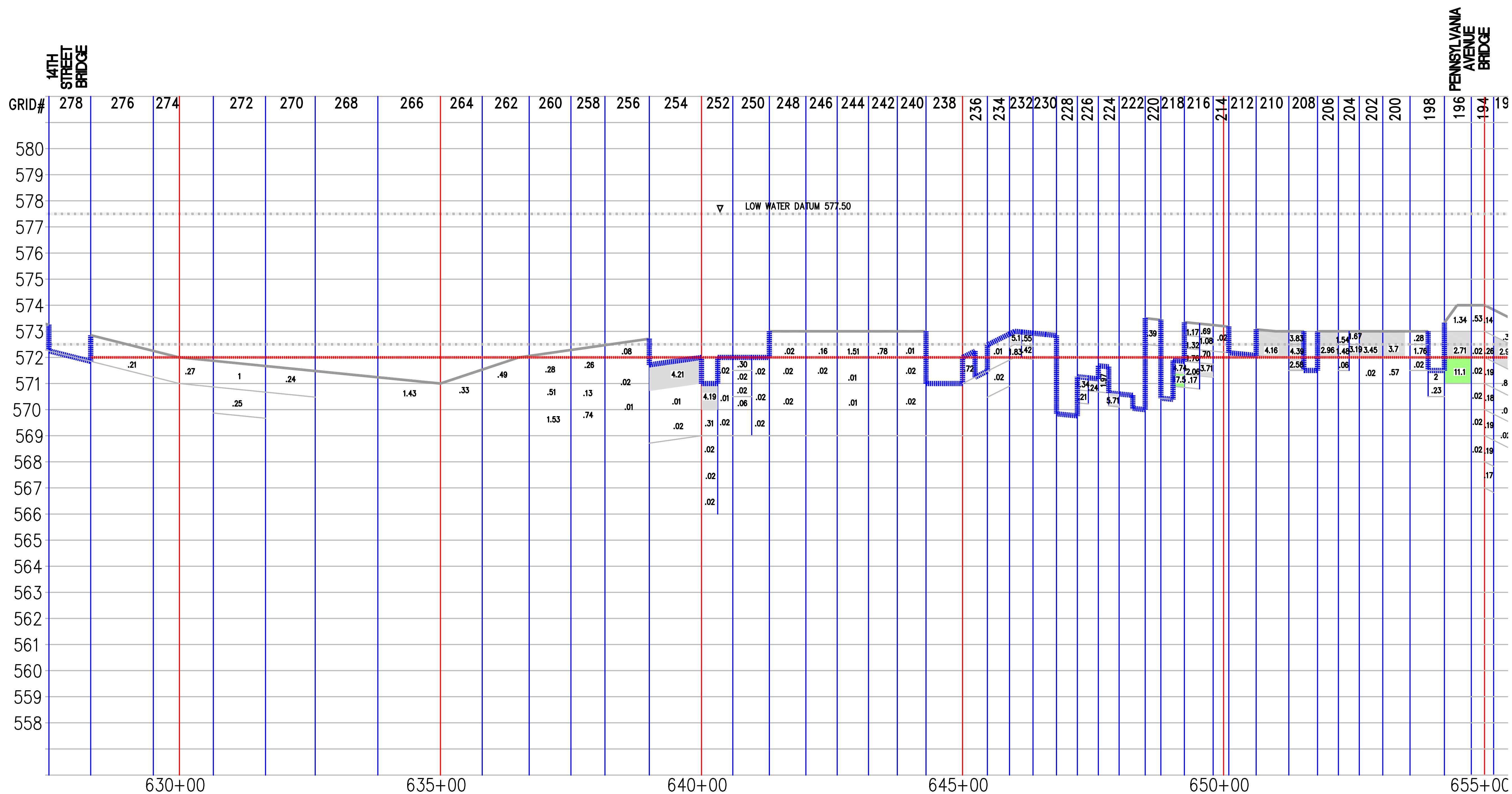
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SHEBOYGAN FALLS, WISCONSIN

PROFILE

Scale: shown

FIGURE NO. 12



RIVER RIGHT MIDDLE GRID

0 100' 200'

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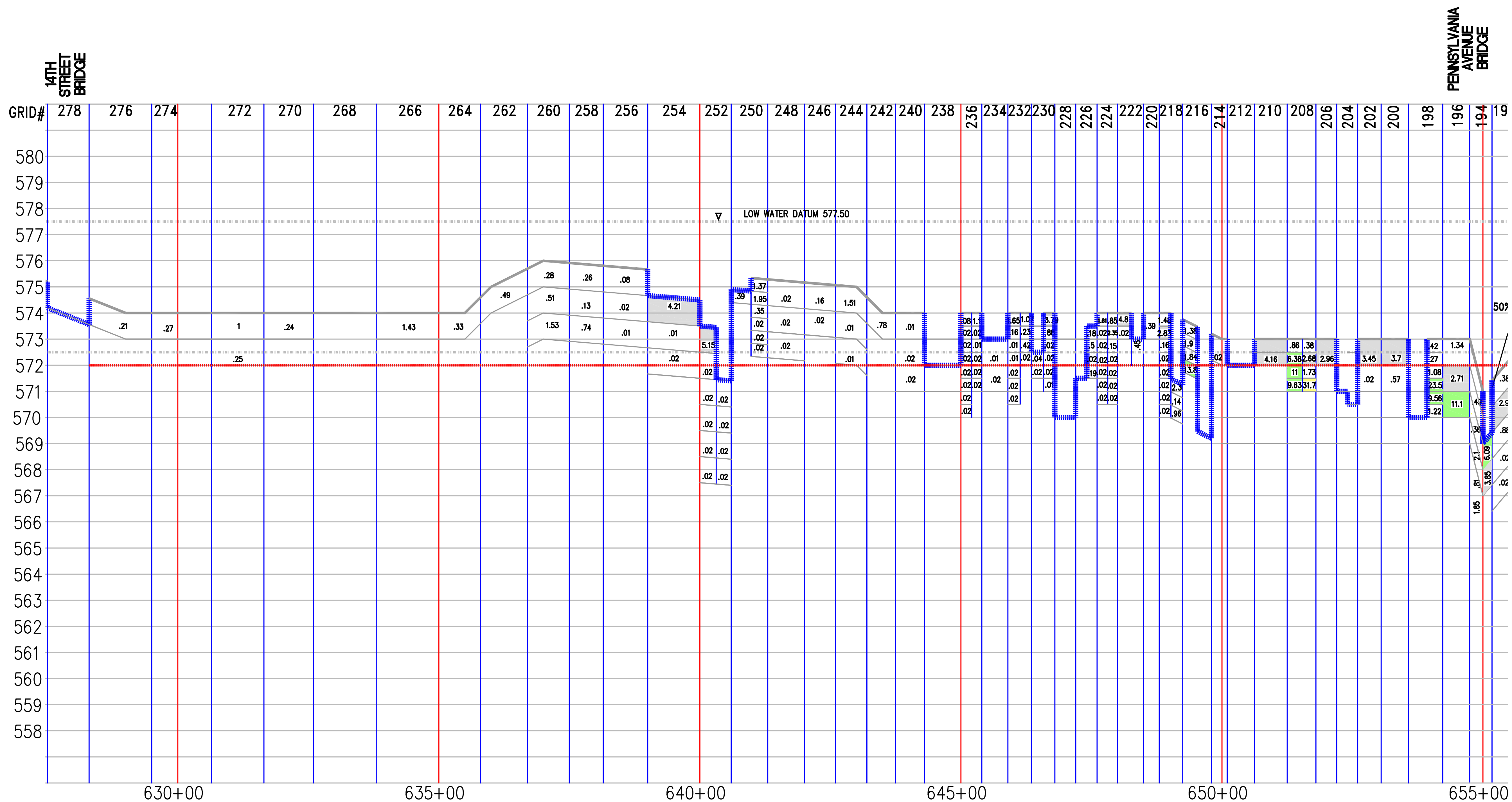
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SHEBOYGAN FALLS, WISCONSIN

PROFILE

Scale: shown

FIGURE NO. 13



RIVER RIGHT BANK

0 100' 200'

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SHEBOYGAN FALLS, WISCONSIN

PROFILE

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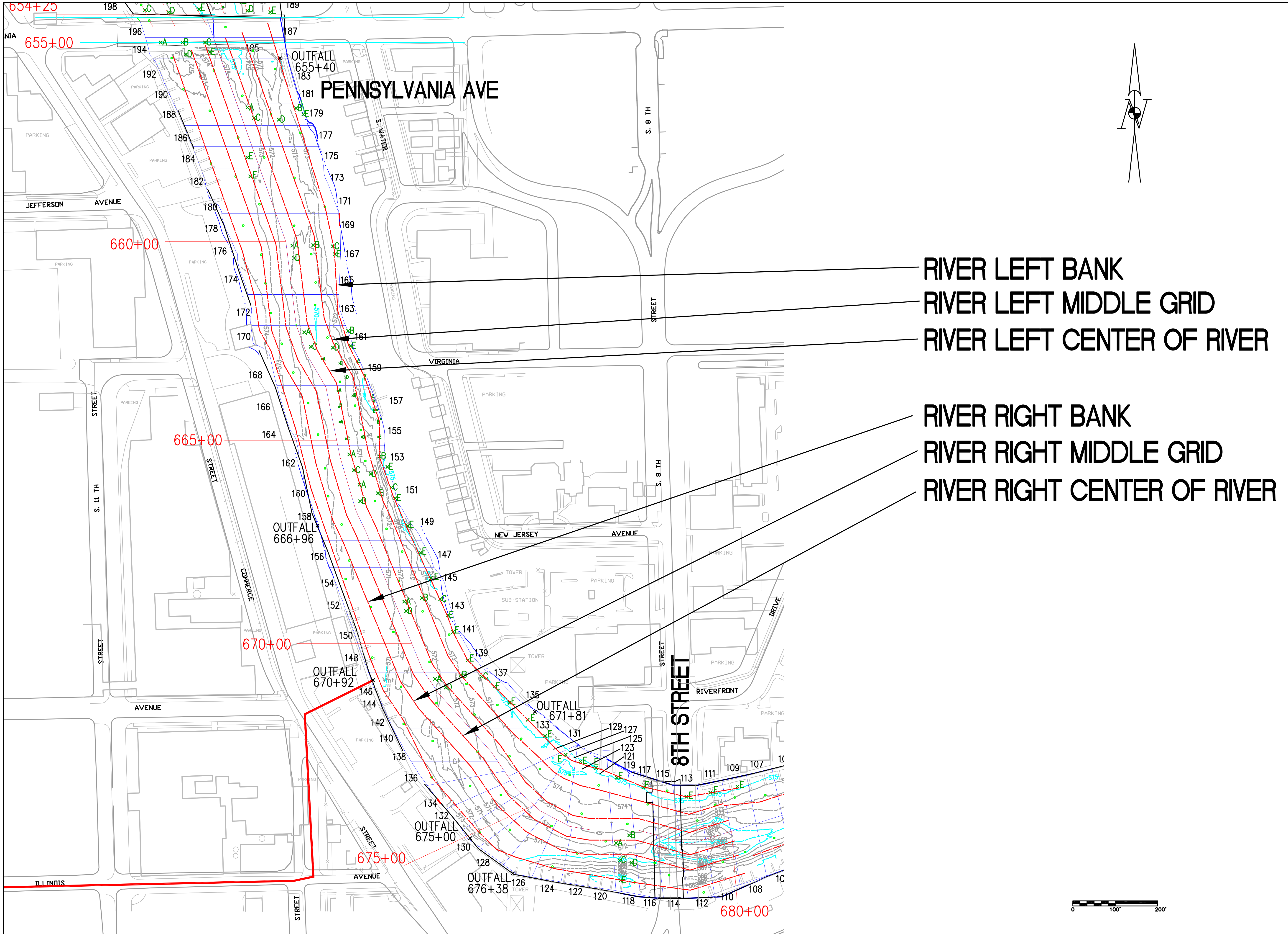
FIGURE NO. 14



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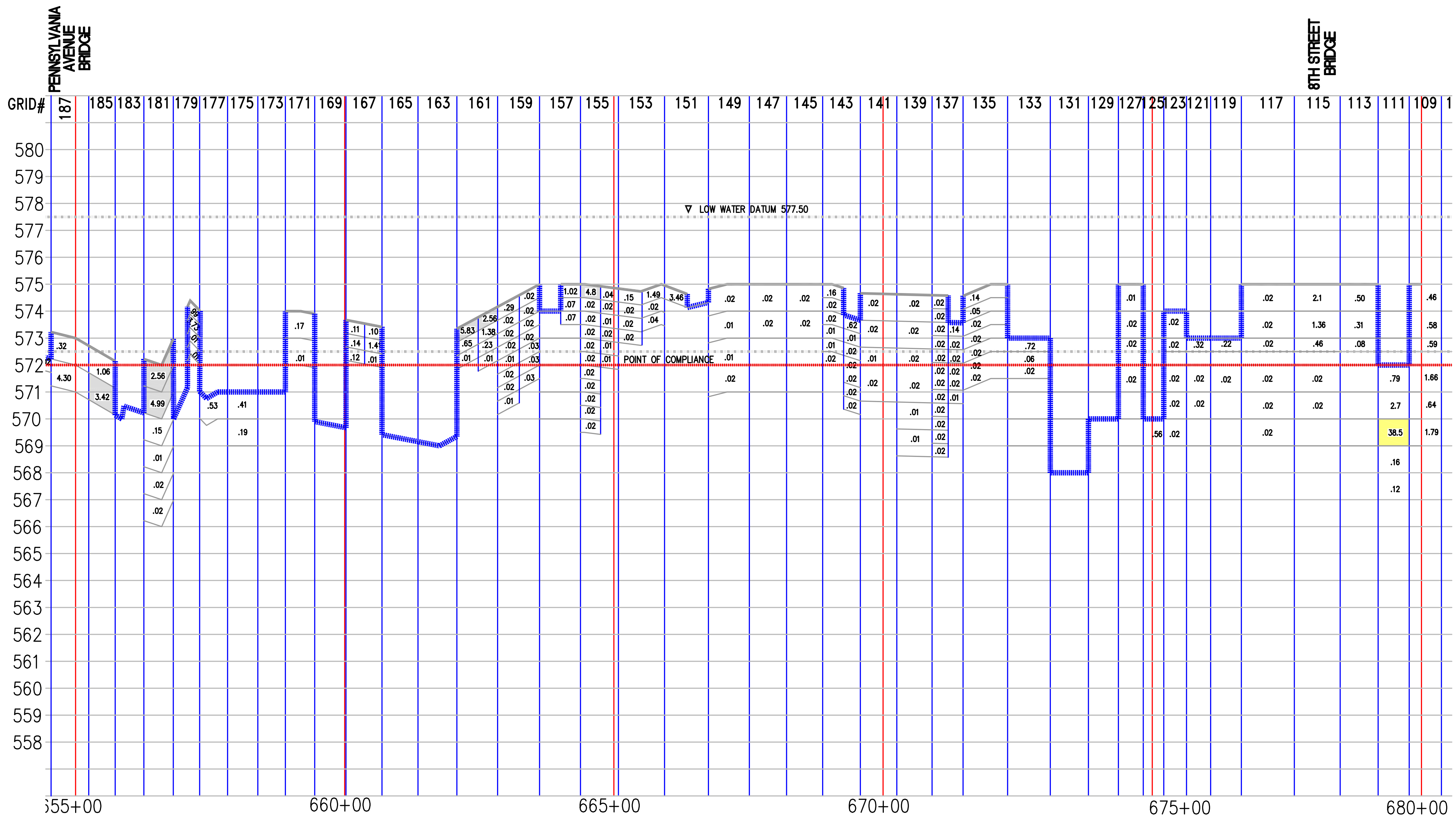
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SHEBOYGAN FALLS, WISCONSIN

KEY MAP

Scale: shown

FIGURE NO. 15



RIVER LEFT BANK

0 100' 200'

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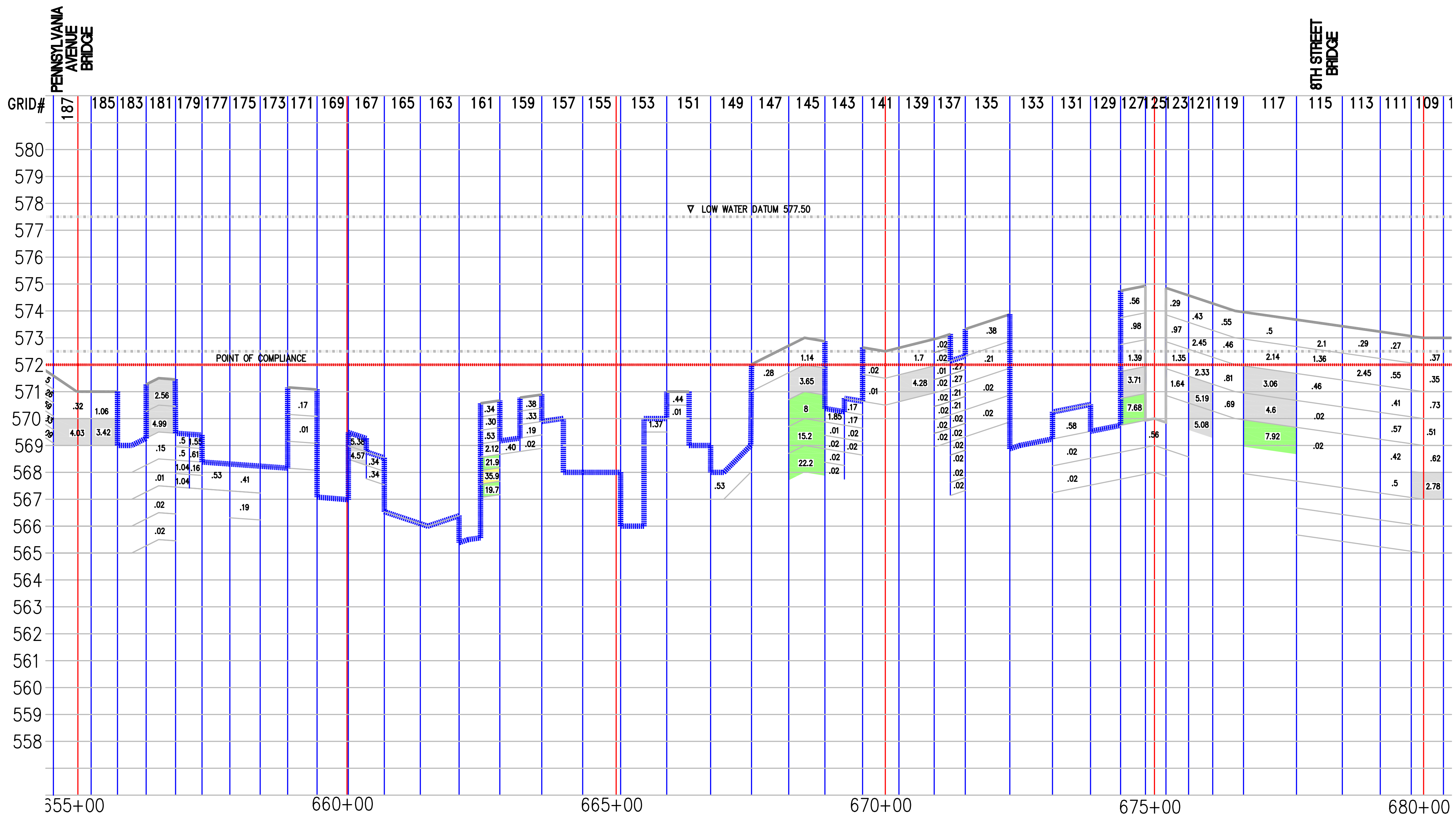
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SHEBOYGAN FALLS, WISCONSIN

PROFILE

Scale: shown

FIGURE NO. 16



RIVER LEFT MIDDLE GRID

0 100' 200'

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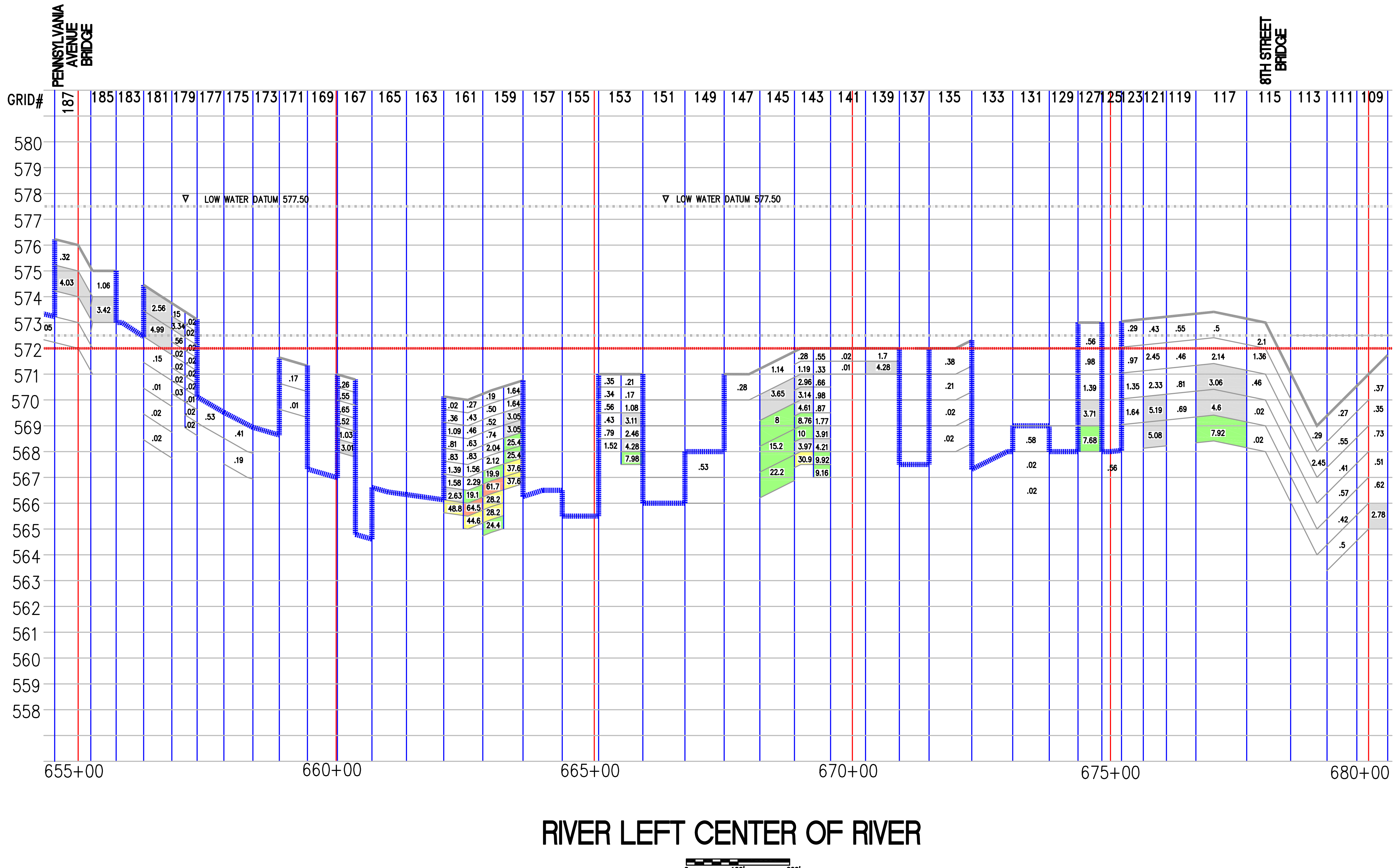
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SHEBOYGAN FALLS, WISCONSIN

PROFILE

Scale: shown

FIGURE NO.
17



RIVER LEFT CENTER OF RIVER

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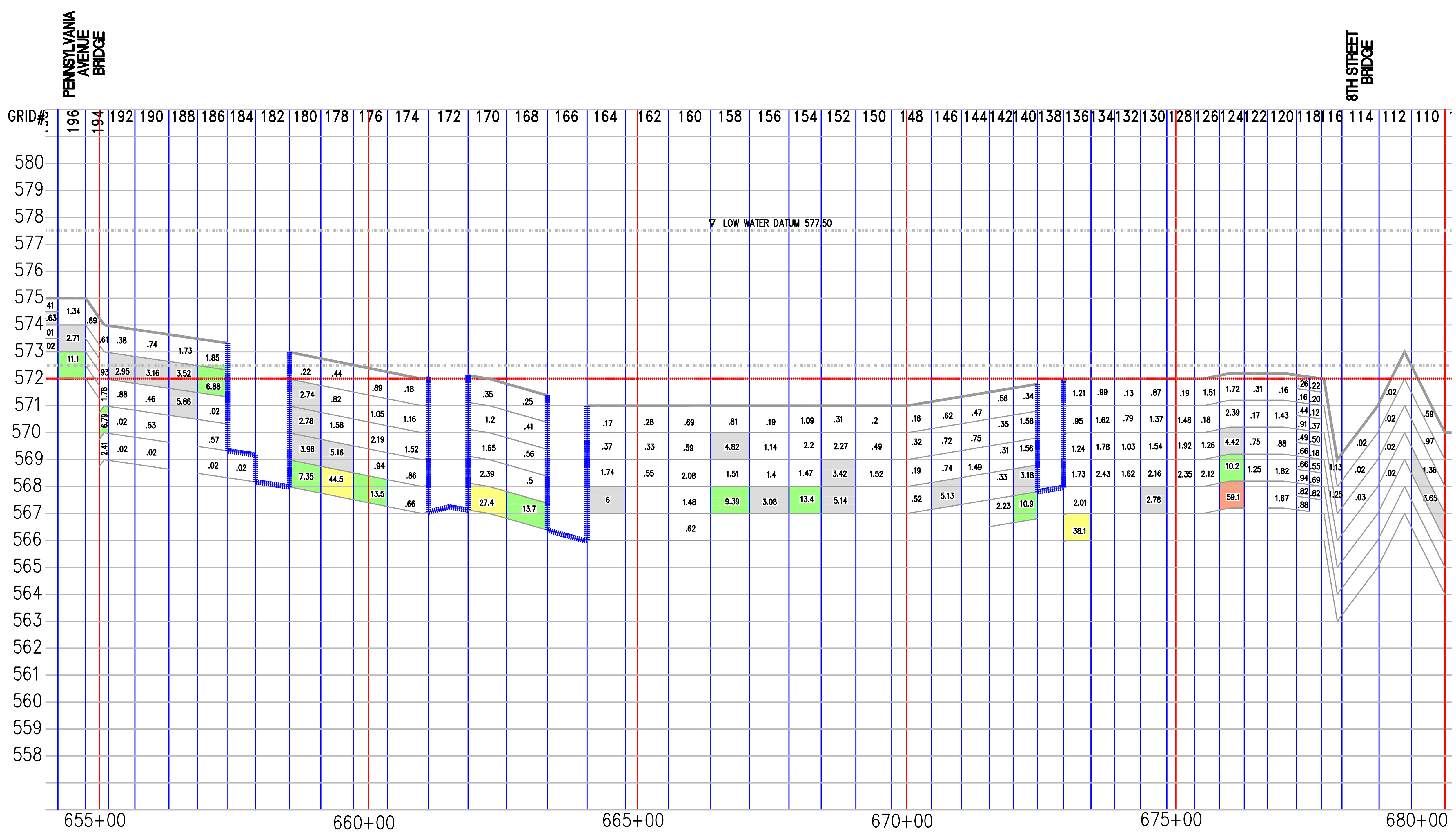
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
SHEBOYGAN FALLS, WISCONSIN

PROFILE

Scale: shown

FIGURE NO. 18



RIVER RIGHT CENTER OF RIVER

0 100' 200'

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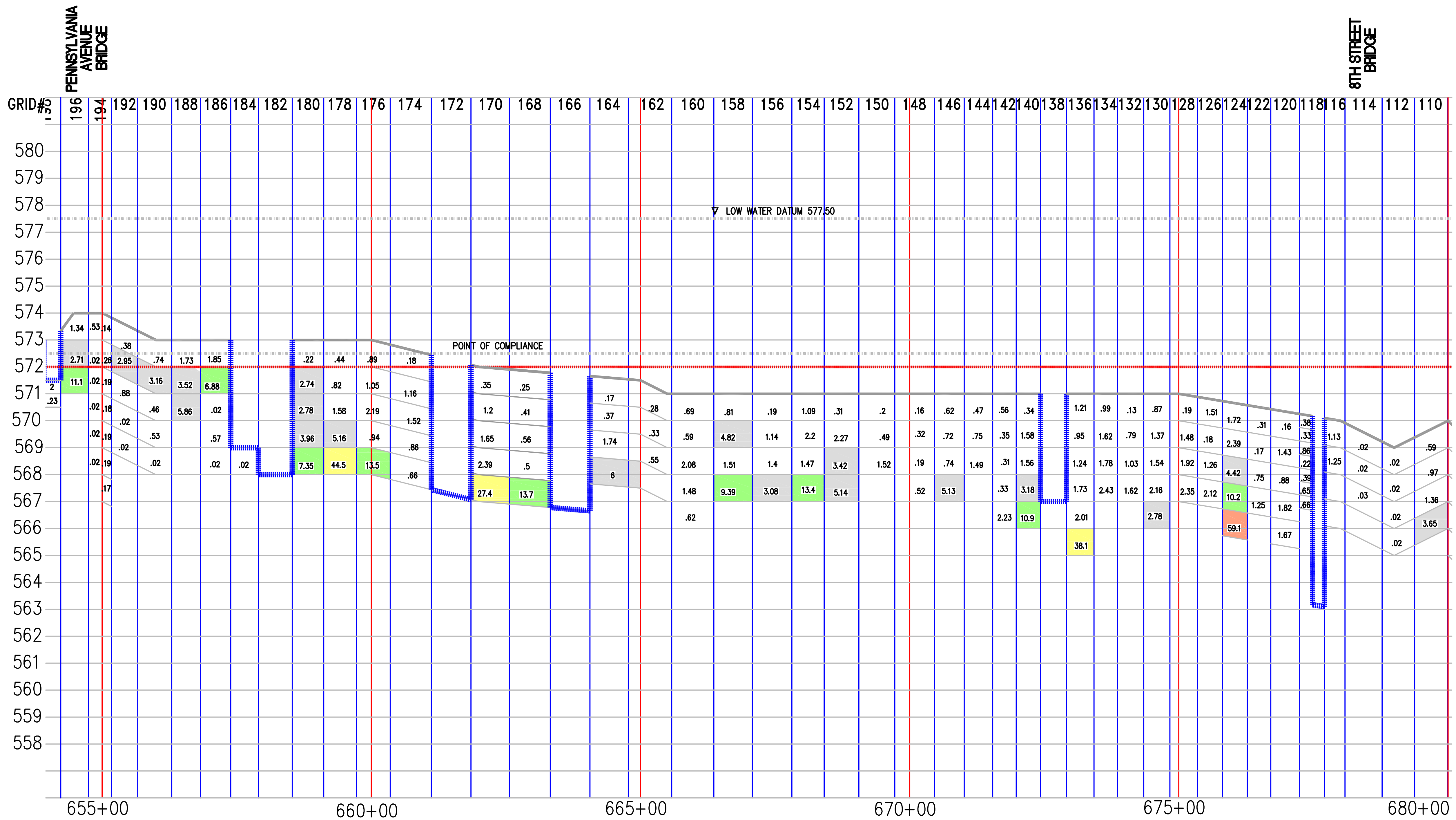
SHEBOYGAN FALLS, WISCONSIN

PROFILE

Scale: shown

FIGURE NO. 19



RIVER RIGHT MIDDLE GRID

0 100' 200'

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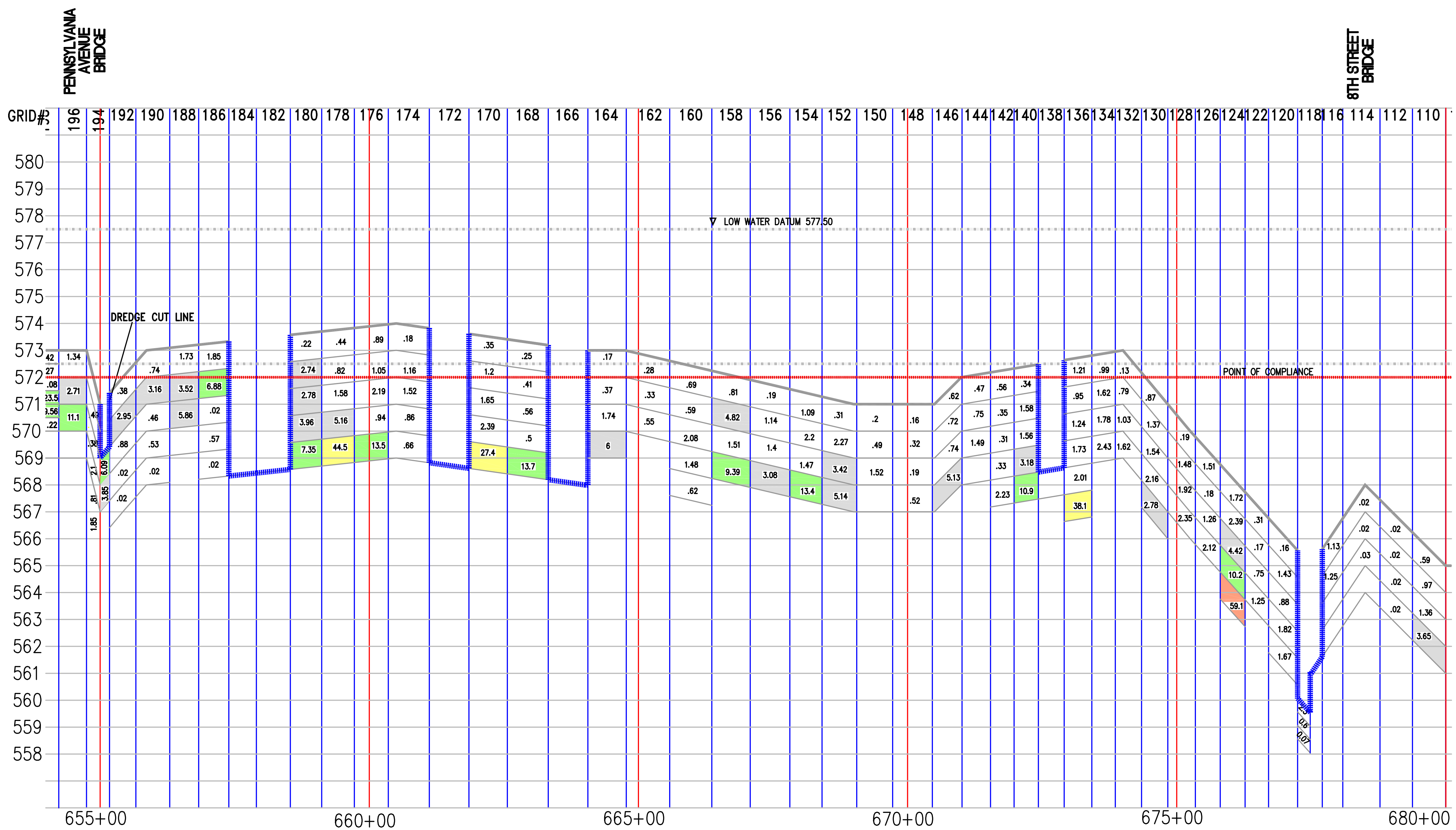
SHEBOYGAN FALLS, WISCONSIN

PROFILE

Scale: shown

FIGURE NO. 20



RIVER RIGHT BANK

0 100' 200'

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SHEBOYGAN FALLS, WISCONSIN

PROFILE

Scale: shown

FIGURE NO.
21

DIVISION 1 – GENERAL REQUIREMENTS

SECTION 01050
CONSTRUCTION STAKING

PART 1 GENERAL

1.1 Summary

Each proposed work area will be surveyed. This surveying will be used to delineate a local system for each area to regulate sampling and other work performed at the site. The surveying system will be used for horizontal and vertical control. Each local area will be tied to an established station or as shown on the Design Drawings. Vertical and elevation measurements will be relative to existing ground, water, and/or benchmark elevations. Survey markers will be maintained at all times.

1.2 Primary Control Monument(s)

Bench marks provided by local government agencies to establish primary vertical control for Work will be indicated on the final Design Drawings. These will be either official benchmarks tied into the state plane coordinate grid or local benchmarks established at known points (building corners, manhole lids, etc.). These are shown in relation to previously surveyed site elevation contours. Monuments or references for primary horizontal control for the construction of Work are indicated on Design Drawings. Preserve and maintain primary control monuments.

1.3 Primary Line and Grade

Primary line and grade will be provided and established by means of stakes placed at site of Work.

1.3.1 Excavation and Embankments

Stakes for excavation and embankment will be set:

a. Offset to best serve operations.

1.3.2 Contractor Responsibilities

a. Arrange operations to avoid interference with establishment of primary lines and grades.
b. Check accuracy of line and grade by visual inspection, checks between stakes, and periodic checks (with surveying equipment) between primary control monuments and stakes.
c. Be responsible for protection and preservation of stakes.

1.4 Construction Line and Grade

Correct transfer of construction lines and grades from primary line and grade points and for correct alignment and grade of completed Work based on lines and grades shown on Design Drawings shall be performed. “Grades” are to mean relative depths below pre-construction grades at individual work locations.

1.5 Survey Monuments

Protect survey monuments shown on Design Drawings. If such marked monuments are damaged, replace by Registered Land Surveyor.

1.6 Location of Underground Utilities

Locate all utilities prior to start of excavation. Verify the elevations of existing piping, utilities, and any type of underground obstruction. Verify elevations before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made.

1.6.1 Notification Prior to Excavation

Contact the Diggers Hotline 72 hours prior to excavating.

--- END OF SECTION ---

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01100
SUMMARY OF WORK

PART 1 GENERAL

1.1 Work Covered by Design Documents

1.2.1 Project Description

The work includes those tasks described in the Project Proposal and the Scope of Work as well as incidental related work, including but not limited to:

1. Submittals
2. Mobilization
3. Dewatering Area
4. Sediment Removal
5. Sediment Cover
6. Sediment Preparation and Loading
7. Transportation and Disposal
8. Compliance Verification
9. De-mobilization

1.2.2 Location

The work shall be located along the Sheboygan River approximately as indicated on the Design Drawings.

-- END OF SECTION --

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01285
MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 Payment Items

Payment items for the work of this contract for which contract lump sum, time and material, or unit price payments will be made are described below. All costs for items of work, which are not specifically mentioned to be included in a particular lump sum, time and material, or unit price payment item, shall be included in the listed item most closely associated with the work involved. The price and payment shall constitute full compensation for furnishing all labor, materials, and equipment, and performing any associated quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for which separate payment is not otherwise provided.

1.1.1 Submittals

1.1.1.1 Measurement and Payment

Payment will be made for costs associated with providing a schedule, product data, and test results. Measurement will be a lump sum rate.

1.1.2 Mobilization

1.1.2.1 Measurement and Payment

Payment will be made for costs associated with land based and water based operation mobilization. Measurement will be a lump sum rate.

1.1.3 Dewatering Area

1.1.3.1 Measurement and Payment

Payment will be made for costs associated with constructing of the dewatering area. Measurement will be a lump sum rate.

1.1.4 Sediment Removal

1.1.4.1 Measurement and Payment

Payment will be made for costs associated with dredging and dewatering the volume of sediment estimated in the Design.   Measurement will be a per cubic yard rate. Overages in the estimated Design quantity will be reimbursed per cubic yard.

1.1.5 Sediment Cover

1.1.5.1 Measurement and Payment

Payment will be made for costs associated installing cover material over contaminated sediment. Measurement will be a per ton rate.

1.1.6 Sediment Preparation and Loading

1.1.6.1 Measurement and Payment

Payment will be made for costs associated with preparing and loading TSCA (>50 ppm) and non-TSCA (<50 ppm) sediment. Measurement will be a per hour rate.

1.1.7 Transportation and Disposal

1.1.7.1 Measurement and Payment

Payment will be made for costs associated with transporting and disposing TSCA (>50 ppm) and non-TSCA (<50 ppm) sediment. Measurement will be a per ton rate.

1.1.8 Compliance Verification

1.1.8.1 Measurement and Payment

Payment will be made for costs associated with compliance verification sampling performed for the water and land based operations. Measurement will be a per sample rate.

1.1.9 De-mobilization

1.1.9.1 Measurement and Payment

Payment will be made for costs associated with land based and water based operation de-mobilization. Measurement will be a lump sum rate.

- END OF SECTION -

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01330
SUBMITTALS

PART 1 GENERAL

1.1 Summary

Section includes procedural requirements for Work-related submittals:

1. Progress Schedule Requirements.
2. Product Data Requirements.
3. Test Result Requirements.
4. Action on Submittals

1.2 Definitions

1.2.1 Submittal for Review

This is a submittal which will require review and approval prior to commencing project activities. An example would be product data, plans, and schedule.

1.2.2 Submittal for Record

This is a submittal which will be included into the records prior to substantial completion and does not require approval. An example would be test results.

1.3 Schedule Requirements

1. Separate horizontal bar for each major activity that identifies the first work day of each week.
2. Scale and spacing to allow space for notations and future revisions.
3. Arrange listings in order of start of each major activity.
4. Shows beginning and completion date for each major activity.
5. Indicates progress of each activity at date of submittal.
6. Shows changes occurring since previous submittal of schedule, such as:
   a. Major changes in scope.
   b. Activities modified since previous submittal.
   c. Revised projections of progress and completion.
   d. Other identifiable changes.
7. Provide narrative report to define following:
   a. Problem areas and anticipated delays and their impact on schedule.
   b. Corrective action recommended and its effect.
   c. Effect that change will have to other work party’s schedule.

1.4 Product Data Requirements

1. Coordinate each submittal with requirements of Schedule.
2. Notify in writing, at time of submittal, of deviations in submittals from requirements of Work Plans.
3. Date of submittal and dates of previous submittals.
4. Project title and number.
5. Identification of product (i.e., Supplier or Manufacturer), with identification numbers, and Specification section numbers.
6. Show manufacturer and model number, give dimensions, and provide clearances.
7. Applicable standards, such as ASTM or Federal Specification numbers.
8. Blank space for approval signature.
9. Submit 3 copies unless specified otherwise.

1.5 Test Result Requirements

1. Submit test results required in Specification sections.
2. Submit test results upon completion of test.

1.6 Action on Submittals

1.6.1 Reviewer's Requirements

1. Review submittals in accordance with schedule.
2. Provide signature, and indicate requirements for re-submittal or approval of submittal.
3. Return submittals.
4. For planning purposes, a set goal of 5 days for review of submittals from the day received has been established.

1.6.2 Re-submittal Requirements

1. Comply with submittal requirements.
2. Make corrections or changes in submittals required by reviewer and resubmit until approved.

-- END OF SECTION --

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01355
ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.1 Definitions

1.1.1 Environmental Pollution and Damage

Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally and/or historically.

1.1.2 Environmental Protection

Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during remediation. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; as well as other pollutants.

1.1.3 Generated Waste

These waste streams would typically consist of material brought on site to execute work, but are not fully consumed during the course of construction.

1.1.4 Surface Discharge

The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "waters of the United States" and would require permission to discharge water from the governing agency.

1.1.5 Waters of the United States

All waters which are under the jurisdiction of the Clean Water Act, as defined in 33 CFR 328.

1.2 Requirements

The environmental resources within the project boundaries and those affected outside the limits of permanent work will be protected during the entire duration of the project. All project work activities will comply with all applicable environmental Federal, State, and local laws and regulations.

1.3 Submittals

1.3.1 Environmental Protection Plan (EPP)

The purpose of the Environmental Protection Plan is to present a comprehensive overview of known or potential environmental issues which must be addressed during project activities. Issues of concern will be defined within the Environmental Protection Plan as outlined in this section. Each topic will be addressed at a level of detail with the environmental issue and required project task(s). Topics or issues which are not identified in this section, but which are considered necessary, will be identified and discussed after those items formally identified in this section. The Environmental Protection Plan will be current and maintained in the on-site office trailer.

1.3.1.1 Compliance

No requirement in this Section will be construed as relief from any applicable Federal, State, and local environmental protection laws and regulations. During project activities, responsibility will be taken to identify, implement, and submit for approval any additional requirements to be included in the Environmental Protection Plan.

1.3.1.2 Contents

The Environmental Protection Plan will include, but not be limited to, the following:

1. Name(s) of person(s) who is (are) responsible for ensuring adherence to the Environmental Protection Plan.
2. A Spill Prevention, Control and Countermeasure Plan (SPCC) which will include the procedures, instructions, and reports to be used in the event of an unplanned spill of contaminated material regulated by 40 CFR 68, 40 CFR 302, 40 CFR 355, and/or regulated under State or Local laws and regulations.

1.5 Protection Features

Prior to start of any project activities, the Project Manager and Property Owner will make a joint condition survey of all access locations and collect photographs of baseline conditions. The environmental features included in the survey, regardless of interference which their preservation may cause to the project, will be protected.

1.6 Special Environmental Requirements

Compliance will be made to the special environmental requirements listed in the Storm Water Pollution Prevention Plan (SWPPP).

1.7 Environmental Assessment of Deviations

Any deviations from the drawings, plans and specifications which may have an environmental impact will be subject to approval by the Project Manager and may require an extended review, processing, and approval time. The Project Manager reserves the right to disapprove alternate methods, even if they are more cost effective, if the Project Manager determines that the proposed alternate method will have an adverse environmental impact.

1.8 Notification

The Project Manager will notify in writing of any observed noncompliance with Federal, State or local environmental laws or regulations, permits, and other elements of the Environmental Protection plan. After receipt of such notice, the Project Manager will be informed of the proposed corrective action. Corrective action will be taken after approval by the Project Manager. The Project Manager may issue an order stopping all or part of the work until satisfactory corrective action has been taken. If necessary, this work stoppage will be reflected in a revised project schedule.

PART 2 EXECUTION

2.1 Environmental Permits

Compliance will be made to all environmental permits required by Federal, State, Regional, and local environmental laws and regulations.

2.2 Land Resources

All project activities will be confined to areas defined by the drawings and specifications. Prior to the beginning of any project activities, land resources to be preserved within the work area will be identified. Except in areas indicated on the drawings, the project team will not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, and land forms without approval. No ropes or cables will be fastened to or attached to any trees for anchorage unless specifically authorized. The project team will provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs. Stone, soil, or other materials displaced into access areas will be removed and restored.

2.2.1 Work Area Limits

Prior to commencing remediation activities, the project team will mark the areas that need not be disturbed. Monuments and markers will be protected before project activities begin. Where construction operations are to be conducted during darkness, any markers will be visible in the dark.

2.2.2 Landscape

Trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved will be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques. Landscape features damaged or destroyed during project activities will be restored.

2.2.3 Erosion and Sediment Controls

The project team will be responsible for providing erosion and sediment control measures in accordance with Federal, State, and local laws and regulations. The erosion and sediment controls will be selected and maintained such that water quality standards are not violated as a result of the project activities. Areas exposed at any one time by project activities will be kept to a minimum. The project team will construct or install temporary and permanent erosion and sediment control best management practices (BMPs). BMPs may include, but not be limited to, vegetation cover (bioengineering), stream bank stabilization, slope stabilization, and silt fences. The best management practices will also be in accordance with the Wisconsin Pollutant Discharge Elimination System (WPDES), and Project Specification Section #01356, *Storm Water Pollution Prevention Plan*. Any temporary measures will be removed after the area has been restored.

2.2.4 Contractor Facilities and Work Areas

The field offices, dewatering pad, wastewater treatment plant (WWTP), and material and equipment storage facilities will be placed in areas designated on the drawings or as directed by the Project Manager. Temporary movement or relocation of facilities will be made only when approved.

2.3 Water Resources

The project team will monitor project activities to prevent pollution of ground water. Toxic or hazardous chemicals will not be applied to soil or vegetation unless otherwise indicated. For project activities in waters of the state, the project team will be capable of quantifying sediment or pollutant loading when required.

2.4 Air Resources

Dust particles will be controlled during sediment load-out. The project team will maintain stockpiles and haul roads free from particulates which would cause the Federal, State, and local air pollution standards to be exceeded or which would cause a hazard or a nuisance. Sprinkling with water will be permitted to control particulates in the work area. Sprinkling with water, to be efficient, must be repeated to keep the disturbed area damp at all times. To achieve this, sufficient, competent equipment must be available.

2.5 Waste Disposal

2.5.1 Solid Wastes

Solid wastes (excluding clearing debris) will be placed in containers which are emptied on a regular schedule. Handling, storage, and disposal will be conducted to prevent contamination. Segregation measures will be employed so that no contaminated waste will become co-mingled with solid waste.

2.5.2 Fuel and Lubricants

Storage, fueling, and lubrication of equipment will be conducted in a manner that affords the maximum protection against spill and evaporation. Fuel, lubricants, and oil will be managed and stored in accordance with all Federal, State, Regional, and local laws and regulations. Used lubricants oil to be discarded will be stored in marked corrosion-resistant containers and recycled or disposed in accordance with 40 CFR 279, State, and local laws and regulations.

2.5.4 Wastewater

Wastewater from project activities, such as decontamination water and water generated from dewatering dredged sediment will be treated with the on-site wastewater treatment plant (WWTP) in accordance with Federal, State, and Local regulations before discharging back into the Sheboygan River.

2.6 Site clean-up

All areas will be cleaned prior to demobilization. All signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction will be obliterated prior to final acceptance of the work. The disturbed area will be equivalently restored to prior conditions.

-- END OF SECTION --

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01356
STORM WATER POLLUTION PREVENTION MEASURES

PART 1 GENERAL

1.1 Submittals

The following will be submitted:

Storm Water Pollution Prevention Plan (SWPPP)

1.2 Erosion and Sediment Controls

1.2.1 Erosion Controls

Erosion controls to be implemented will include seeding and/or erosion mats in accordance with *Wisconsin Construction Site Best Management Practice Handbook, Erosion Control Product Acceptability Lists (PAL, and Technical Standards)*. Erosion controls will be initiated as soon as practicable (end of day), but no more than 7 days, in any portion of the site where project activities have temporarily or permanently ceased.

1.2.2 Sediment Controls

Sediment controls will be implemented to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site during and post remediation activities in accordance with *Wisconsin Construction Site Best Management Practice Handbook, Erosion Control Product Acceptability Lists (PAL, and Technical Standards)*. Sediment controls will be implemented in a timely manner during project activities to minimize sediment runoff.

1.2.2.1 Silt Fence

Silt fence is one form of structural practice that will be provided to minimize sediment runoff. Silt fences will be properly installed to effectively retain sediment where erosion would occur in the form of sheet and rill erosion (e.g. clearing and grubbing, excavation and embankment). Silt fences will be installed based on field conditions. Final removal of silt fences will be upon the Project Manager’s approval.

1.2.2.2 Straw Bales

Straw bales are another form of structural practice that will be provided to minimize sediment runoff. Straw bales will be properly placed to effectively retain sediment where erosion would occur in the form of sheet and rill erosion (e.g. clearing and grubbing, excavation and embankment). Straw bales will be installed based on field conditions. Additional locations may be required by the Project Manager. Final removal of straw bale barriers will be upon the Project Manager’s approval.

Rows of bales of straw will be provided, at a minimum, as follows:

a. Perpendicular to the flow in the bottom of existing drainage ditches, channels, swales, etc. that traverse disturbed areas or carry runoff from disturbed areas.
b. At the entrance to culverts that receive runoff from disturbed areas.

PART 2 PRODUCTS

2.1 Silt fence

The geotextile will comply with the requirements of ASTM D 4439 and will consist of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. The filament will consist of a long-chain synthetic polymer composed of at least 85 percent by weight of ester, propylene, or amide, and will contain stabilizers and/or inhibitors added to the base plastic to make the filaments resistance to deterioration due to ultraviolet and heat exposure. Synthetic filter fabric will contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0 to 120 degrees F. The filter fabric will meet the following requirements:

PHYSICAL PROPERTY	TEST PROCEDURE	STRENGTH REQUIREMENT
Grab Tensile	ASTM D 4632	100 lbs. min.
Elongation (%)	ASTM D 4632	30 % max.
Trapezoid Tear	ASTM D 4533	55 lbs. min.
Permittivity	ASTM D 4491	0.2 sec-1
AOS (U.S. Std Sieve)	ASTM D 4751	20-100

Either wooden stakes or steel posts will be used. Wooden stakes utilized for silt fence will have a minimum cross section of 2 inches by 2 inches when oak is used, 4 inches by 4 inches when pine is used, and will have a minimum length of 3 feet. Steel posts (standard "U" or "T" section) utilized for silt fence will have a minimum weight of 1.33 pounds per linear foot and a minimum length of 3 feet.

2.2 Straw Bales

The straw in the bales will be stalks from oats, wheat, rye, barley, rice, or from grasses such as Byhalia, Bermuda, etc., furnished in air dry condition. The bales will have a standard cross section of 14 inches by 18 inches. All bales will be either wire-bound or string-tied.

Either wooden stakes or steel posts will be used to secure the straw bales to the ground. Wooden stakes will have minimum dimensions of 2 inches x 2 inches in cross section and a minimum length of 3 feet. Steel posts (standard "U" or "T" section) will have a minimum weight of 1.33 pounds per linear foot and a minimum length of 3 feet.

PART 3 EXECUTION

3.1 Silt Fence

3.1.1 Installation

Silt fences will extend a minimum of 24 inches above the ground surface and will not exceed 36 inches above the ground surface. Filter fabric will be from a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, filter fabric will be spliced together at a support post, with a minimum 6 inch overlap, and securely sealed. A trench will be excavated approximately 4 inches wide and 4 inches deep on the up slope side of the location of the silt fence. The 4-inch by 4-inch trench will be backfilled and compacted over the filter fabric.

3.1.2 Maintenance

Silt fences will be inspected and repaired promptly. Close attention will be paid to the repair of damaged silt fence resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, the fabric will be replaced promptly. Sediment deposits will be removed when deposits reach one-half of the height of the barrier. When a silt fence is no longer required, it will be removed. The immediate area occupied by the fence and any sediment deposits will be shaped to an acceptable grade. The areas disturbed by this shaping will be seeded.

3.2 Straw Bale

3.2.1 Installation

Straw bales will be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. Straw bales will be installed so that bindings are oriented around the sides rather than along the tops and bottoms of the bales in order to prevent deterioration of the bindings. Each bale will be securely anchored by at least two stakes driven through the bale. The first stake or steel post in each bale will be driven toward the previously laid bale to force the bales together. Stakes or steel posts will be driven a minimum 12 inches deep into the ground to securely anchor the bales.

3.2.2 Maintenance

Straw bale barriers will be inspected and necessary repairs to barriers or replacement of bales will be accomplished promptly. Sediment deposits will be removed when deposits reach one-half of the height of the barrier. Bale rows used to retain sediment will be turned uphill at each end of each row. When a straw bale barrier is no longer required, it will be removed. The immediate area occupied by the bales and any sediment deposits will be shaped to an acceptable grade. The areas disturbed by this shaping will be seeded.

3.3 Inspections

Inspection of silt fence and straw bales will occur at least once every seven (7) calendar days and within 24 hours of the end of any storm that produces 0.5 inches or more rainfall at the site.

Discharge points will be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Access areas will be inspected for evidence of offsite sediment tracking.

For each inspection conducted, the Project Manager will prepare a report summarizing the inspection, including the name of person making the inspection, the date of the inspection, observations in the erosion and sediment controls, and maintenance performed. The inspection will be documented on a form provided as part of the Storm Water Pollution Prevention Plan.

-- END OF SECTION --

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01510
TEMPORARY FACILITIES AND UTILITIES

PART 1 GENERAL

1.1 Requirements

Components and installation will comply with NFPA 70, federal, state, and local codes and regulations, and with utility company requirements.

PART 2 PRODUCTS

2.1 Water

Arrangements will be made to obtain potable water for dust emission control. If unattainable, water from the WWTP effluent can be used based on the analytical results and upon approval from the EPA and WDNR. If WWTP effluent cannot be used and no potable water is available, river water will be used as an alternative.

2.2 Sanitary Facilities

Sanitary toilet facilities conforming to state and local health and sanitation regulations, in sufficient number for use will be provided to personnel and located out of flood zone.

2.3 Fire Protection

Provide and maintain fire extinguishers in accordance with OSHA regulations.

2.4 Access Roads

Construct and maintain temporary access roads in snow free, ice free, drivable condition necessary to carry out project activities. Apply water to maintain dust control

2.5 Security

Provide the necessary security and/or take precautionary measures to protect equipment and materials.

2.6 Parking

Designated areas of existing facilities will be used for parking of personnel's vehicles and light-weight equipment.

2.7 Fencing

Provide temporary fencing sufficient to prevent trespass of public onto site. Materials will be sufficiently durable and effective for the entire duration of project activities.

2.8 Signs

Provide signs suitably supported and erected on site. Locate signs designated by Project Manager. Temporary warning signs will be posted at the dewatering pad and for general public boating on the river.

2.9 Field Office and Storage

Erect a temporary field office for on-site personnel and USEPA Oversight located out of flood zone. Storage will be of ample size to provide space for tools and materials.

2.10 Electrical Power

Provide temporary power and connections for field offices, wastewater treatment plant (WWTP), and polymer system.

PART 3 EXECUTIONS

3.1 General

Maintain and operate systems to ensure continuous service. Modify and extend systems as Work progress requires.

3.2 Removal

Completely remove materials, equipment, signs, and structures when no longer required. In unfinished areas, clean and repair damage caused by temporary installations or use of temporary facilities, restore drainage, and evenly grade, seed or plant as necessary to provide appearance equal to or better than original. In finished areas, restore existing or permanent facilities used for temporary services to baseline condition.

3.3 Damage to Existing Property

The project team will be responsible for replacing or repairing damage to existing buildings, structures, sidewalks, roads, parking lot surfacing, and other access locations.

--- END OF SECTION ---

DIVISION 2 - SITE WORK

SECTION 02074
GEOTEXTILE TUBES

PART 1 GENERAL

1.1 Submittals

1.1.1 Data

Manufacturer's data for Geotextile tube will be submitted by the vendor prior to delivery.

1.1.2 Certificates

A written certificate of compliance from the vendor will be submitted upon delivery of the Geotextile tube. The certificate will state that Geotextile tube meet or exceed the minimum values listed in Table 1 below.

1.2 Delivery, Storage, and Handling

1.2.1 Delivery

Geotextile tubes will be shipped only after the required submittals have been received and approved. Each roll will be wrapped in an opaque and waterproof layer of plastic. The plastic wrapping will be placed around the Geotextile tube roll in the manufacturing facility and will not be removed until installation. Each roll will be labeled with the manufacturer's name, Geotextile tube type, lot number, roll number, and roll dimensions, including length, width, or gross weight. Geotextile tube or plastic wrapping damaged as a result of shipping will be repaired or replaced, as directed, at no additional cost.

1.2.2 Storage

Geotextile tubes will be stored in areas where water cannot accumulate, elevated off the ground, and protected from conditions that will affect the properties or performance of the Geotextile tube.

1.2.3 Handling

No hooks, tongs, or other sharp instruments will be used for handling the Geotextile tubes. Geotextile tubes will not be dragged along the ground.

PART 2 PRODUCTS

2.1 Manufacturing Requirements

The Geotextile tube will be a woven monofilament or multi-filament pervious sheet of polymeric yarn. The Geotextile tube will be constructed to meet the properties listed in Table 1. Fibers used in the manufacture of the Geotextile tubes will consist of long-chain synthetic polymers composed of at least 85 percent by weight polyolefins, polyesters, or polyamides. Stabilizers and inhibitors will be added to the base polymer of the Geotextile tubes if necessary to make the filaments resistant to deterioration by ultraviolet light and heat exposure. Reclaimed or recycled fibers or polymer will not be added to the formulation. Geotextile tubes will be formed into a network so that the filaments or yarns retain dimensional stability relative to each other.

The Geotextile tube will be fabricated by sewing together sheets of high strength woven Geotextile tube material to form a tubular shape. The tubes will have a maximum circumference of sixty (60) feet. The tubes will have a maximum length of two-hundred (200) feet. The Geotextile tube will be delivered with tube filling ports spaced at intervals not to exceed 50 feet along the crest of the tube. Each fill port will consist of a sleeve having a length of at least 3 feet and circumference slightly greater than that of the dredge discharge pipe (8-inches). The port sleeves will be fabricated of the same material as the Geotextile tubes and have a “drawstring” closure system to assure a secure closure after the completion of filling. Loops or straps will be incorporated along the sides of the tube every 20 feet to facilitate deployment. The loops or straps will have the same tensile strength as the Geotextile tube. Seams will be overlapped, folded, and sewn.

2.2 Testing

Geotextile tubes and factory seams will meet the requirements specified in Table 1. Conformance testing will be performed on random samples by the Manufacturer.

PART 3 EXECUTION

3.1 Installation and Operation

The underlying surface to receive the Geotextile tubes will be prepared to a relatively smooth condition free of ruts, erosion rills, obstructions, depressions, or debris greater than 6 inches in height. The proposed Geotextile tube surface will be leveled in the cross direction prior to filling because the Geotextile tube has a tendency to roll down very shallow slopes of one to two percent during initial filling. The Geotextile tube will be placed on the pad to produce a smooth plane in continuous contact with the surface.

During initial filling, personnel will be warned to stay up hill to prevent entrapment if the Geotextile tube happens to become unstable and roll. The Geotextile tubes will be filled and excess water allowed to drain. Filling will begin in the center port and move to the outer ports. Geotextile tubes will be filled no more than two (2) times per day. The inlet sleeve will be secured to the injection pipe prior to filling. The tubes will be monitored for settlement and deterioration during the filling process. Failed seams or ruptures in the tubes will be repaired. Tubes will be filled to a maximum height of six (6) feet. Geotextile tubes will be placed in a single layer. Stacking of non-TSCA geotextile tubes may be performed only to maintain dredge efficiencies.

3.2 Protection and Repairs

The Geotextile tube will be protected during installation from blinding, clogging, penetrations, tears, or other damage. Repairs will be made by placing a patch of the same type of material which extends a minimum of 18 inches beyond the edge of the damage or defect. Patches will be continuously fastened using a sewn seam or other approved methods recommended by the manufacturer. The machine direction of the patch will be aligned with the machine direction of the Geotextile tube being repaired. Geotextile which cannot be repaired will be replaced.

Table 1
Physical Properties

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			Machine Direction	**Cross Section**
Wide Width Tensile Strength (at ultimate)	ASTM 4595	kN/m (lbs/in)	70 (400)	96.3 (550)
Wide Width Tensile Elongation	ASTM 4595	%	20 (max.)	20 (max.)
Factory Seam Strength	ASTM D 4884	kN/m (lbs/in)	52.5 (300)	
Apparent Opening Size (AOS)	ASTM D 4751	mm (U.S. Sieve #)	0.425 (40)	
Water Flow Rate	ASTM D 4491	$l/m/m^2$ (gpm/ft^2)	813 (20)	
Mass/Unit Area	ASTM D 5261	g/m^2 (oz/yd^2)	585 (17.3)	
UV Resistance (% strength retained after 500 hrs)	ASTM D 4355	%	70	

-- END OF SECTION --

DIVISION 2 – SITE WORK

SECTION 02089
PVC PIPE AND FITTINGS

PART 1 GENERAL

1.1 Submittals

1. Provide product data on pipe and fittings.
2. Testing results which record deficiencies, repair method, and location.

1.2 Requirements

1. Notify agency representatives prior to any testing.
2. Repeat test after correction of deficiencies and until satisfactory tests are obtained.
3. During operations, repair leaks immediately.

1.3 Delivery and storage

1. Upon delivery inspect pipe and fittings for damage, cracks, holes, or foreign inclusions.
2. Store pipe and accessories on flat level ground with no rocks or other objects under the pipe.

PART 2 PRODUCTS

2.1 Pipe

All PVC Schedule 40 pipe will be manufactured from a Type 1, Grade 1 Polyvinyl Chloride (PVC) compound with a Cell Classification of 12454 per ASTM D1784. The pipe will be manufactured in strict compliance to ASTM D1785 and D2665 (where applicable), consistently meeting and/or exceeding the test requirement of these standards with regard to material, workmanship, burst pressure, flattening, and extrusion quality. The pipe will be manufactured, using domestic materials, by an ISO 9001 certified manufacturer. Standard length of pipe sizes 6” and larger will be beveled each end by the pipe manufacturer. Pipe will be stored indoors after production at the manufacturing site until shipped from factory. The pipe will carry the National Sanitation Foundation (NSF) seal of approval for water applications.

2.2 Fittings

Rigid PVC used in the manufacturing of schedule 40 fittings is Type 1, Grade 1 compound as stated in ASTM D1784. Raw material used in molding will contain the specified amounts of color pigment, stabilizers, and other additives approved by the National Sanitation Foundation. PVC schedule 40 fittings will conform to ASTM D2466.

2.3 Primer and Solvent

Primer will conform to ASTM F656. Solvent cements will conform to ASTM D2564.

PART 3 EXECUTIONS

3.1 Preparation

1. Clean PVC pipe of any debris and material.

2. Repair or replace PVC piping, valves, and fittings which have visible defects or leakage before commencing test.

3.2 Testing of PVC Pipe Used for Gravity Pipelines

Gravity PVC pipelines will be visually inspected and a record of the results furnished to the Project Manager. Visual inspection will include: checking vertical and horizontal alignment by sighting through newly constructed pipeline.

3.3 Testing of PVC Pipe Used for Pressure Pipelines

Pressure PVC pipelines will be tested by applying wastewater treatment plant pump pressure. The test procedures are as follows:

1. Fill each section with water slowly, venting air completely from the pipeline and appurtenances.
2. Pressurize the pipe to system pressure.
3. Inspect pipeline and repair visible leaks.
4. Re-pressurize pipeline to system pressure as many times as necessary until there are no visible leaks.

- END OF SECTION -

DIVISION 2 – SITE WORK

SECTION 02090
HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

PART 1 GENERAL

1.1 Submittals

1. Provide product data on pipe and fittings.
2. Testing results which record deficiencies, repair method, and location.

1.2 Requirements

1. Notify agency representatives prior to any testing.
2. Repeat test after correction of deficiencies and until satisfactory tests are obtained.
3. During operations, repair leaks immediately.

1.3 Delivery and storage

1. Upon delivery inspect pipe and fittings for damage, cracks, holes, or foreign inclusions.
2. Store pipe and accessories on flat level ground with no rocks or other objects under the pipe.

PART 2 PRODUCT

2.1 Pipe

1. Pipe will be high density polyethylene (HDPE) meeting AWWA C906 standards.
2. Materials used for the manufacture of the HDPE pipe will be made from a PE 3408 resin compound meeting the minimum cell classification of PE 345434C in accordance with ASTM D3350 and the hydrostatic design basis of 1,600 psi determined in accordance with ASTM D2837.
3. Provide pipe with a dimension ratio (DR) of 17, pressure class 160 unless stated otherwise.

2.2 Fittings

1. Fittings will meet the requirements of AWWA C901 or AWWA C906 whichever applies.
2. Fittings for pipe greater than 3 inches in diameter will be HDPE molded fittings and HDPE fabricated fittings of the same pressure rating and outside diameter as the connecting pipe.
3. Molded fittings will be manufactured with thermal butt-fused joints meeting the requirements of ASTM D3261.
4. Fabricated fittings will be made by heat fusion joining specially machined shapes cut from pipe, polyethylene sheet stock, or molded fittings.

2.3 Joints

1. Pipe and pipe fittings will be designed for joining by thermal butt fusion.
2. Joints will be pipe end to pipe end and pipe end to fitting.

PART 3 EXECUTION

3.1 Testing of HDPE Pipe Used for Pressure Pipelines

Fixed points, dredge and booster pump discharge, will be made with a flexible reinforced rubber hose. In addition, slack will be built into the dredge line to compensate for expansion and daily movements. Pressure HDPE pipelines will be tested by applying dredge pump pressure. The test procedures are as follows:

1. Fill pipeline with water slowly, venting air completely from the pipeline and appurtenances.
2. Pressurize the pipe to system pressure.
3. Inspect pipeline and repair visible leaks.
4. Re-pressurize pipeline to system pressure as many times as necessary until there are no visible leaks.

- END OF SECTION -

SECTION 02301
GENERAL EARTHWORK

PART 1 GENERAL

1.1 Summary

Excavation and Grading to shape site entrance, roadways, berms, construction roads and dewatering pad.

PART 2 PRODUCTS

2.1 General Earth Fill

The general earth fill will be free of organic material. The general earth fill can consist of soil fill. Any earth fill used from an off-site borrow source will be sampled to assure that contaminants are not present.

2.2 Structural/Hard Fill

The structural/hard fill shall be free of organic material. The structural/hard fill can consist of rock fill.

2.3 Sediment Cover Material

Clean sands or other permeable material generally classified according to Unified Soil Classification System as SW, SP, GW or GP. The selected material should have rounded to sub-rounded grains.
Clean gravels or other permeable material generally classified according to Unified Soil Classification System as SW, SP, GW or GP. The selected material should have rounded to sub-rounded grains. The maximum particle size of the selected material is 3/4-inches.

PART 3 EXECUTION

3.1 Preparation

Identify required lines, levels, contours, and datum. Protect bench marks and survey layout stakes from excavation equipment and vehicular traffic.

3.2 Grading

Uniformly grade areas to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent grades and new grades. Cut out soft spots, fill low spots and trim high spots to achieve a firm surface.

3.3 Protection

Repair and reestablish grades where completed or partially completed surfaces become eroded, rutted, settled or where they loose compaction due to subsequent construction operations or weather conditions.

--- END OF SECTION ---

DIVISION 2 – SITE WORK

SECTION 02271
RIP RAP

PART 1 GENERAL

1.1 Submittals

Daily delivery tickets for each load of rip rap delivered to the site.

PART 2 PRODUCTS

2.1 General

Rip rap will be clean, sound, hard, dense, durable, field or quarry stone which is free from seams, cracks, or other structural defects. It will be angular material from shot rock (blasted) or crushed rock. Rip rap will not be frozen. The particle size of the selected material will be 12-inch minus (Type B).

PART 3 EXECUTION

3.1 Application

Rip rap will be used as cover material for contaminated sediment and at the outfall of the wastewater treatment plant (WWTP) as an energy dissipator.

---END OF SECTION ---

DIVISION 2 - SITE WORK

SECTION 02325
DREDGING

PART 1 GENERAL

1.1 References

The publications listed below form a part of this specification to the extent referenced. The most recent version of the reference applies.

CODE OF FEDERAL REGULATIONS (CFR)

33 CFR 84	Annex I: Positioning and Technical Details of Lights and Shapes
33 CFR 85	Annex II: Additional Signal for Fishing Vessels in Close Proximity
33 CFR 86	Annex III: Technical Details of Sound Signal Appliances
33 CFR 89	Inland Navigation Rules: Implementing Rules U.S. COAST GUARD (USCG)
M16672.2	(1999) Navigation Rules Instruction Manual

1.2 Scope of Work

The Scope of work includes: furnishing all labor, material, equipment, and supervision to dredge and dewater sediments as specified herein and in accordance with the Design documents. Pursuant to the Design, sediment removal will be accomplished by dredging each targeted grid until any of the following criteria are met:

- Sediment removal to hardpan or to consolidated material.
- Sediment removal to the Design elevation.

1.3 Submittals

1. Dredge Plan

1.4 Sediment to be Removed

Remove the sediment in grids as identified on the Design Cross Section, Profile, and Plan View Drawings. TSCA sediment will be established in-situ, using the pre-design and pre-dredge sampling data. TSCA sediment will be segregated from non-TSCA sediment by flushing the dredge slurry line with water before and after dredge removal. Flushing will be determined complete when the density of the slurry (10-15% operational) is less than 1% as indicated by the density loop of the polymer system.

1.5 Quantity of Sediment

The total estimated amount of in-place material to be removed is provided in the Design.

1.6 Dredging Depth

The final dredge elevation for each removal grid is provided in the Design Cross Section, Profile, and Plan View Drawings.

1.7 Near Riverbanks

Dredging near riverbanks will have a lateral setback of a 2 feet.

1.8 Near Bridge Structures and Boat Slips

Dredging will not be allowed within 5 feet, laterally, of an existing bridge structure and/or boat slip in order to protect existing structures and ensure proper safety.

1.8 Environmental Protection Requirements

Provide and maintain during the dredge operation, environmental protective measures in accordance with *Section 01355 Environmental Protection* and *Contingency Plan*.

PART 2 EQUIPMENT

2.1 Hardware/Software

- Dual antenna Global Positioning System (GPS)
- Rotary encoder
- Inclinometer
- Dredgepack or equivalent software
- Laptop display computer
- GPS to establish base station control points
- Ancillary wiring

2.2 Operations

The dredge equipment will receive a signal from a GPS. The base signal is received through a dual antenna system located on the dredge which provides the heading and cutterhead position. In addition, base stations will be established at multiple locations on the river to provide known X, Y, and Z coordinates. The appropriate base stations (i.e. depending on location of dredge) will be used daily to provide the surface water elevation as input to the dredge software. A display computer, located in the dredge cabin, receives inputs from a rotary encoder to detect the swing angle and an inclinometer to measure the ladder angle relative to vertical. All of these inputs (i.e. GPS, water surface elevation, rotary encoder, inclinometer, and removal locations in Appendix E and F) are received by the software (Dredgepack or equivalent) and display for the operator the appropriate removal elevation relative to the X and Y position.

2.3 Training

Dredge operator must have proper training from the manufacturer's representative on the proper use of the hardware and software systems. Training requirements include, but are not limited to, hardware operation and troubleshooting, set-up, loading inputs daily, and removal elevation QC relative to the X and Y position. Training will be performed prior to and during the first week of dredge operations.

PART 3 EXECUTION

3.1 Order of Work

Dredging will begin at the furthest upstream grid location and work downstream to each successive grid location, unless otherwise directed.

3.2 Best Management Practices

The following BMPs will be implemented to minimize impacts to the aquatic environment during dredging operations:

- Ensure that no fuel, garbage, or debris enters the waterway from the dredge, or other vessels associated with the project.
- Wherever possible, dredging will be conducted using equipment that minimizes the release and redistribution of dredged material to the water column during dredging.
- Dredging will be conducted using procedures that will minimize impacts to water quality and sediment quality to the extent practicable.
- After project completion all equipment will be properly decontaminated to prevent potential spreading of contaminated sediment from the project area.

3.3 Lights

If dredging activities are performed during periods of restricted visibility, provide lights for dredge, booster pumps and pipelines.

3.4 Navigation Warnings

Furnish and maintain appropriate navigation warning signs along the pipeline, dredge, and booster pumps in accordance to the US Coast Guard and/or other applicable federal, state, and/or local regulations. In addition, temporary warning signs will be posted for general public boating on river.

3.5 Communication

Provide a system of communication between the dredge crew, the crew at the dewatering area and points between. Two-way radios or cell phones are acceptable.

3.6 Quality Control

3.6.1 Bathymetry

Conduct post-dredge bathymetry measurements as described in *Verification Sampling Plan*.

3.6.2 Turbidity

Conduct turbidity measurements as described in the *Verification Sampling Plan.*

Dredge methods will be modified if turbidity measurements indicate applicable trigger level (35 ppm) has being exceeded. Dredge methods will be stopped if turbidity measurements indicate applicable action level (70 ppm) has being exceeded. Dredging will recommence once dredging techniques or methods are changed to minimize resuspension.

3.7 Transferring Sediment Upriver

The discharge of sediment or drainage water outside of project boundaries is strictly prohibited. Sediment recovered from grids will be transferred upland to the dewatering area using booster pumps. Dredging sediment with concentrations of total PCB's greater than 50 mg/kg (ppm) are designated as in-situ TSCA sediment. TSCA sediment locations are provided in the Design Cross Section and Profile Drawings.

3.8 Dewatering

Dewatering applies to the sediment slurry that is transferred upland to the dewatering area. Minimize the water added to sediment during dredging to maximize free draining of water from recovered sediment. In the event of failure of the geotextile tube during dredge operations, dredging will be halted until a replacement geotextile tube is available. In-situ TSCA material will be de-watered in specific and identified geo-textile tubes and disposed at the appropriate out-of-state landfill. Geo-textile tubes will not be re-used or decontaminated but rather disposed with sediment they held (TSCA or non-TSCA).

3.9 Final Examination and Acceptance

Quality Control/Assurance will be conducted by performing post-dredge verification bathymetry measurements as described in the *Verification Sampling Plan.* Grids will be re-dredged that do not meet the required removal extent and/or elevation. Post-dredge verification samples will be collected as described in the *Verification Sampling Plan*. When the dredge grid area is found to be complete and in satisfactory condition, with regard to removal extent, elevation, and cleanup criteria (i.e., PCB concentration), it will be accepted.

--END OF SECTION--

DIVISION 2 – SITEWORK

SECTION 02740
ASPHALT PAVEMENT

PART 1 GENERAL

1.1 Submittals

1. Provide product data.

1.2 Requirements

1. Mix design at a rate of one per source.

1.3 Delivery and storage

1. Deliver asphalt in trucks free of foreign substances and caked asphalt.
2. Storage period for hot mix will not exceed 2 hours.

PART 2 PRODUCT

2.1 Asphalt

Conform to WisDOT Standard Specifications for Highway and Structures Construction Sections 450, 455, and 460.

2.2 Equipment

All equipment will conform to WisDOT Standard Specifications for Highway and Structure Construction Section 450.

PART 3 EXECUTION

3.1 Preparation over existing concrete

1. Remove loose and protruding joint material.
2. Clean surface and joints of foreign material, e.g. dust, dirt, water, vegetation, etc.
3. Seal cracks.
4. Tack coat on existing asphalt or concrete pavements at minimum rate of 0.025 gallon per square yard.
5. Fill potholes and depressions with a leveling course of asphalt mix compacted to required density of surface course.

3.2 Installation

1. Do not place asphalt pavement when following conditions exist: Unstable or frozen base, during rain or snow, or when air temperature is less than 35°F (1.5°C).
2. Place to thickness and grade as indicated in the Design. When thickness is not shown, pavement thickness will be 4-6 inches compacted.
3. Spreading will be permitted only in areas inaccessible to finishing machines. Place by means of a shovel, and shape with rake or lute. Do not rake over machine spread surfaces.
4. Roll as soon as mixture will support roller without displacing or hair line cracking. Initial pass will be with drive roller toward paver. Start at the center and continue toward edges. Overlap successive trips. Subsequent strips laid will start adjacent to previously laid strip and continue to opposite edge. Roll until marks are eliminated, surface is of uniform density, and required density is obtained.
5. When joining new asphalt pavement to existing asphalt pavement, saw cut joints and tack coat. When joining new asphalt pavement to new asphalt pavement, saw cut end joints and tack coat cold joints.

3.3 Testing

1. Inspect area for proper placement and elevation of asphalt.

- END OF SECTION -

DIVISION 2 – SITE WORK

SECTION 02931
SEEDING

TABLE OF CONTENTS

PART 1 GENERAL

1.1 Submittals

1. Provide product data on seed and erosion blanket.

1.2 Requirements

1. Provide seed mix and erosion blanket design prior to installation

1.3 Delivery and storage

1. Delivery same day as installation.
2. Store in area to prevent damage.

PART 2 PRODUCTS

2.1 Seed

Fresh, clean, and new crop seed included in specified varieties and proportioned by weight. Tests are for minimum percentages of germination indicated. Weeds shall not exceed 0.25%. Seed mix design is provide below. Winter rye or winter wheat will be added to mix during late fall application.

Name	**% by Weight**	**Germination**
Kentucky Bluegrass	45	80%
Perennial Rye	5	90%
Creeping Red Fescue	35	80%
White Clover	15	90%

2.2 Erosion Blanket

Combination of knitted synthetic netting interwoven with curled wood excelsior fiber, with consistent thickness and fiber evenly distributed over entire area of blanket. Roll type, mesh size approximately 1 in. sq, nominal weight of 1.0 lb/sq yd. Staples for anchoring blanket will be a combination of wire, 0.091-in. dia. or more, U-shaped with legs 6 in. in length and 1 in. crown and wood.

PART 3 EXECUTION

3.1 Preparation

Scarify areas where topsoil is not removed being careful of tree roots, adding topsoil to eliminate depressions and hollows, and cutting high points to create smooth uniform surface. Remove sticks, stones, and debris.

3.2 Installation

Seeding method will establish smooth, uniform grass composed of specified mixture. Do not seed following rain or if surface has been compacted by rain. Do not seed when wind velocity exceeds 6 mph.

Install erosion control blanket in accordance with the manufacturer's installation instructions.

3.3 Protection

Protect restored areas against damage by trespass and other Work. Replace and/or repair damaged restoration. Protect slopes and embankments against erosion until Work is accepted. Repair eroded portions of restored areas by reseeding as required.

3.5 Testing

Visually inspect installation per restored area. For purposes of establishing a testing standard, scattered bare spots, no larger than 1 sq ft, will be allowed up to maximum of 3% of restored area.

--- END OF SECTION ---

DIVISION 11 - EQUIPMENT

SECTION 11355
WASTEWATER TREATMENT PLANT (WWTP)

PART 1 GENERAL

1.1 Submittals

1. Provide product data on multi-media and granulated activated carbon (GAC).
2. Manufacturer's instructions and procedures for proper operation of multi-media and GAC vessels.
3. Wastewater Treatment Plant Report.
4. Discharge Monitoring Report (DMR) summarizes the results of the WWTP testing.
5. Water Management Plan

1.2 Operational Requirements

1. Certification that the piping system passes leak test.
2. Daily inspections, repair leaks immediately.
3. Use appropriate operating practices to prevent spillage or leakage of contaminated water from occurring during operations. Immediately report any spills and provide cleanup in accordance with *Section 01355 Environmental Protection* and *Contingency Plan*. Wastewater treatment plant (WWTP) will be installed with secondary containment.

PART 2 PRODUCT

Not used.

PART 3 EXECUTION

3.1 Preparation

1. Establish a PCB control area to prevent unauthorized entry of personnel. Rope off area and provide 29 CFR 1910.145 signs at approaches and around perimeter. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Allow only personnel briefed on the elements and trained as specified herein into the area. Do not permit food, drink, or smoking materials in the control area. Smoking is not permitted within 50 feet of the PCB control area.
2. Provide decontamination and first aid facilities. Workers shall wear and use PPE upon entering a PCB control area. Keep work footwear inside work area until completion of the job. Do not carry out PCB handling operations in confined spaces. Do not delay aid to a seriously injured worker for reasons of decontamination.

3.2 Collection, Treatment, and Quality Control

3.2.1 Collection

Carriage water generated from dewatering sediment in Geotextile tubes will be collected in a sump as shown in the Design drawings.. This water will be conveyed with a pump, sized according to the Design calculation, to the WWTP for treatment. A back-up pump will be provided sized identical to the primary pump.

3.2.2 Treatment

Collected water will be treated with a series of three (3) multi-media vessels followed by a series of three (3) GAC vessels, sized according to the Design calculation, before discharge back into the Sheboygan River. Erosion control (i.e., riprap) will be provided at the outfall of the WWTP.

3.2.3 Quality Control

1. Turbidity (NTUs) testing to develop correlation to Total Suspended Solids (TSS) for effluent stream.
2. Influent and effluent will be sampled at a rate designated by the WPDES permit. At a minimum, effluent will be daily composites collected during dredge operations and analyzed for PCBs and TSS. The pH will be analyzed once per month from the daily composite effluent sample. Influent will be daily grabs collected during dredge operations and analyzed for PCBs and TSS. Mercury will be analyzed twice per month from a grab influent and effluent sample. Results will be documented on a Discharge Monitoring Report (DMR) provided by the Wisconsin Department of Natural Resources (WDNR). This report will be submitted by the 15th of the following month. In addition turbidity measurements will be made on the effluent stream approximately every hour. These turbidity measurements in NTUs correlated to TSS will provide the ability to determine real time levels of TSS and allow immediate stoppage of work, notification to regulators, and operational changes, if necessary.

-- END OF SECTION --

DIVISION 13 - SPECIAL CONSTRUCTION (TSCA)

SECTION 13285
LOADING, TRANSPORTATION, AND DISPOSAL OF PCB SEDIMENT

PART 1 GENERAL

1.1 Submittals

1. Sediment Management Plan (SMP)

1.2 Requirements

1. Use appropriate vehicles and operating practices to prevent spillage or leakage of contaminated materials from occurring during operations. Inspect vehicles leaving the site to ensure that no contaminated sediment adheres to the wheels or undercarriage. Immediately report any spills and provide cleanup in accordance with *Section 01355 Environmental Protection* and *Contingency Plan.*
2. Maintain strict dust control at all times to prevent dust particles from becoming airborne. Sprinkle or treat the sediment at the site and other areas disturbed by operations with water.

PART 2 PRODUCT

Not Used.

PART 3 EXECUTION

3.1 Preparation

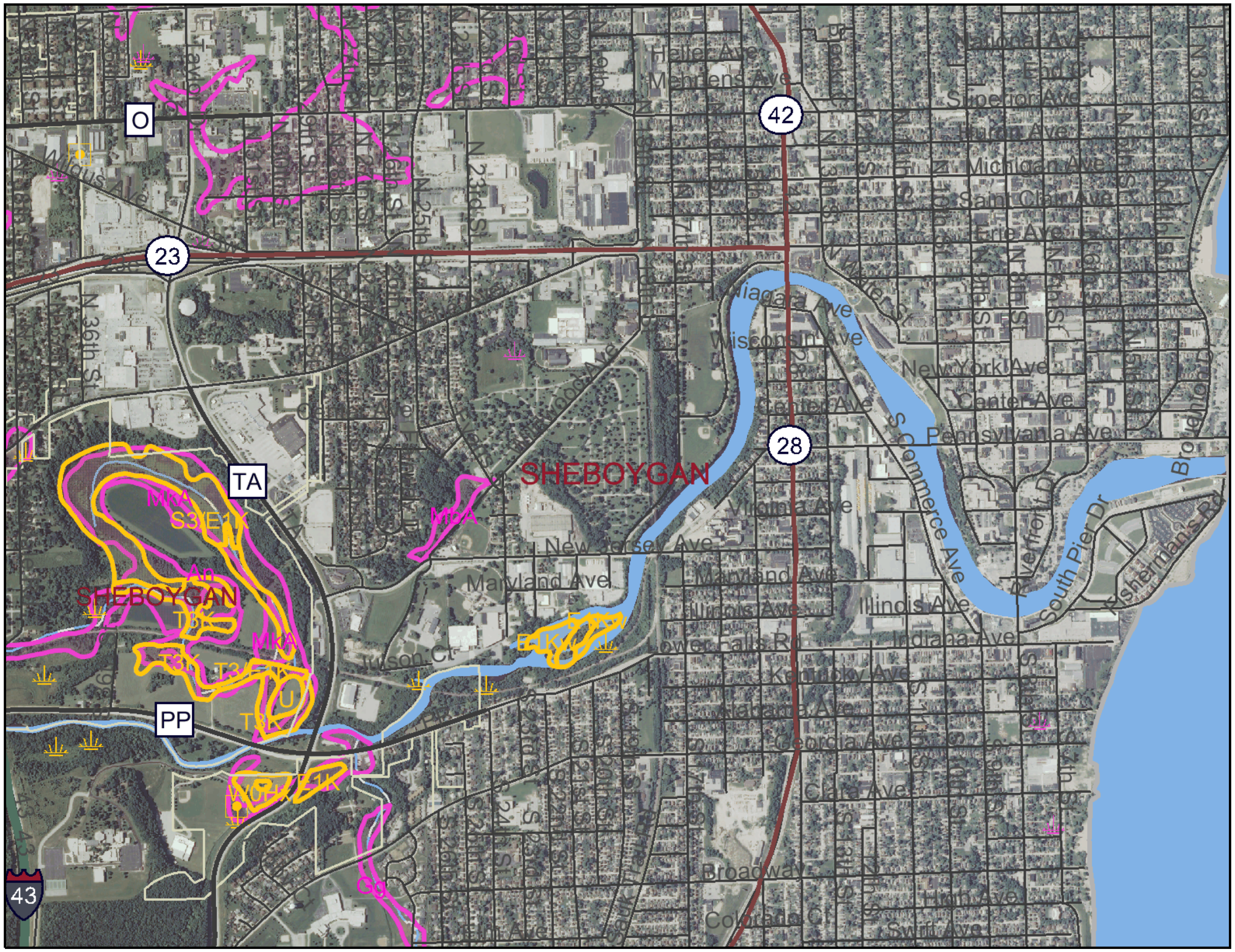
1. Establish a PCB control area to prevent unauthorized entry of personnel. Rope off area and provide 29 CFR 1910.145 signs at approaches and around perimeter. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Allow only personnel briefed on the elements and trained as specified herein into the area. Do not permit food, drink, or smoking materials in the control area. Smoking is not permitted within 50 feet of the PCB control area.

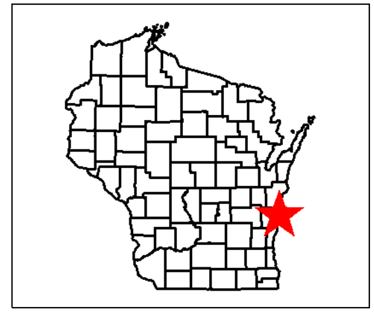
2. Provide decontamination facilities. Workers shall wear and use PPE upon entering a PCB control area. Keep work footwear inside work area until completion of the job. Do not carry out PCB handling operations in confined spaces. Do not delay aid to a seriously injured worker for reasons of decontamination.

3.2 Loading, Transportation, and Disposal

3.2.1 Loading

Map Created on Mar 09, 2010





Legend

Major Highways

- Interstate
- State Highway
- U.S. Highways

County Roads

Local Roads

24K County Boundaries

Civil Towns

- Civil Town

USDA Wetspots

DNR Wetland Points

- Excavated Pond
- Dammed Pond
- Wetland Too Small to Delineate
- Filled Excavated Pond
- Filled Dammed Pond
- Filled Wetland Too Small to Delineate
- Filled or Drained Wetland

DNR Wetland Areas

- Upland
- Wetland
- Filled or Drained Wetland

Wetland Indicator Soils

24K Open Water

24K Rivers and Shorelines

- Intermittent
- Fluctuating
- Perennial

N

Scale: 1:23,918

0 2250 4500 6750 ft.

Map created on Mar 9, 2010

Wisconsin Wetland Inventory (WWI) maps show graphic representations of the type, size and location of wetlands in Wisconsin. These maps have been prepared from the analysis of high altitude imagery in conjunction with soil surveys, topographic maps, previous wetland inventories and field work. State statutes define a wetland as "an area where water is at, near or above the land surface long enough to be capable of supporting aquatic or hydrophytic vegetation and which has soils indicative of wet conditions." The principal focus of the WWI is to produce wetland maps that are graphic representations of the type, size and location of wetlands in Wisconsin. Within this context, the objective of the WWI is to produce reconnaissance level information on the location, type, size of these habitats such that they are accurate at the nominal scale of the 1:24,000 (1 inch = 2000 feet) base map. The DNR recognizes the limitations of using remotely sensed information as the primary data source. They are to be used as a guide for planning purposes. There is no attempt, in either the design or products of this inventory, to define the limits of jurisdiction of any Federal, State, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, State, or local agencies concerning specified agency regulatory programs and jurisdictions that may affect such activities. The most accurate method of determining the legal extent of a wetland for federal or state regulations is a field delineation of the wetland boundary by a professional trained in wetland delineation techniques.

Notes: Wetland Inventory Map

Dewatered sediment will meet a paint filter test prior to disposal. Air drying will be the primary method to assure the dewatered sediment pass the paint filter test. If necessary, water absorption additives may be added to aid or accelerate the drying process.

To protect the surface, sediment within the pad will be moved to the excavator with a rubber tired wheel loader equipped with a rubber leading edge on the bucket to reduce abrasion on the asphalt surface. The sediment will be loaded with an excavator located outside the pad in the “loading area”. After load out, the pad will be inspected and made suitable (i.e. seal coat or new asphalt) before the next phase of geo-textile tubes are placed. Sediment will be loaded into trucks in the “loading area”. The loading area will be designed with containment (i.e. berm) so that truck decontamination can be performed within the confinements of the loading area. Any material spilled during loading will be shoveled and placed back into the truck or dewatering area. Any water generated during decontamination or rainfall events will be pumped to the dewatering area for treatment. State regulations require that fugitive dust emission be controlled. Therefore, all roadways, designated work areas, and other possible sources of dust generation will be controlled by application of water when visible dust is observed.

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3.2.2 Transportation

1. Transport, in accordance with Federal and State requirements with vehicles designed to carry PCB contaminated sediments.

2. Weigh vehicles at a State-certified weigh scale.

3. Prepare and maintain waste shipment records and manifests required by the Resource Conservation and Recovery Act (RCRA), U.S. Federal Department of Transportation (DOT), and State transportation department.

3.2.3 Disposal

Dispose of PCB contaminated sediments at the appropriate landfill in accordance with 40 CFR 761. Sediments containing less than 50 mg/kg PCB concentrations will be disposed in an in-state non-TSCA waste landfill. Sediments containing 50 mg/kg PCB concentrations or greater will be disposed in an out-of-state landfill licensed to receive TSCA material. A point of contact for each disposal facility will be provided.

3.3 Quality Control

1. A single composite of five (5) grab will be collected from each geotextile tube, prior to loading the sediment for disposal. Samples will be collected to a depth of 4 feet or refusal, whichever comes first, with a hand auger at evenly spaced locations along the geotextile tube (i.e. approximately every 40 feet lengthwise). PCB analysis will be performed on non-TSCA geotextile tubes per the requirements of the landfill. Additional details of disposal sampling are provided in the *Verification Sampling Plan* (VSP).
2. Dredged dewatered material will be subject to moisture testing for free liquids in either the lab or the field. The test will be conducted according to SW-846 Method 9095A. As part of the dewatering process, materials may be blended drying agents.

3. Prior to loading out sediment placed on the dewatering area, baseline air monitoring will be performed on a single day at two downwind perimeter points (two) along the dewatering pad to establish background PCB levels. In addition, sampling along the perimeter of the dewatering pad will occur at two downwind locations on two separate days during each sediment load-out phase or anytime dust is visible during load-out. Additional sampling may be performed should results show excessive levels of airborne PCBs above background.

-- END OF SECTION --

Sheboygan River and Harbor Superfund Site
Lower River

Verification Sampling Plan (VSP)

November 2010

Prepared for
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Sheboygan River and Harbor Superfund Site
Lower River

Verification Sampling Plan (VSP)

Prepared for
United States Environmental Protection Agency
Region 5

Prepared By
Pollution Risk Services, LLC

November 2010

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Exhibits

Exhibit 1 Turbidity Measurement Specification
Exhibit 2 Water Sampling for Correlation Curve Development Specification
Exhibit 3 Disposal Sampling Specification
Exhibit 4 Air Monitoring Specification
Exhibit 5 Water Monitoring Specification
Exhibit 6 Sediment Sampling Specification
Exhibit 7 Bathymetric Survey Specification

Figures

Figure 1 River Reaches
Figure 2 Typical Post-dredge Sample Locations

Appendices

Appendix A SWAC Calculation Procedure
Appendix B Standard Operating Procedures

1 Introduction

This Verification Sampling Plan (VSP) was prepared consistent with the requirements of the *Record of Decision* (ROD), *Administrative Order on Consent for Remedial Design for the Lower River Portions of the ROD* (AOC), and *Lower River Remedial Design Statement of Work for the Sheboygan River and Harbor Superfund Site* (LRRDSOW). Other companion documents that are required for performing the verification sampling include the *Quality Assurance Project Plan* (QAPP) and *Health and Safety Plan* (HASP), previously approved. They are provided as separate documents and should be referenced, as necessary. This VSP was developed consistent with the following U.S. EPA guidance document:

- *Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties,* OSWER Directive 9355.0-4B. April 1990.

1.1 Site Description

The Sheboygan River and Harbor Superfund Site (the Site) is located on the western shore of Lake Michigan approximately fifty-five miles north of Milwaukee, Wisconsin, in Sheboygan County. The Lower River includes the 11 miles of the river from the Waelderhaus Dam downstream to Lake Michigan and is comprised of the Middle River, Lower River, and Inner Harbor reaches. These reaches were defined by the U.S. EPA during the Remedial Investigations (RI), based on physical characteristics such as average depth, width, and level of polychlorinated biphenyl (PCB) sediment contamination. The Upper River reach of the Site was completed in 2007. Each separate reach of the "Lower River Portions" are described below and presented on Figure 1:

<u>Middle River</u> - extends seven miles from the Waelderhaus Dam to the former Chicago & Northwestern (C&NW) railroad bridge.

<u>Lower River</u> - extends three miles from the C&NW railroad bridge to the Pennsylvania Avenue Bridge in downtown Sheboygan.

<u>Inner Harbor</u> - extends from the Pennsylvania Avenue Bridge to the river's outlet to the Outer Harbor. The Outer Harbor is defined as the area formed by the two break-walls.

1.2 Objectives

The VSP objectives are to define the requirements, techniques, and reports to be used during the Lower River and Inner Harbor remediation and to confirm these portions' remedy. The measurements and documentation created from this VSP will be compiled in a Construction Complete Report, consisting of the following:

1. Field turbidity with Total Suspended Solids (TSS) correlation results;
2. Disposed sediments' poly-chlorinated biphenyl (PCB) concentrations;
3. Air monitoring PCB results;
4. Wastewater Treatment Plant (WWTP) influent/effluent results, including PCB, TSS, Mercury, and any other parameters required under the Wisconsin Pollutant Discharge Elimination System (WPDES) permit results;
5. Pre- and Post-dredge bathymetry;
6. Pre- and Post-dewatering area soil results;
7. Pre- and Post-dredge sampling results and logs;
8. Cover material quantities;
9. Mass of PCBs removed;
10. Deviations from plan;

11. The Post-dredge SWAC as calculated in accordance with the methodology presented in the Feasibility Study for each river reach; and
    a. SWAC Calculation procedure is provided in Appendix A.
12. Cubic yards of sediment removed and tons of sediment disposed.

2 Sample Methodology

The procedures used to perform the Lower River and Inner Harbor verification sampling as described in this section are further defined in the Standard Operating Procedures (SOPs) and are provided in Appendix B. The SOP's include:

- Completion of Field Logbook
- Decontamination of Sampling Equipment
- Sample Identification
- Chain-of-Custody, Labeling, Packaging, and Shipping
- General Interim Guidance for the Management of Investigative Wastes
- Sonar Bathymetry Survey
- Turbidity Measurement
- Water Sampling for Correlation Curve Development
- Disposal Sampling
- Air Monitoring
- Water Monitoring
- Surface Sediment Sampling – Ponar
- Subsurface Sediment Sampling – Vibrating Core
- Composite and Grab Sample Processing
- Trimble GeoXT Global Positioning System
- Dewatering Area Mitigation Soil Sampling

2.1 Turbidity Measurement

Identical to the work approved and performed in the Upper River, visual turbidity monitoring will be performed continuously to assess whether dredging and wastewater treatment activities are significantly contributing suspended solids to the river. The turbidity measurements will be reported in Nephelometric Turbidity Units (NTUs). During dredging and wastewater treatment, real-time turbidity measurements will provide information of the activity's increase in Total Suspended Solids (TSS) to the river.

2.1.1 River Water

Consistent with the Upper River, turbidity measurements during dredging will be conducted at two (2) locations, one (1) upstream and one (1) downstream approximately every two (2) hours or anytime there is a visible change in the water quality. Turbidity will be measured in NTUs. The level of TSS will be determined using the correlation curve discussed in Section 2.2. Turbidity measurements will be located in the field during each day of dredging, using the GPS, depending on the location of the dredge and downstream dispersion of the sediment. The downstream measurement will be collected approximately 500 feet from the dredge. The upstream measurement will be collected approximately 150 feet from the dredge. The downstream and upstream measurements will be collected at a location corresponding to the same distance from the shore where dredging is occurring. This procedure is further detailed in SOP #13 while sampling specifications are provided in Exhibit 1.

2.1.2 Wastewater Treatment Plant (WWTP) Effluent

Consistent with the Upper River, turbidity measurements will be made on the effluent stream of the Wastewater Treatment Plant (WWTP) approximately every hour to document real-time levels of TSS. Turbidity will be measured in NTUs. The level of TSS will be determined using the correlation curve discussed in Section 2.2. This procedure is further detailed in SOP #13 while sampling specifications are provided in Exhibit 1.

2.2 Water Sampling for Correlation Curve Development

2.2.1 River Water

Prior to dredge operations, a minimum of ten (10) turbidity measurements will be made concurrently with ten (10) grab water samples, analyzed for TSS, to develop the initial Turbidity to Total Suspended Solids (TSS) correlation curve. Additional turbidity measurements with concurrent samples, analyzed for TSS, will be collected twice/day during the first week of operation or anytime measurements are out of range to enhance the correlation curve. Turbidity measurements and TSS samples will be collected at various locations along the river and during a range of flow conditions. The correlation curve will be used during remediation to limit dredging or change dredging techniques if too much suspended solids are being released. In addition, river flow rates will be documented as reported from the USGS gauge station when obtaining turbidity measurements. The number of samples was sufficient to set a correlation for the Upper River remedy; however, if necessary, additional data may be added during the course of dredging activities to enhance the correlation curve. This procedure is further detailed in SOP #14 while sample specifications are provided in Exhibit 2.

2.2.2 Wastewater Treatment Plant (WWTP) Effluent

During the first day of operation, a minimum of ten (10) turbidity measurements will be made concurrently with ten (10) grab water samples in the effluent stream of the WWTP, analyzed for TSS, to develop the initial Turbidity to Total Suspended Solids (TSS) correlation curve. Additional turbidity measurements with concurrent samples in the WWTP effluent stream, analyzed for TSS, will be collected twice/day during the first week of operation or anytime measurements are out of range to enhance the correlation curve. The correlation curve will provide the ability to determine real time levels of TSS and allow immediate stoppage of work, notification to regulators, and operational changes, if necessary. The number of samples was sufficient to set a correlation for the Upper River remedy; however, if necessary, additional data may be added during the course of dredging activities to enhance the correlation curve. This procedure is further detailed in SOP #14 while sample specifications are provided in Exhibit 2.

2.3 Disposal Sampling

Sediment slurry is pumped to a dewatering area to allow passive dewatering of the sediment. In-situ TSCA material will be identified, dredged, and de-watered in specific geo-textile tubes. A minimum of one (1) composite sample from five (5) grab locations equally spaced along the non-TSCA geo-textile tube (i.e. every 40 feet) will be collected by pushing a hand auger 4 feet or to refusal, whichever comes first. PCB analysis will be performed on all composite samples to determine that concentrations meet the requirements of the landfill. This procedure is further detailed in SOP #15 while sampling specifications are provided in Exhibit 3.

2.4 Air Monitoring

Health and safety air monitoring will be conducted at the dewatering location or Site. The health and safety monitoring conducted for the Lower River is the same as was approved and performed for the Upper River. Prior to sediment placed in the dewatering area, baseline air monitoring will be performed on a single day at two (2) down wind perimeter points along the dewatering area to establish background PCB levels. In addition, sampling along the perimeter of the dewatering area will occur at two (2) down wind locations on two (2) separate days during each load-out phase. Additional sampling will be performed should results show excessive levels of airborne PCB's above background or any time there is visible dust. This procedure is further detailed in SOP #16 while sampling specifications are provided in Exhibit 4.

2.5 Wastewater Monitoring

Carriage water from the dewatering area will be routed to the on-site Wastewater Treatment Plant (WWTP) for treatment prior to discharge back into the Sheboygan River. Water treated with the on-site WWTP will be collected required to meet the Wisconsin Pollution Discharge Elimination System (WPDES) permit. Influent and effluent will be sampled at a rate designated by the WPDES permit. At a minimum and consistent with the requirements in the Upper River, effluent will be daily composites collected during dredge operations and analyzed for PCB's and TSS. The pH will be analyzed once per month from the daily composite effluent sample. Influent will be daily grabs collected during dredge operations and analyzed for PCB's and TSS. Mercury will be analyzed twice per month from a grab influent and effluent sample. This procedure is further detailed in SOP #17 while sampling specifications are provided in Exhibit 5.

2.6 Post-Dredge Verification Sediment Sampling

In grids or sub-grid where dredging is performed, sediment will be sampled using a Vibrating Core Sampler and analyzed for PCB concentration. Sampling will be conducted, at a minimum, one week after dredging is complete. The core samples will be collected to a depth of two feet or refusal, whichever comes first. The core samples will be collected from the bottom (located at the center of the grid or sub-grid) and from the midpoint of the slope on each edge of the grid or sub-grid abutted to a non-dredged grid or sub-grid. Bottom cores will be analyzed at the 0-6" and 0-2' intervals by splitting the core in half. The 0-6" interval from one half of the core will be homogenized for analysis and the 0-2' interval from the second half of the core will be homogenized for analysis. Edge cores will be analyzed at the 0-2' interval by homogenizing the entire core.

If 75% recovery is not achieved on the first attempt, two (2) additional attempts will be made at different locations within the grid or sub-grid. If after the third attempt 75% recovery is still not achieved, a notation will be made in the field logbook for this sample location and the core will be processed as noted. Each sample location will be identified with the Global Positioning System (GPS) unit and logged in the GPS data file. The resulting PCB concentration will be used in the Mitigation Plan Decision Tree, Appendix A. Further detail for sub-surface (i.e. core) sediment sampling is provided in SOP #29. GPS procedure is provided in #31. Sampling specifications are provided in Exhibit 6. Figure 2 is provided to show typical locations and types of post-dredge verification samples.

2.7 Post-Dredge SWAC Determination Sediment Sampling

In grids in the Lower River and Inner Harbor Between Bridges (IHBB) 500 feet downstream from last dredge grid (generally grids 102/103), post-dredge or post-remediation sediment surface (0-6") will be sampled with a Ponar Sampler and analyzed for PCB concentration. Sampling will be conducted after dredging is deemed complete. Post-dredged sediment surface will have samples collected at a rate of six (6) grabs per 8,100 square foot grid with a Petite Ponar Dredge. The grab samples will be composited. The grab samples will be collected from the center of six (6) equal sub-grids established within the 8,100 square foot grid.

In grids in the Inner Harbor 500 feet downstream from last dredge grid (generally grids 102/103) to the mouth, post-dredge or post-remediation sediment surface (0-6") will be sampled with a Ponar Sampler and analyzed for PCB concentration. Sampling will be conducted as dredging moves down river. Post-dredged sediment surface will have samples collected at a rate of one (1) grab per 8,100 square foot grid with a Petite Ponar Dredge. The grab samples will be generally collected from the same location as the Pre-design Investigation.

If no sediment is recovered on the first attempt, from any grid or sub-grid, two (2) additional attempts will be made at different locations within the grid or sub-grid. If after the third attempt no sediment is recovered, a notation will be made in the field logbook for this sample location and a value of half the detection limit will be assigned to that section of the grid as a resulting PCB concentration. Each sample location will be identified with the Global Positioning System (GPS) unit and logged in the GPS data file. The resulting PCB concentration will be used in determining the post-dredge SWAC. Further detail for surface sediment sampling is provided in SOP #24. GPS procedure is provided in #31. Sampling specifications are provided in Exhibit 6. Figure 2 is provided to show typical locations and types of post-dredge SWAC determination samples.

2.8 In-situ TSCA Sediment Delineation Sampling

Additional sampling will be performed, prior to dredging, to determine or bound the limits of TSCA regulated sediment (concentrations $\geq$ 50 ppm). The grids scheduled for additional sampling are as follows: 175, 184, 173, 182, 169, 165, 163, 172, 133, 131, 138, 125, and 124. Sediment will be sampled with a Vibrating Core Sampler and the samples analyzed for PCB concentration. Sampling will be performed by dividing the main 8,100 square foot grid into 6 sub-grids and collecting a core from the center of the grid by pushing to refusal. Analysis will be performed on 6" intervals.

If proper recovery (> 75%) is not obtained on the first attempt, two (2) additional attempts will be made at different locations. If after the third attempt the proper recovery is not obtained, a notation will be made in the field logbook for this sample location and the sediment collected in the third core will be processed for analysis. Each sample location will be identified with the Global Positioning System (GPS) unit and logged in the GPS data file. Further detail for subsurface sediment sampling is provided in SOP #29. GPS procedure is provided in #31. Sampling specifications are provided in Exhibit 6.

2.9 Bathymetric Surveying

A bathymetric survey will be performed before and one week following completion of a dredged grid or sub-grid and placement of cover, if necessary. The before and after survey measurements will be compared to verify that sediment was removed or cover is placed to the required elevations and to establish a post-dredge/baseline river bottom contour. Sonar bathymetric surveying transects will be located at a traverse or cross-section frequency of 10 feet unless near a bridge structure that interferes with surveying. Here, bathymetric measurements will be taken at the best available traverse frequency and noted in the Field Logbook. The ends of each transect will extend from the land-water interface on one shore to the land-water interface of the opposite shore. Specifications for bathymetric surveying are provided in Exhibit 7 and SOP #12 describes the procedures.

2.10 Dewatering Area Mitigation Soil Sampling

A site assessment in conformance with Wisconsin Administrative Code, ch. NR 700 (NR 700) will be performed on the entire dewatering area property, including paved and unpaved areas. If soil or groundwater contamination is discovered, soil and groundwater will be remediated in conformance with NR 700. Site assessment will include sampling for PCBs, PAHs, and Resource Conservation and Recovery Act (RCRA) heavy metals. If final remediation includes a protective cap, a cap maintenance plan shall be developed in accordance with NR 700. SOP #32 describes the procedures.

2.11 Field Instrumentation

Instruments and equipment used to generate, or measure environmental data will be calibrated in accordance with the manufacturer's specifications. Field measurement devices will be calibrated upon first use for this project. Maintenance and procedural requirements from the manufacturer will be followed to ensure that the field equipment is operating properly.

Equipment to be used during field sampling will be examined to certify that it is in operating condition. This includes following recommendations of the manufacturer's operating manual to ensure that all maintenance requirements are being observed. Calibration of field instruments will be performed at intervals specified by the manufacturer or more frequently as conditions dictate. In the event that an internally calibrated field instrument fails to meet calibration/checkout procedures, it will be returned to the manufacturer for servicing or a replacement in-kind will be obtained.

Calibration of field instruments is governed by manufacturer procedures, and such procedures take precedence over the following general discussions.

- Global Positioning System - The GPS system is a Geoexplorer 2005 series manufactured by Trimble. This GPS unit will be operated by trained personnel. The GPS unit will be linked to a beacon daily. Specifications for the accuracy of the X (latitude) and Y (longitude) coordinates are determined based on the available satellites and the amount of interference (i.e., trees, vegetation, etc.). Standard tolerance with the beacon and appropriate satellites (4 – 5) is +/- 3 feet. Calibration will be performed daily.
- Sonar – Per manufacturer recommendations on a daily basis.
- pH Meter - The pH meter will be calibrated monthly with a pH of seven (7) buffer solution.
- Nephelometer (Turbidity Meter) Calibration – The turbidity meter is an Analite NEP160 manufactured by McVan Instruments. A two point calibration will be performed weekly with a 0 NTU reference solution and a 100 NTU reference solution provided by the manufacturer.
- Air sampler – Initially the unit is calibrated for a specified volume of air by the laboratory. If necessary, a flowmeter will be used to calibrate the air sampler before each day of use. Battery replacement will be performed before each use.
- Dry back equipment – Dry back equipment consists of a Model 10 Humboldt Lab oven and scale. The oven is used to dry back the sediment and measure the amount of moisture content. Based on the manufacturer, no calibration is necessary for the Lab oven. The balance will be calibrated before each use with ASTM Class 1 (or equivalent) weights.
- ISCO Sampler – Based on the manufacturer, no calibration is necessary. Sample volumes, intervals, start time, etc. will be performed daily. The strainer will be cleaned monthly and the hoses feeding the ISCO sample will be replaced monthly.

2.12 Quality Assurance and Quality Control

Quality Assurance (QA) and Quality Control (QC) are discussed in detail in the approved *Quality Assurance Project Plan* (QAPP), provided as a separate document. Both laboratory and field quality control samples are indicated. In addition to quality control samples, field QA/QC will include specific sampling documentation, sample handling, field instrument maintenance and calibration, equipment decontamination, data reduction, third-party data validation, and laboratory reporting procedures. The analytical laboratory will adhere to their Quality Assurance Manual (QAM) and the QA/QC requirements of the analytical method.

2.13 Sample Designation

Media to be sampled will consist of sediment, soil, water, and air. A detailed description of the sample designation and identification nomenclature for samples to be collected during the verification sampling is provided in SOP #6.

2.14 Sampling Handling and Analysis

Samples collected will be brought to the dewatering area for processing or processed in the field. Further detail for composite, core interval homogenization, and grab sample processing is provided in SOP #30.

All processed samples will be secured within a refrigerator and shipped to the laboratory. Non-dedicated sampling equipment, which includes Ponar dredge, stainless steel container, sampling spoon, and hand auger will be decontaminated between grab or composite sampling. Further detail for decontamination of non-dedicated sampling equipment is provided in SOP #2.

Each sample collected will be containerized, preserved, and shipped for analysis in accordance with the requirements listed in the QAPP. Further detail for packaging and shipping methods is provided in SOP #7 as well as examples of the paperwork that will be used to track sample shipments.

3 Safety Plan

All sampling activities will be performed in accordance with the approved *Health and Safety Plan* (HASP). The Pre-design Investigation data will be used to determine level of PPE and training for Site personnel.

4 Records and Reporting

4.1 Records

Records of the sampling activities will be kept in a project file or field logbook. Substantive logbook data will be entered into a Quality Control Report which will become the comprehensive file. Further detail for completion of a field logbook is provided in SOP #1.

4.2 Reporting

Analytical data reports normally will be received from the contract laboratory within 15 business days of receipt of samples from the field. If quick turn around time is necessary for results, the laboratory directory will be notified and the quick turn around time requirement will be documented on the Chain-of-Custody. Analytical data will be submitted in printed and electronic format. The printed format will include a signed narrative from the laboratory stating that the analytical results comply with U.S. EPA requirements, unless otherwise specified. Deviations from standard methodologies, additional sample prep, and analytical problems not rectified, will be justified in the narrative enclosed with the printed laboratory report.

Analytical results will include sample identification, sampling dates, date samples were received by the laboratory, analysis dates, analytical methods used, and sample quantitation limits. Sampling forms, chain-of-custody forms, and summary sheets for laboratory QC samples also will be included with printed analytical results. Samples which exceed control limits or acceptance criteria will be flagged in the analytical report. As described in the QAPP, the concentration of non-detects will be assigned the value of one-half the value of the detection limit for all calculations and comparisons.

Analytical data will be exported to spreadsheets and summarized electronically (MS Excel) in tabular form for ease of use. GPS station location information will be delivered in decimal degrees, or other electronic format approved by U.S. EPA. The submission of this data will be in accordance with the Submittal Register. All of the monitoring, survey, and sampling data will be made available in electronic format to USEPA and WDNR.

Maps will be drawn at the smallest practical scale that allows information to be shown on a single-sheet. The sheet size will be based to allow the reader/reviewer a clear understanding of the presentation and the sheets could range from 8½" x 11" to 11" x 17" up to ANSI D (22" x 34"). Tables, maps, and an electronic copy of the laboratory analytical data reports will be included in the report. The reports will include all GPS coordinates of sampling locations in the Appendices.

Verification results will be used to develop a Construction Complete Report, which shall include the following information:

1. Field turbidity with Total Suspended Solids (TSS) correlation results;
2. Disposed sediments’ poly-chlorinated biphenyl (PCB) concentrations;
3. Air monitoring PCB results;
4. Wastewater Treatment Plant (WWTP) influent/effluent results, including PCB, TSS, Mercury, and any other parameters required under the Wisconsin Pollutant Discharge Elimination System (WPDES) permit results;
5. Pre- and Post-dredge bathymetry;
6. Pre- and Post-dewatering area soil results;
7. Pre- and Post-dredge sampling results and logs;
8. Cover material quantities;
9. Mass of PCBs removed;

10. Deviations from plan;
11. The Post-dredge SWAC as calculated in accordance with the methodology presented in the Feasibility Study for each river reach; and
    a. SWAC Calculation procedure is provided in Appendix A.
12. Cubic yards of sediment removed and tons of sediment disposed.

5 Investigative Derived Waste (IDW)

The field sampling procedures necessary for the investigation activities will generate solid Investigative Derived Waste (IDW). IDW is generally defined as any solid waste including contaminated media (sediment) generated as a result of typical investigative activities, including but not limited to tests, excess sample materials, and Personnel Protective Equipment (PPE) that is intended to be disposed of.

Any excess sediment collected but not submitted for laboratory analyses will be minimized, to the extent practicable, and will be managed as a remedial waste. All IDW will be appropriately managed in accordance with the WDNR, *General Interim Guidance for the Management of Investigation Waste (Publication RR556)* (April 2002) and disposed at the appropriate off-site landfill. A copy of *Publication RR556* is included in SOP #8. The specific sections of the WDNR, *Publication RR556* that should be reviewed are:

- Section III – *General Management Principles*
- Appendix B – *Guide to Management of Investigation Derived Waste.*
- Attachment 3 – *Long Term On-Site Storage of Investigation Derived Wastes*.

In general, IDW management methods should be protective of human health, the environment, and comply with applicable laws and regulations including solid waste and hazardous waste.

6 References

U.S. EPA. 1990. *Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties,* OSWER Directive 9355.0-4B. April 1990.

U.S. EPA. 2000. *U.S. EPA Superfund Record of Decision*, *Sheboygan River and Harbor*, *Sheboygan, Wisconsin*, May 2000.

U.S. EPA. 2009. *Administrative Order on Consent for Remedial Design for the Lower River Portions of the ROD.* January 2009.

U.S. EPA. 2009. *Statement of Work for the Lower River Remedial Design for the Sheboygan River and Harbor Superfund Site, Sheboygan County, Sheboygan, Wisconsin.* January 2009.

PRS. 2009. *Health and Safety Plan (HASP)*. April 2009.

PRS. 2009. *Quality Assurance Project Plan (QAPP)*. April 2009.

WDNR. 2002, *General Interim Guidance for the Management of Investigation Waste (Publication RR556).* April 2002.

EXHIBIT 1
Turbidity Measurement Specification

Location	Measurement Frequency (hours)	Horizontal Position Accuracy (feet)	Quality Control
River water - 150' up-river from dredge	2	± 10	Five readings - averaged
River water - 500' down-river from dredge	2	± 10	Five readings - averaged
WWTP effluent	1	Not applicable	Five readings - averaged

EXHIBIT 2
Water Sampling for Correlation Curve Development Specification

Location	Measurement Frequency (number)	Sample Type	Field Duplicates (%)
River – Initial	10	Grab	10
River – Operation	Twice/day during first week of operation or anytime measurements are out of range	Grab	10
WWTP	10	Grab	10
WWTP – Operation	Twice/day during first week of operation or anytime measurements are out of range	Grab	10

EXHIBIT 3
Disposal Sampling Specification

Location	Measurement Frequency	Sample Type	Depth	Field Duplicates (%)
Dewatering Area	Non-TSCA Geotextile Tube	Composite of 5 grab locations evenly spaced (i.e. every 40 feet)	4 feet or refusal, which ever comes first	10

EXHIBIT 4
Air Monitoring Specification

Location	Measurement Frequency (events)	Perimeter Locations	Sample Type
Dewatering Area	Baseline and during each load-out phase	2 – located down wind	Composite of 8 hours

EXHIBIT 5
Water Monitoring Specification

Location	Measurement Frequency	Sample Type	Field Duplicates (%)
WWTP (Influent TSS)	Daily	Grab	10
WWTP (Influent PCB)	Daily	Grab	10
WWTP (Influent Mercury)	Bi-weekly	Grab	10
WWTP (Effluent TSS)	Daily	24-hr Composite	10
WWTP (Effluent PCB)	Daily	24-hr Composite	10
WWTP (Effluent Mercury)	Bi-weekly	Grab	10
WWTP (Effluent Flow Rate)	Daily	Continuous	NA
WWTP (pH)	Monthly	Grab	NA

Notes:
NA – Not Applicable
Influent samples are grabs and effluent samples are composites unless noted.
Location, frequency, and sample type will be finalized with approved WPDES Permit.

EXHIBIT 6
Sediment Sampling Specification

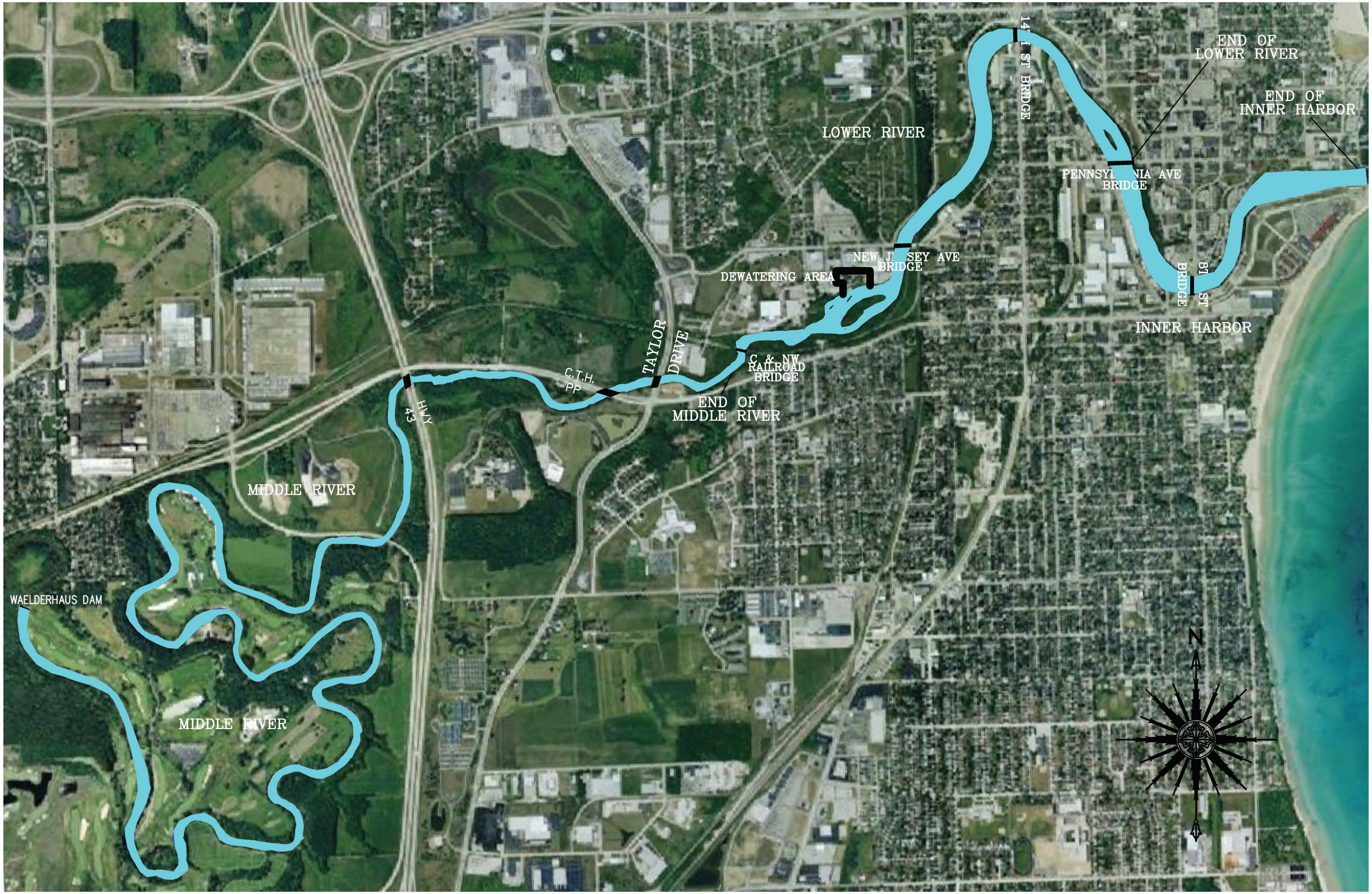
Description	Measurement Frequency	Depth	Interval Sample Frequency	Sample Type	Horizontal Position Accuracy (feet)*	Horizontal Position Precision (%)*	Interval Sample Accuracy (inch)	Core Recovery (%)	Field Duplicates (%)
Post-dredge Verification	Bottom of grid or sub-grid	2 feet	0-6” 0-2’	Homogenized grab from each interval	± 3	<5	± 1	75	20
Post-dredge Verification	Edges of grid or sub-grid adjacent to non-dredged area	2 feet	0-2’	Homogenized grab from interval	± 3	<5	± 1	75	20
SWAC Determination – Lower River and Inner Harbor Between Bridges (500 feet downstream of last dredge grid, generally grids 102/103)	Six locations (i.e. sub-grid) per grid	0.5 feet	0-6”	Composite	± 3	<5	NA	NA	20
SWAC Determination – Inner Harbor (500 feet downstream of last dredge grid, generally grids 102/103) to mouth	One location per grid	0.5 feet	0-6”	Grab	± 3	<5	NA	NA	20
TSCA Delineation	Six locations (i.e. sub-grid) per grid	Refusal	Every 6”	Grab from each interval	± 3	<5	± 1	75	20

Notes:
NA = Not applicable

EXHIBIT 7
Bathymetric Survey Specification

Description	Measurement Frequency	Horizontal Position Accuracy (feet)*	Horizontal Position Precision (%)*	Vertical Accuracy (feet)	Vertical Precision (%)	Quality Control
Sonar	Transects every 10 feet with ping measurements collected every 0.5 feet along transect.	± 0.5	<5	± 0.25	< 5	Establish Benchmark

Notes:
* – Based on satellite coverage and topography



SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
LOWER RIVER DESIGN
SHEBOYGAN FALLS, WISCONSIN

RIVER REACHES

PRS Pollution Risk Services
7870 East Kemper Road, Suite 240
Cincinnati, Ohio 45249
Phone: 513-489-2793
Fax: 513-489-2794

REVISIONS			SIGNATURES	
NO.	BY	DATE	BY	DATE
△	KDA	NOVEMBER 17, 2010		
			APPROVED	
△				
			REVIEWED	
△				
			DESIGNED	

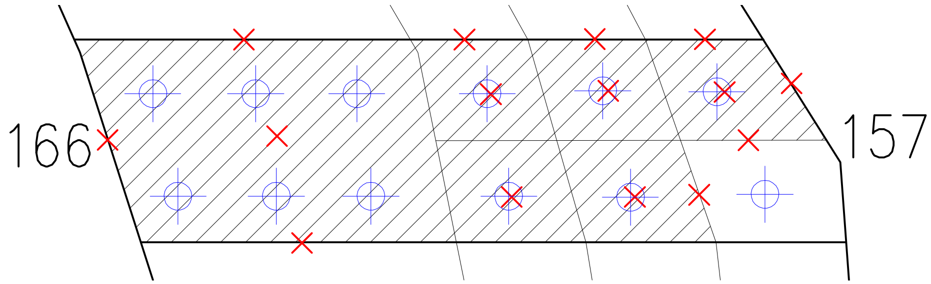
RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS. BY ______ DATE ______

FILE NAME:
DRAWN BY: KDA DATE: NOVEMBER 2009

REUSE OF DOCUMENTS
THIS DOCUMENT HAS BEEN DEVELOPED FOR A SPECIFIC APPLICATION AND NOT FOR GENERAL USE. THEREFORE IT MAY NOT BE USED WITHOUT THE WRITTEN APPROVAL OF FOTH & VAN DYKE and ASSOCIATES. UNAPPROVED USE IS THE SOLE RESPONSIBILITY OF THE UNAUTHORIZED USER.

Scale: SHOWN

FIGURE NO. 1



LEGEND

DREDGED AREA

SWAC DETERMINATION SAMPLE LOCATION – PONAR

POST–DREDGE VERIFICATION SAMPLE LOCATION – CORE

FILE NAME:
DRAWN BY: KDA
DATE: NOVEMBER 2010

SIGNATURES BY DATE
APPROVED
REVIEWED
DESIGNED

REVISIONS
NO. BY DATE

Pollution Risk Services
7870 East Kemper Road, Suite 240
Cincinnati, Ohio 45249
Phone: 513-489-2793
Fax: 513-489-2794

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
LOWER RIVER DESIGN
SHEBOYGAN FALLS, WISCONSIN

TYPICAL POST-DREDGE SAMPLE LOCATIONS

Scale:
NOT TO SCALE

FIGURE NO.
2

APPENDIX A
SWAC Calculation Procedure

Subject:

SWAC Calculation Procedure

Purpose and Objective:

The following calculation is used to determine the soft sediment PCB SWAC for the defined units (i.e. deposits, grids) in the Lower River section (i.e. Middle River, Lower River, and Inner Harbor of the Sheboygan River.

Procedure:

Soft Sediment SWAC will be calculated as:

$$\text{SWAC} = \frac{\sum_{i=1}^{n} A_i \times C_i}{\sum_{i=1}^{n} A_i}$$

Where

A_i = surface area of associated Soft Sediment defined unit
C_i = PCB concentration of associated Sediment defined unit
n = total number of Soft Sediment defined units

COMPLETION OF FIELD LOGBOOK
STANDARD OPERATING PROCEDURE #1
Revision: 02
Revision Date: 11/17/2009

I) Scope:
This Standard Operating Procedure (SOP) is used for the purpose of recording data in the Field Logbook to create a legally defensible record to reconstruct field activity. This procedure is to be used during all field activities related to Sediment Pre-Design Investigation, Sediment Remediation Verification, and Sediment Post-Remediation Monitoring.

II) Equipment/Materials:
- Field Logbook
- Calculator
- Waterproof Black Ink Pen
- Watch

III) Procedure Description:
A. Completion of Field Logbook
1. All information related to the field activity or sampling event must be recorded in a bound Field Logbook using a black waterproof ink pen. If the ink pen does not function at the time of entry, note the malfunction as reason for using some other method (i.e., pencil, etc.). The title page of the logbook will include the following (at a minimum):
   a) Person to whom the logbook is assigned
   b) Logbook number
   c) Project name
2. The date and start time will be documented at the beginning of each entry. Additional entries in the logbook must include the following:
   a) Time of each entry (24-hour clock) for each activity performed
   b) General field conditions
   c) Project personnel on jobsite
   d) Activities performed
   e) References, (i.e., maps or photographs)
   f) Instrument calibration parameters
   g) Instrument readings for health and safety monitoring (if applicable)
   h) Level of Personal Protective Equipment (PPE) (if applicable)
   i) Personnel and equipment decontamination procedures (if applicable)
   j) Name of visitors and reason for visit
3. The field notes portion of the Field Logbook will document the day's field activities and be completed in a sequential, chronological order. In addition to the items listed in above, the following will be documented in the field notes portion of the logbook (if applicable).
   a) Type, volume, and number of samples collected
   b) Sample location and identification number
   c) Sampling method
   d) Sample handling, packaging, labeling and shipping information (including destination)
   e) Reference to field data or log sheets

B. Reporting, Quality Assurance, Quality Control:
1. The individual responsible for documenting the day's field activities will sign the bottom of the page at the end of the day.
2. Data changes or errors within the Field Logbook should be corrected by placing a single line through the data, followed by the recorders initials and date, followed by the correction.
3. The Field Logbook will be kept in a secure place during the field activities (i.e., in hand, within visual site, locked in field vehicle, office trailer, etc.).

4. Upon completion of the activity, the Field Logbook will be checked for completeness and a copy of the completed logbook will be made. The copy of the logbook will be stored as part of the project files. The original Field Logbook will become part of the final evidence file.
5. Pages left blank in the logbook will be marked "intentionally blank".

IV) Related Activities

A. <u>Typical Pre-Field Logging Activities</u>
   1. Earthworm Sampling (SOP #9)
   2. Turbidity Measurement (SOP #13)
   3. Water Sampling for Correlation Curve Development (SOP #14)
   4. Air Monitoring (SOP #16)
   5. Water Monitoring (SOP #17)
   6. Disposal Sampling (SOP #15)
   7. Emergent Invertebrates Sampling (SOP #20)
   8. Surface Sediment Sampling – Ponar (SOP #24)
   9. Subsurface Sediment Sampling - Manual Core Tube (SOP #28)
   10. Subsurface Sediment Sampling – Vibra Core (SOP #29)
   11. Composite and Grab Sample Processing (SOP #30)
   12. Dewatering Area Mitigation Soil Sampling (SOP #32)

B. <u>Typical Post-Field Logging Activities</u>
   1. Chain-of-Custody, Labeling, Packaging, and Shipping (SOP #7)

DECONTAMINATION OF SAMPLING EQUIPMENT
STANDARD OPERATING PROCEDURE #2
Revision: 04
Revision Date: 11/12/2010

I) Scope:

This Standard Operating Procedure (SOP) is used for decontaminating non-dedicated sampling or sample processing equipment after use. Non-dedicated sampling equipment, which includes Ponar dredge, stainless steel container, sampling spoon, and hand auger will be decontaminated between grab or composite sampling. This procedure is used for Sediment Pre-Design Investigation, Sediment Remediation Verification, and Sediment Post-Remediation Monitoring.

II) Equipment/Materials:

- Personnel Protective Equipment (PPE), as defined in the HASP
- Scrubbing brushes
- Soap[1] , biodegradable-phosphate free, (i.e., Alconox or equivalent)
- Clean water source
- Storage container

III) Procedure Description:

A) Decontaminating Non-dedicated Sampling or Sample Processing Equipment

1. Don PPE as required by the *Health and Safety Plan* (HASP).
2. Decontamination of sample collection equipment will be performed in the field to expedite sample collection or in the sample processing compositing area.
3. Grab Samples: Decontamination will be performed between each location for Grab samples.
4. Composite Samples: Decontamination will be performed after all composite locations have been collected.
5. Scrape or rub off any excessive material from the non-dedicated equipment and place into appropriate container for end of shift transportation to the processing area for bulk storage and future disposal at the appropriate landfill.
6. Clean/scrub the equipment with water and natural soap solution.
7. Rinse with clean water.
8. Collect all decon water and place into appropriate storage container for transportation to the processing area at the end of the shift. DO NOT DISCHARGE DECON WATER INTO RIVER.
9. Allow to air dry as necessary.
10. At the end of the shift, collect all PPE and decon water and transport back to the processing area. Place material in appropriate bulk containers for future disposal at the appropriate landfill.

B) Reporting, Quality Assurance, Quality Control:

1. Complete Field Logbook as detailed in SOP #1

IV) Related Activities

A) Typical Pre-Decon Activities

1. Earthworm Sampling (SOP #9)
2. Turbidity Measurement (SOP #13)
3. Water Sampling for Correlation Curve Development (SOP #14)
4. Air Monitoring (SOP #16)
5. Water Monitoring (SOP #17)
6. Disposal Sampling (SOP #15)
7. Emergent Invertebrates Sampling (SOP #20)
8. Surface Sediment Sampling – Ponar (SOP #24)
9. Subsurface Sediment Sampling - Manual Core Tube (SOP #28)
10. Subsurface Sediment Sampling – Vibra Core (SOP #29)

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[1] No detergents and/or solvents will be used.

11. Composite and Grab Sample Processing (SOP #30)
12. Dewatering Area Mitigation Soil Sampling (SOP #32)

B) Typical Post-Decon Activities
   1. Chain-of-Custody, Labeling, Packaging, and Shipping (SOP #7)

SAMPLE IDENTIFICATION
STANDARD OPERATING PROCEDURE #6
Revision: 04
Revision Date: 03/12/2010

I) Scope:
The following Standard Operating Procedure (SOP) outlines the procedures required for sample identification. This procedure is used for Sediment Pre-Design Investigation, Sediment Remediation Verification, and Sediment Post Remediation Monitoring.

II) Equipment/Materials:
Not applicable

III) Procedure Description:
Many initials, abbreviations, and acronyms are used in naming samples. Where one has been defined before, it will not be re-defined. A complete list is provided at the end of this section.

Key to sample identification is the concept of defined unit established because of the different sediment deposition characteristics and remedial approach of these reaches. A defined unit for the Upper River will be the previously established Remedial Management Units (RMU). A defined unit for the Middle River and any portion of the Lower River where sediment may be found intermittently will be a deposit. A defined unit for the portions of the Lower River where sediment exists throughout the river bottom and the Inner Harbor, will be a grid.

A) Sediment Pre-Design Investigation Sample
Samples collected to characterize the river before remediation will be denoted as follows:

River Reach Initials-PRD-Defined Unit-Depth

Where: **River Reach Initials** is: **UR** (Upper River), **MR** (Middle River, **LR** (Lower River) and **IH** (Inner Harbor),
PRD is Pre Remedial Design sample,
Defined Unit is: RMU, Deposit, or Grid, and
Depth is the interval of sediment sample

Example:

MR-PRD-DEP1 0-6”	Characterization sample from 0-6” interval at Deposit 1 in Middle River.
IH-PRD-Grid1 0-1’	Characterization sample from 0 to 1 foot interval at Grid 1 of Inner Harbor.

B) Verification Samples

1) Water Monitoring
Grab samples of the WWTP influent will be collected daily and analyzed for PCBs and Total Suspended Solids (TSS). Composite samples of the WWTP effluent will be collected daily and analyzed for PCBs and TSS. Grab samples of the WWTP influent and effluent will be collected twice per month and analyzed for Mercury. Samples will be denoted as follows:

WWTP-Water Type, Date

Where: **WWTP** is Wastewater Treatment Plant sample and
Water Type is **DWI** for Influent and **DWE** for Effluent.

Example:

WWTP-DWI, 3/1/08	Influent sample collected March 1, 2008.
WWTP-DWE, 3/1/08	Effluent sample collected March 1, 2008.

2) Air Monitoring

Air samples collected prior to and during the first week of loading out sediment from the dewatering pad will be denoted as follows:

AIR- Number, Date

Where: **AIR** is Air sample
Number is assigned by Project Manager

Example:

AIR-1, 3/1/08	Air sample collected from location 1 on March 1st, 2008.

3) Disposal Sampling

Sediment grab samples collected and composited from five (5) locations per 1,000 cubic yards will be denoted as:

DS- Number, Date

Where: **DS** is Disposal Sample and
Number is assigned by Project Manager.

Example:

DS-1, 3/1/08	Disposal sediment sample collected on March 1st, 2008 from first 1,000 cubic yards.

4) Water Samples for Correlation Curve Development

River water samples collected will be denoted as follows:

W- Number-Location-CC, Date

Where: **W** is Water sample
Number is assigned by the Project Manager
Location is River (**R)** or Waste Water Treatment Plan (**WWTP**) and
CC is Correlation Coefficient

Example:

W-1-R-CC, 3/1/08	Sample identifier for the first water sample collected from river to develop the correlation curve on March 1st, 2008.
W-1-WWTP-CC, 3/1/08	Sample identifier for the first water sample collected from WWTP to develop the correlation curve on March 1st, 2008.

5) Surface Sediment Sampling - Ponar

Sediment samples collected to verify concentrations following dredging will be denoted as follows:

River Reach Initials-PD-Defined Unit

Where: **PD** is Post-Dredging sample

Example:

LR-PRD-GRID1	Verification sample at Grid 1 in Lower River
IH-PRD-GRID5	Verification sample at Grid 5 in Inner Harbor

6) Dewatering Area Mitigation Soil Sampling

Surface soil samples collected to verify concentrations following dewatering will be denoted as follows:

Location-S-Defined Unit, Depth

Where: **S** is soil sample

Example:

DA-S-A1, 0-1'	Mitigation soil sample at grid A1 in Dewatering Area from the 0-1' interval

C) Post-Remediation Monitoring Samples

Samples collected to track concentrations of fish or sediment in river are described below.

1) Upper and Lower River Baseline Fish Monitoring

Baseline Upper and Lower River fish samples collected will be denoted as follows:

BL-River Reach Site-Fish Species-Sample Type, Date

Where: **BL** is Base Line Monitoring sample,
River Reach and Site is: **UR1** (above Riverbend Dam or Site 1), **UR2** (between Riverbend and Waelderhaus Dam or Site 2), **MR1** (above Kohler Landfill or Site 1), **MR2** (below Kohler Landfill or Site 2), **LR** (Lower River) or **IH** (Inner Harbor),
Fish Species is: **SB** (smallmouth bass), **C** (carp), **WS** (white sucker), **W** (Walleye), **CC** (channel catfish), **LD** (longnose dace), and **RB** (rock bass),
Sample Number is: 1, 2, 3, 4, etc., and
Sample Type is: **C** (composite) or **G** (grab).

Examples:

BL-MR1-SB1-G, 7/15/2008	Smallmouth bass #1 collected July 15, 2008, in Middle River Site 1 and submitted as a grab sample.

2) Floodplain Earthworms Monitoring
Earthworm samples collected for post-remedial monitoring will be denoted as follows:

PRM-Floodplain-EW, Date

Where: **PRM** is post-remedial monitoring sample,
Floodplain is Floodplain Number (1-6)
EW (earthworm)

Example:

PRM-FP6-EW, 9/10/2015	Earthworm sample collected from Floodplain 6 on September 10th, 2015.

3) Upper and Lower River Annual Fish Monitoring
Phase 1 Upper and Lower River post-remedial monitoring fish samples collected will be denoted as follows:

PH1-PRM-River Reach and Site-Fish Species-Sample Type, Date

Where: **PH1** (Phase 1 Monitoring sample),
PRM (Post Remedial Monitoring sample)
River Reach and Site is: **UR1** (above Riverbend Dam or Site 1), **UR2** (between Riverbend and Waelderhaus Dam or Site 2), **MR1** (above Kohler Landfill or Site 1), **MR2** (below Kohler Landfill or Site 2), **LR** (Lower River) or **IH** (Inner Harbor),
Fish Species is: **SB** (smallmouth bass), **C** (carp), **WS** (white sucker), **W** (Walleye), **CC** (channel catfish), **LD** (longnose dace), and **RB** (rock bass),
Sample Number is: 1, 2, 3, 4, etc., and
Sample Type is: **C** (composite) or **G** (grab).

Example:

PH1-PRM-UR1-SB1-G, 7/15/2008	Smallmouth bass #1 grab Phase 1 post-remedial monitoring sample collected from the Upper River above the Riverbend Dam (Site 1) on July 15th, 2008.

Phase 2 Upper and Lower River post-remedial monitoring fish samples collected will be denoted with the prefix **PH2** rather than **PH1**. All other naming is the same as for Phase 1.

4) Upper and Lower River Sediment Monitoring
Sediment samples will be collected every five years until the remedial goals are met. Additional monitoring may be performed more frequently. After the five (5) year monitoring is completed, conformational sampling will be conducted annually for three (3) years to assure the sediment goals have been met.

Sediment samples may be collected more frequently than every five (5) years will be denoted as follows:

PRM-Frequency-River Reach-Defined Unit, Date

Where: **PRM** (post-remedial monitoring sample),
N (non-five year monitoring),
River Reach (i.e. UR, MR, LR, or IH),
Defined Unit (i.e., DEP GRID, or RMU)

Example:

PRM-N-UR-DEP9-1, 7/15/2008	A post-remedial monitoring non-five year sample collected in the Upper River from Deposit 9, RMU 1 on July 15th, 2008.

Sediment samples collected every five (5) years will be denoted by using an **F** for frequency rather than an **N**.

Example:

PRM-F-UR-DEP9-1, 7/15/2008	A post-remedial five (5) year sample collected in the Upper River from Deposit 9, RMU 1 on July 15th, 2008.

Sediment samples collected for conformational year post-remedial monitoring will be denoted by using a **C** for frequency rather than an **N** or **F**.

Example:

PRM-C-UR-DEP9-1, 7/15/2008	A post-remedial conformational year sample collected in the Upper River from Deposit 9, RMU 1 on July 15th, 2008.

5) Upper and Lower River Benthic or Water Column Monitoring
Benthic or water column samples that may be collected for post-remedial monitoring will be denoted as follows:

PRM-River Reach Initials-Sample Type-Location Number, Date

Where: **PRM** is post-remedial monitoring sample,
Sample Type is: **BM** (benthic macroinvertebrate) and **WC** (water column),
Location Number that is assigned by the Project Manager.

Example:

PRM-UR-BM-1, 9/10/2015	Sample identifier for a benthic macroinvertebrate collected from location 1 in the Upper River on September 10th, 2015.

D) Miscellaneous
Miscellaneous sample designations and identifications will be used as needed throughout the sampling effort. Letter suffixes will be appended to the second part of the two-part designation and naming convention. An example of a miscellaneous sample designation may be as follows:

Sample Retest – "RETEST"

Where "retest" designates a sample collected from the same location in the Middle River as a previously collected sample. In this case, an example identifier would be:

MR-PRD-DEP1 0-6" RETEST

E) Quality Assurance/Quality Control (QA/QC):
Standard sample designations for QA/QC will be used as needed during the sampling efforts. The QA/QC letter suffixes that will be appended to the second part of the two-part designation and naming convention will be taken from the following list:

Sample Duplicate – "DUP"
Field Blank – "FB"
Rinse Blank – "RB"

For example, a duplicate sample collected from the Middle River for QA/QC purposes may be designated and identified as follows:

MR-PRD-DEP1 0-6" DUP

F) Summary of Sample Identifiers:

AIR	Air sample
BL	Baseline sample
BM	Benthic macroinvertibrate
C	Post remedial monitoring confirmation sediment sample
	Carp
	Composite sample
CC	Correlation curve
	Channel Catfish
Date	Date sample collected.
Defined Unit	RMU, Deposit, or Grid
Depth	Sample interval
DS	Disposal sample.
Dup	Duplicate Sample
DWE	WWTP Effluent Sample
DWI	WWTP Influent Sample
EW	Earthworm sample
F	Five year post remedial monitoring sediment sample
Fish Species	Type of fish
Floodplain	Floodplain sample
FB	Field Blank
G	Grab sample
IH	Inner Harbor river reach
LD	Longnose dace
LR	Lower River reach
MR	Middle River reach.

MR1	Fish sample area 1 in Middle River reach
MR2	Fish sample area 2 in Middle River reach
Location Number	Location of sample assigned by Project Manager
PD	Post dredge sample
PH1	Phase 1 sample
PH2	Phase 2 sample
PRD	Pre remedial design sample.
PRM	Post remedial monitoring sample
RB	Rinse Blank
	Rock Bass
RETEST	Resample of a previous sample.
River Reach Initials	Initials for specific section of river.
RW	River Water
Sample Type	When there is a choice, a unique identified for the type.
SB	Small mouth bass
Site	One of 2 fish sampling areas in the Upper and Middle river reaches.
Tube Number	Geotextile tube number as assigned by Project Manager.
UR	Upper River reach
UR1	Fish sample area 1 in Upper River reach
UR2	Fish sample area 2 in Upper River reach
W	Walleye
Water Type	Type of sample collected from WWTP.
WC	Water column sample
WS	White sucker
WWTP	Wastewater treatment plant sample.

Related Activities

A) Typical Pre-Sample Identification Activities
   1. Subsurface Sediment Sampling - Manual Core Tube (SOP #28)
   2. Subsurface Sediment Sampling – Vibra Core (SOP #29)
   3. Surface Sediment Sampling – Ponar (SOP #24)
   4. Earthworm Sampling (SOP #9)
   5. Emergent Invertebrates Sampling (SOP #20)
   6. Disposal Sampling (SOP #15)
   7. Composite and Grab Sample Processing (SOP #30)
   8. Dewatering Area Mitigation Soil Sampling (SOP #32)

B) Typical Post-Sample Identification Activities
   1. Completion of Logbook (SOP #1).
   2. Composite and Grab Sample Processing (SOP # 30)
   3. Chain-of-Custody, Labeling, Packaging, and Sampling (SOP #7)

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Pace Analytical™ www.pacelabs.com

Page: of

Section A **Required** Client Information:		Section B **Required** Project Information:	Section C Invoice Information:
Company:		Report To:	Attention:
Address:		Copy To:	Company Name:
			Address:
Email To:		Purchase Order No.:	Pace Quote Reference:
Phone:	Fax:	Project Name:	Pace Project Manager:
Requested Due Date/TAT:		Project Number:	Pace Profile #:

REGULATORY AGENCY

- ☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
- ☐ UST ☐ RCRA ☐ OTHER ________

Site Location **STATE:** ________

Requested Analysis Filtered (Y/N)

Section D
Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

ITEM #	SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED: COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Y/N ➡ Analysis Test ➡												Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1																															
2																															
3																															
4																															
5																															
6																															
7																															
8																															
9																															
10																															
11																															
12																															

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER: **DATE Signed (MM/DD/YY):**

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.07, 15-Feb-2007

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, Inc.
1241 Bellevue Street, Ste. 9
Green Bay, WI 54302
(920) 469-2436

Client: ____________________

Client Sample ID: ____________________

Date Collected: ______________ Time: ______________

Collected by: ____________________

Analysis: ____________________

Preservatives: ☐None ☐HNO_3 ☐H_2SO_4 ☐NaOH ☐HCl

☐$Na_2S_2O_3$ ☐MeOH ☐Zn Acetate ☐Other: __________

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☐$Na_2S_2O_3$ ☐MeOH ☐Zn Acetate ☐Other: __________

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☐$Na_2S_2O_3$ ☐MeOH ☐Zn Acetate ☐Other: __________

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☐$Na_2S_2O_3$ ☐MeOH ☐Zn Acetate ☐Other: __________

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Client: ____________________

Client Sample ID: ____________________

Date Collected: ______________ Time: ______________

Collected by: ____________________

Analysis: ____________________

Preservatives: ☐None ☐HNO_3 ☐H_2SO_4 ☐NaOH ☐HCl

☐$Na_2S_2O_3$ ☐MeOH ☐Zn Acetate ☐Other: __________

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(920) 469-2436

Client: ____________________

Client Sample ID: ____________________

Date Collected: ______________ Time: ______________

Collected by: ____________________

Analysis: ____________________

Preservatives: ☐None ☐HNO_3 ☐H_2SO_4 ☐NaOH ☐HCl

☐$Na_2S_2O_3$ ☐MeOH ☐Zn Acetate ☐Other: __________

CUSTODY SEAL

DATE ______________________________

SIGNATURE ______________________________

QEC
Quality Environmental Containers
800-255-3950 • 304-255-3900

Chicago
2417 Bond Street

University Park, IL 60466
phone 708.534.5200 fax 708.534.5363

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	**Project Manager:**	**Site Contact:**	**Date:**	COC No:
Your Company Name here	**Tel/Fax:**	**Lab Contact:**	**Carrier:**	_______ of ______ COCs
Address	**Analysis Turnaround Time**			Job No.
City/State/Zip	Calendar (C) or Work Days (W) __________			
(xxx) xxx-xxxx Phone	TAT if different from Below _________			SDG No.
(xxx) xxx-xxxx FAX	☐ 2 weeks			
Project Name:	☐ 1 week			
Site:	☐ 2 days			
P O #	☐ 1 day			

Sample Identification	**Sample Date**	**Sample Time**	**Sample Type**	**Matrix**	**# of Cont.**	**Filtered Sample**																		Sample Specific Notes:

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____________

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For __________ Months*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

Company Name	20000197	
Sample ID		
Project	Sample Date	Sample Time
Bottle Desc. Plastic 1000mL Oblong, HDPE		
Preservatives: HNO3		Filtered ___ Unfiltered X
Analysis Requested Comments Metals		

SEVERN TRENT STL
489814

Custody Seal

DATE

SIGNATURE

SEVERN TRENT STL
489814

STL-4145

CHAIN OF CUSTODY LABELING, PACKAGING AND, SHIPPING
STANDARD OPERATING PROCEDURE #7
Revision: 03
Revision Date: 03/12/2010

I) Scope:

This Standard Operating Procedure (SOP) is used to provide the requirements to trace possession and handling of samples from time of collection through transportation to the laboratory for analysis. This procedure is used for samples collected during Sediment Pre-Design Investigation, Sediment Remediation Verification, and Post-Remediation Monitoring.

II) Equipment/Materials:

- Sample Labels (example attached)
- Chain-of-Custody Form (example attached)
- Custody Seal (example attached)
- Waterproof Ink Pen
- Cooler and ice
- Paper Towels
- Packaging tape
- Sealable plastic bags
- Packaging materials (e.g. bubble wrap)
- Field Logbook

III) Procedure Description:

A. Labeling and Chain of Custody (COC)

1. Sample labels will be securely affixed to sample containers prior to or at the time of collection and include the following information:
   a) Project name
   b) Sample identification (as specified in the Sample Identification SOP #6)
   c) Date of collection
   d) Time of collection
   e) Analysis
   f) Sampler's initials
2. If affixing label after sample collection, clean and dry the full sample container to ensure label adhesion.
3. A Chain of Custody (COC) form will be completed and will accompany each sample (s) to the laboratory. The COC will include the following information:
   a) Project name
   b) Sampler's signature
   c) Unique sample identification
   d) Date and time of collection
   e) Composite or grab sample designation
   f) Sample location or description
   g) Indication of analytical parameters to be performed (including analytical method and preservation if any)
   h) Remarks, if necessary
   i) Signature of persons involved in the chain of possession
4. The completed COC form will be placed in a re-sealable plastic bag and placed inside the sample cooler.
5. Sampling activities will be recorded in the sequential portion of the Field Logbook (as further defined in SOP #1).

B. Packaging and Shipping

1. Using bubble packing or Styrofoam sheets securely wrap samples and arrange in the sample cooler to minimize breakage during shipment. Place a layer of double-bagged ice over the samples. If using a common carrier to transport samples to the laboratory, wrap the sample cooler securely with strapping tape for shipment. If using a courier service to transport samples to the laboratory, strapping tape is not necessary.
2. If using a common carrier to transport samples to the laboratory, a Custody Seal will be placed on each sample cooler. Each seal will be marked with the shipping date and samplers initials and will be placed so it will be separated upon opening of the sample cooler. A piece of clear tape will be placed over the Custody Seal to ensure it remains in place during transport. If using a courier service to transport samples to the laboratory, a Custody Seal will not be used.
3. Samples are to be delivered to the laboratory for analysis as soon as possible. The samples must be delivered to the person in the laboratory authorized to receive samples.
4. The route through which samples reach the laboratory is as follows:
   a) By Common Carrier: Personnel will deliver samples to a common carrier, i.e., UPS, Federal Express, etc. to be shipped overnight to the laboratory. The Bill of Lading number becomes part of the Chain-of-Custody documentation.
   b) Courier Pick-up: The prepared sample will be picked-up by the laboratory as determined by the pick up schedule developed the week prior to sampling.

C. Reporting, Quality Assurance, Quality Control:

1. Complete Field Logbook as detailed in SOP #1

IV) Related Activities

A) Typical Pre-Sample Handling Activities

1) Earthworm Sampling (SOP #9)
2) Turbidity Measurement (SOP #13)
3) Water Sampling for Correlation Curve Development (SOP #14)
4) Air Monitoring (SOP #16)
5) Water Monitoring (SOP #17)
6) Disposal Sampling (SOP #15)
7) Emergent Invertebrates Sampling (SOP #20)
8) Surface Sediment Sampling – Ponar (SOP #24)
9) Subsurface Sediment Sampling - Manual Core Tube (SOP #28)
10) Subsurface Sediment Sampling – Vibra Core (SOP #29)
11) Composite and Grab Sample Processing (SOP #30)
12) Dewatering Area Mitigation Soil Sampling (SOP #32)

B) Typical Post-Sample Handling Activities

1. Decontamination of Sampling or Sample Processing Equipment (SOP #2)

GENERAL INTERIM GUIDANCE FOR THE MANAGEMENT OF INVESTIGATIVE WASTES

Wisconsin DNR Remediation and Redevelopment Program
Publication RR-556

General Interim Guidelines for the Management of Investigative Waste

1. Addendum to General Interim Guidelines for the Management of Investigative Wastes (April 1, 2002)
2. Jan 14, 1993 Memo: General Interim Guidelines for the Management of Investigative Wastes
3. Attachment 1: Regulatory Requirements and Policies Affecting Investigative Waste (IW) management
4. Appendix A to Attachment 1: Excerpts from Omega Hills Approval
5. Appendix B to Attachment 1: EPA Publication 9345.3-03FS Facsimile: Guide to Management of Investigation-Derived Wastes
6. Attachment 2: Sampling and Testing of Investigative Wastes
7. Attachment 3: Long-Term On-Site Storage of Investigative Wastes (IW)

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Addendum to Publication RR-556
General Interim Guidelines for the Management of Investigative Waste
April, 2002

Chapter NR 718

Chapter NR 718, Wis. Adm. Code, has been promulgated since the development of this guidance. The provisions of that chapter may be applied to investigative waste soils.

Attachment 1 Statutory and Rule Cites

Some of the statutory and rule citations in attachment 1 to the guidance have changed since the guidance was issued. They're outlined below.

Solid Waste Statutes:

The solid waste statutes previously found in ch. 144, Wis. Stats. (ss. 144.43 to 144.47) are now found in ch. 289, Wis. Stats.

The definition of "solid waste" that was previously found in s. 144.01 (15), Wis. Stats., is now found in s. 289.01 (33), Wis. Stats.

Hazardous Waste Statutes:

The hazardous waste statutes previously found in ch. 144, Wis. Stats., (ss. 144.60 to 144.74) are now found in ch. 291, Wis. Stats.

Air Management Statutes:

The state statutes that provide the legal basis for the Air management program are now found in ch. 285, Wis. Stats.

Solid Waste, Hazardous Waste and Air Management Administrative Rules:

Solid waste program rules are found in the NR 500 rule series (chs. NR 500 to 590), hazardous waste program rules are found in the NR 600 rule series (chs. NR 600 to 690), and air management rules are found in the NR 400 rule series.

CORRESPONDENCE/MEMORANDUM

DATE: January 14, 1993 FILE REF:

TO: District Solid and Hazardous Waste Program Supervisors and Bureau Section Chiefs (SW, HW & ERR)

FROM: Paul Didier - SW/3

SUBJECT: General Interim Guidelines for the Management of Investigative Waste

Contents

I. Purpose
II. Investigative Waste - Definition
III. General Management Principles
   A. General
   B. Minimization
   C. In-State/On-Site Policy
D. Liquid IW
   E. Management as Part of the Remedial Action
IV. Complying With Requirements and Obtaining Approvals
   A. Description of Requirements
   B. Variances, Waivers and Enforcement Discretion
   C. Responsibilities
V. Specific Management Principles
   A. Decontamination
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Attachment 1 - Regulatory Requirements and Policies Affecting IW Management
   Appendix A - Excerpts from Omega Hills Approval
   Appendix B - EPA Superfund IW Factsheet

Attachment 2 - Guidelines for Sampling, Testing and Short-Term Storage

Attachment 3 - Guidelines for Long-Term Storage

I. Purpose

The purpose of this memo is to provide you with general interim guidelines for making decisions regarding the management of investigative waste (IW), produced at sites regulated by our various program authorities. The ERR program formed an investigative waste committee earlier, and some of the recommendations and materials they developed are considered in these guidelines and the attachments. It is my understanding that Mark Giesfeldt, Barb Zellmer and Lakshmi Sridharan will form a second workgroup, including District staff, to develop more specific guidance on this topic, as needed. I would like the Districts to try to implement the guidelines for a 1 year period and then provide comments to this second workgroup. If you would like to provide comments before the workgroup is formed, please send them to Gary Edelstein - SW/3.

II. Investigative Waste - Definition

For the purposes of these guidelines, IW (or investigation-derived waste) is defined to include any solid waste, including any contaminated media (soil, rock or ground water) generated as a result of typical investigative activities. This includes, but is not limited to: drill cuttings from boring or monitoring well installations, decontamination fluids from cleaning investigative equipment (i.e., drill rigs, backhoes, sampling equipment such as bailers and pumps), spoils from backhoe pits, development water, purge water, water from pump tests, excess samples and dirty personal protective equipment and clothing intended to be thrown away. For purposes of these guidelines, IW does not include any wastes from activities generated as a result of remediation activities. Remediation wastes include wastes from petroleum tank/piping excavations, petroleum tank bottoms/sludges and other wastes that are picked up, treated and returned to the site. Also, the term does not include wastes used for treatability studies, including off-site bench scale tests and on-site pilot tests. We expect to develop separate guidelines in the future addressing the management of wastes generated as a result of remedial action, treatability and pilot test activities. Some of the principles outline in these guidelines may be found to be appropriate for those wastes.

III. General Management Principles

Whenever making decisions regarding the management of IW, the following general principles should be followed:

A. **General** - IW management methods should be protective of human health and the environment and comply, to the extent practicable, with all applicable laws and rules, including wastewater, solid waste and hazardous waste laws and rules. As a general rule, it will be necessary to use best professional judgement, in light of the site specific conditions, to determine if a management option is protective of human health and the environment. In some instances, a variance, waiver or exemption may be available to allow certain on-site management methods, including redisposal of IW back on the site, that normally would not be allowed under the solid or hazardous waste laws and rules. In other instances, managers may make enforcement discretion decisions. This is discussed in more detail under the next section - Complying with Requirements and Obtaining Approvals.

B. **Minimization** - The amount of IW produced should be minimized as much as possible. Work plans for investigations should outline drilling and sampling techniques that minimize the generation of IW. Non-intrusive investigation methods may be used, when such methods are considered appropriate for the site. The potential problems of managing IW should be a factor in choosing investigative methods. For additional specific suggestions for IW minimization methods, please refer to page 5 of the attached (appendix B) U.S. EPA Superfund fact sheet, under the title "IDW Minimization".

C. **In-State/On-Site Policy** - Management of hazardous IW should be in accordance with our "Interim Policy for Promoting the In-State and On-Site Management of Hazardous Waste in Wisconsin", dated March 14, 1991.

D. **Liquid IW** - Contaminated liquids should generally not be disposed of on the ground or back onto waste at a site. Aqueous wastes may be collected, properly characterized for possible treatment or incorporation into on-site remediation, such as for ground water or leachate, or collected for management at a permitted waste water treatment plant willing to accept these wastes, and having the appropriate approvals to do so. The preferred method for managing contaminated pump test discharges or other large volumes of aqueous wastes with low levels of contamination is to provide any necessary treatment to meet Waste Water program requirements and discharge them to surface wasters in accordance with those program requirements. It may be necessary to provide a temporary treatment unit for such discharges. Liquids generated from areas known to be free of contamination need not be handled as IW, but should not be disposed of over areas known to be contaminated or over waste, to avoid the leaching of additional contaminants into the environment.

E. **Management as Part of Remedial Action** - For sites where it is known that some sort of remedial action will be conducted in the future, secure on-site storage (see the long-term storage guidelines, attachment 3) and subsequent management of the IW through incorporation into the remedial action is preferred to off-site management, where possible. This will avoid the need for separate treatment and/or disposal arrangements. IW (with the exception of non-indigenous IW) generated during the course of an investigation can be considered part of the site and managed with other wastes from the site, consistent with a final remedy.

F. **Field Screening** - Where appropriate, field screening methods may be used to help determine if IW contains contaminants of concern, in lieu of laboratory testing. Staff project managers should decide if field screening is an appropriate method for making this determination on a site specific basis. In many instances, field screening might be used to help reduce the number of samples requiring laboratory analysis.

IV. Complying with Requirements and Obtaining Approvals

A. **Description of Requirements** - Attachment 1 describes the solid waste, hazardous waste, wastewater and air management requirements that may apply to IW. Whenever IW is produced, appropriate steps need to be taken to characterize the waste to determine whether it should be handled as a hazardous waste, and to determine the options available for both the short term and long term management of that IW.

B. **Variances, Waivers and Enforcement Discretion** - For activities requiring a hazardous waste license, it may be possible to obtain a variance from that licensing requirement. In addition, in an emergency situation a waiver from any of the hazardous waste requirements may be possible (limited to 90 days in duration). For activities requiring a solid waste license, a written exemption may be possible. **In other situations, a decision may be made to use discretion and not enforce certain solid and/or hazardous waste program requirements.** Each situation must be reviewed and considered individually regarding the appropriate course of action. The following criteria should be considered when making such decisions:

1. The contaminants, their concentrations, and total volume of IW;

2. Media potentially affected (e.g., groundwater, soil) under management options;

3. Location of nearest population(s) and the likelihood and/or degree of site access;

4. Potential exposure to workers; and

5. Potential for environmental impacts.

C. **Responsibilities** - If a project manager is assigned to and is actively overseeing a project, then that person is responsible for assuring that steps are taken to properly characterize the IW, that a plan is in place for the management of those wastes, and that appropriate approvals are obtained. In all cases I expect the District Program Supervisor to be responsible for determinations on whether, for example, a license is required for a specific waste management activity, along with the other applicable requirements, and whether a variance, waiver or exemption from that licensing requirement is appropriate and possible, or whether discretion is proposed to be used to not enforce certain requirements. In cases where hazardous investigative wastes or large volumes of solid investigative wastes are to be managed or unusual or unique management principles are involved, the determination should be made in writing along with the basis for the determination.

V. Specific Management Principles

A. **Decontamination** - Equipment decontamination should occur on a pad that is lined and designed to prevent surface water from running on to the pad and to prevent contaminated liquids from running off. Generally, these pads are sloped to drain to a sump that can be pumped out into a storage tank. Often, the pads are constructed of concrete with sealed joints or with a geomembrane covered with a geotextile and gravel. At many sites, it may be necessary to construct such a pad before the investigation begins. It may be necessary to decontaminate and/or manage as waste any contaminated material from the pad once it is decommissioned.

B. **Sampling, Testing and Short-Term Storage** - Guidelines for sampling, testing and short-term storage of IW are outlined in attachment 2. Where appropriate, field screening methods may be used to help determine if IW contains contaminants of concern, in lieu of laboratory testing. ERR staff project managers should decide if field screening is an appropriate method for making this determination on a site-specific basis.

C. **Long-term Storage** - Guidelines for long-term storage are outlined in attachment 3. For hazardous IW, a storage facility license may be required for long-term storage.

D. **Test Pits** - Test pit spoils returned to the same excavation immediately (generally on the same day), where returning the spoils does not pose an increased threat to human health or the environment has been allowed in the past without meeting all approval/licensing requirements using enforcement discretion, and this should be allowed to continue.

VI. Working Group

I expect that the working group formed to develop the specific guidance on this issue will provide direction for which circumstances it is appropriate to use the various authorities to approve the management of investigative waste, and that guidance will provide the direction staff need to assure that we are being consistent state wide on this issue. I also anticipate that this group will develop the specific procedures to use in making decisions regarding the management of investigative waste.

I hope that the working group can be formed and develop the specific guidance on this topic in the next several months. In the mean time please use the general guidelines I have laid out in this memo, as you and your staff address IW management issues.

Attachs.

GAE:BJZ:MFG

cc: Solid & Hazardous Waste Program Unit Leaders, District & Central Office
Darsi Foss - SW/3
Linda Meyer, Patti Hanz, Deb Johnson, & Pete Flaherty - LC/5

ATTACHMENT 1

REGULATORY REQUIREMENTS AND POLICIES AFFECTING INVESTIGATIVE WASTE (IW) MANAGEMENT

Solid Waste Program, Ch. 144, Stats. and Chs. NR 500-520, Wis. Adm. Code

The Solid Waste Program has no regulations or guidance aimed specifically at IW. Under that program's rules and statutes, any material or media from an investigation, even if it is uncontaminated, that is generated and is to be discarded is a solid waste, because the statutory definition of solid waste (s. 144.01(15), Stats.) is very broad. The definition of disposal is also very broad and includes the replacement of solid waste in a closed landfill or other site under investigation. Chapters NR 500-520, Wis. Adm. Code, require persons to obtain a license and meet operating and design standards in order to dispose of solid waste. However, there are exemptions in the rule for the disposal of clean media in s. NR 500.08, Wis. Adm. Code, and wastewater facilities for liquid wastes are also exempt from the rule. Therefore, under the statute and rules, any on-site management of IW consisting of contaminated media or any other material must be in a licensed solid waste facility that meets all operating and design standards or, for liquid wastes, in an exempt wastewater facility. Therefore, re-disposal of such wastes in a closed landfill or disposal area is not allowed without meeting standards and obtaining a license. However, the engineering unit leaders in the program have indicated that there is no site they're aware of where excavated waste from a solid (non-hazardous) waste landfill wasn't allowed to be redisposed of. The program does have a policy (no specific policy memo, although letters and plan approvals may have mentioned it) concerning the re-disposal of solid waste at closed, covered sites. The program will generally allow waste within the site to be moved around on the site, within licensed acreage, for the purposes of grading for site drainage or cover improvement, provided the total waste volume (called design capacity) is not exceeded. Written exemptions from any program requirement, including licensing, may be granted if a written application is submitted and the applicant can show the activity will not cause environmental pollution.

State Hazardous Waste Program, S. 144.60-144.64, Stats. and Chs. NR 600-685, Wis. Adm. Code

The Hazardous Waste Program has no regulations aimed specifically at IW. The only policy memo relating to them is a 4/28/89 memo from Barb Zellmer to the District SW Coordinators specifying who makes determinations on whether a remedial action waste is hazardous. Again, there is a policy on the re-disposal of waste. This policy was documented in the September 29, 1989 closure and long-term plan approval for the Omega Hills North Landfill (appendix A). In summary, the policy generally prohibits the re-disposal of hazardous waste in closed facilities, however, the Program can review such re-disposal proposals on case-by-case basis for each remedial action or investigation proposal, accounting for the latest U. S. EPA guidance (see Superfund, below for the U. S. EPA guidance and regulations discussion).

Although not specifically aimed at IW, the Program has some important requirements that affect its management:

-The definitions of hazardous waste (HW) and solid waste. The IW must be a solid waste to be a HW. The definition of solid waste comes from the solid waste program statutes (s. 144.01(15), Stats.), so any material from an investigation is a solid waste. How a solid waste is identified as hazardous is complicated, but there is considerable guidance available on the subject from both the Program and U. S. EPA. For quick reference, one of the better guidelines is the Superfund Program's land disposal restriction (LDR) fact sheet #5. This discusses how a HW determination is made for waste managed in sites before the HW regulations took effect. There are some exceptions, but for the most part, the state HW rules identify HW the same way the federal rules do. The most notable exceptions are the state F027 and F500 waste listings and the federal TCLP rule, discussed in the next section. The F027 listing is broader than U. S. EPA's, the F500 listing only exists in the state rules and the state rules do not yet have the TCLP test.

-Generator requirements apply to IW that is hazardous. An EPA ID number must be obtained, the manifest system used and the waste must be managed at an approved HW facility. Licensed HW transporters must haul any waste if taken off-site. On-site temporary tank and container storage standards apply to waste as it is generated. Generators who fall under small quantity generator categories must comply with rules less extensive than large quantity generators (it is expected that at most remedial action sites, the amount of IW waste generated would exceed the small quantity generator amounts of 100 and 1000 kg. generated per month).

-Licensing and facility operating and design standards apply to units where HW is treated, stored or disposed of. Large quantity generators must utilize a licensed storage facility for wastes held for more than 90 days. Under a strict interpretation of the rules, any on-site management of hazardous IW (if the quantity is over 100 kg. per month) must be in a licensed HW facility that meets all operating and design standards (under certain circumstances, wastes from generators who produce <100 kg. per month may also be disposed of at a solid waste landfill approved for such disposal by the Department). Therefore, under this interpretation, re-disposal of such wastes in a closed landfill or disposal area is not allowed. Exemptions from the facility design and operating standards (but not licensing) are allowed if the applicant can show equivalent protection. Variances from licensing are allowed for up to 5 years if a hardship to any person exists, and an application is submitted showing how the facility design and operating standards will be met. The variance section has been revised, as part of the NR 600 renumbering revisions, to allow certain types of land disposal. Waivers from any requirement may be granted if an emergency condition exists. As part of the recent revisions, the waiver provision is being expanded to allow waivers for HW management as part of an immediate response to a discharge.

Federal Hazardous Waste Program

Wisconsin is authorized to implement the HW program in lieu of U. S. EPA. However, there are 2 aspects of the federal program that affect IW management that are not yet part of Wisconsin's program. These are the LDR's and the TCLP characteristic.

The LDR's apply to HW that is land disposed. Usually, the waste must be treated before disposal occurs. The requirements are complex, but guidance is available. For quick reference, the Superfund LDR fact sheet series is recommended. Again, under a strict interpretation, re-disposal of IW on-site would trigger the LDR restrictions. There is no LDR guidance that specifically addresses IW. U. S. EPA may grant several types of variances from the LDR's. For Superfund soil and debris, a treatability variance will be normally be granted if a remedy is selected that will not meet LDR treatment levels. However, even under the variance, a certain level of treatment would still be required.

The recently promulgated TCLP test brings many more solid wastes into the HW program. The leach procedure allows wastes that contain certain organics to become characteristic HW, based on the amount of organics that leach out of the waste under the test. Certain contaminated media from the federal underground storage tank program are temporarily excluded. Many IW's that would not be listed HW under the rules are now hazardous under TCLP. There is no TCLP guidance that specifically addresses IW.

Federal Superfund Program

The Superfund Program has no regulations specifically addressing the procedures for managing IW. However, this program has developed general policies on the issue. There is discussion in the proposed (53 FR 51442, 12/21/88) and final (55 FR 8755, 3/8/90) National Contingency NCP preambles on the program's policies for IW. There is a statement that all state and federal standards (applicable or relevant and appropriate requirements - ARARs) should be met for IW management, but for on-site management, "best management practices" are the rule, and compliance is only required to "the extent practicable". U. S. EPA's position is that all investigations (apparently including preremedial site inspections) are conducted pursuant to the CERCLA removal authority, and strict compliance with all standards is not required for a removal (It is important to note that Wisconsin has no equivalent authority under any of the response programs.). Under the federal policy, if IW is managed off-site, however, the facility must be approved for the waste, and in compliance with the Superfund off-site facility policy.

IW managed as part of a Superfund remedial action entirely on-site fall under the on-site permit exemption in §121(e) of CERCLA. Such actions must comply with the substantive technical requirements that are applicable or relevant and appropriate to a management method, but no federal, state or local approvals, permits or licenses are required for the on-site action.

The proposed NCP discussion gives only 2 extreme examples of how to manage IW. The first is that if the IW is from an area with significant dioxin contamination, it will be containerized, tested and managed in accordance with all ARARs. It then mentions that it is standard practice to leave IW on-site until the remedial action commences. The second example is offered as a contrast to the first, stating that the routine testing and containerization of large volumes of drilling muds and purge waters not suspected to contain hazardous substances may be unnecessary.

In January, 1992, the Superfund Program issued a quick reference fact sheet that apparently only applies to the remedial program (copy attached).

The federal preremedial program has developed a more extensive draft guidance manual addressing IW management. The draft manual has information on regulatory requirements, identification of the specific types of IW, and specific guidelines on how to manage the waste in specific situations. It is generally written to allow flexibility for investigators, consistent with the NCP preamble policies discussed above. Most importantly, it states that:

-Non-hazardous IW, including liquids, may be re-disposed of on-site, regardless of its hazard or the concentration of hazardous constituents in the waste.

-Hazardous IW may be re-disposed of on-site if it poses no immediate threat to human health and the environment, considering the potential for community relations problems with residents in the area. Hazardous organic decontamination fluids may be evaporated (small amounts), or should be disposed of off-site.

Wastewater Program

Liquid IW that is to be discharged to a surface water or sewage treatment plant (POTW) must meet this program's requirements. It should be noted that such discharges are, for the most part, exempt from regulation under the solid or hazardous waste programs.

For surface water discharges, the Wastewater program normally requires a WPDES permit be obtained and specific discharge standards be met, including standards for toxics. It is possible, following future revisions to the Department's general permit that fluids containing very low concentrations of regulated substances may be discharged without treatment or a specific permit. If the concentrations of these substances are above levels of concern, treatment will be required under the general permit, or under a specific permit for more long-term or high volume discharges, such as certain pump tests. However, a short form application for discharge is required. Any person may be issued a general permit if its requirements are met. The program has allowed "on-site" wastewater discharges that are part of a federal Superfund site remedial action to only meet the substantive requirements of a permit, and has not required specific permits for those discharges.

For POTW discharge, the state requirements are usually minimal for these types of wastes. Ch. NR 211, Wis. Adm. Code, prohibits discharges that interfere with or pass through a POTW as well as discharges that exhibit certain characteristics, i. e., explosive, corrosive, fire hazard or could cause a sewer blockage. However, the local authority that operates the facility must give permission for the discharge, and will impose pretreatment requirements, which can vary, depending on the local pretreatment ordinance, and the potential for the discharge to interfere with the

POTW's operation. The local pretreatment requirements can include specific numeric limits for specific contaminants.

Air Management Program

Very briefly, this program regulates air emissions above certain amounts. In some cases it may be advantageous to evaporate certain IW's, such as organic decontamination liquids. This may be done without controls if the emissions do not exceed certain amounts.

Appendix A
Excerpts from Omega Hills Approval

September 29, 1989

IN REPLY REFER TO: 4430

Mr. Kevin O'Toole
District Manager
Waste Management of Wisconsin, Inc.
Two Park Plaza
10850 West Park Place, Suite 1200
Milwaukee, WI 53224

SUBJECT: Conditional Approval (Modification) of the
Chapter NR 181 Closure and Long-Term Care Plan
Omega Hills North Landfill
EPA ID# WID000808568

REVIEW COMMENTS

Management of Newly Generated Waste after Covering and Facility Decontamination

Since the landfill is defined as one unit, and there are no effective barriers we are aware of to prevent hazardous constituent migration, any waste, removed from the landfill as a result of any construction, remediation or investigation must be managed as a listed hazardous waste at an on or off-site facility that is licensed, permitted or approved to accept such hazardous wastes. This is because such waste or material is a mixture of solid and hazardous waste and/or is derived from the previous disposal of listed hazardous waste (see s. NR 181.12(l)(b)2. and 4., Wis. Adm. Code). Therefore, there are no "documented non-hazardous waste areas" which would contain non-hazardous wastes we are aware of.

In view of the above discussion, any remedial or other construction work at this site will likely contaminate the equipment used for construction with hazardous constituents. Therefore, all such equipment must be subject to an approved decontamination procedure that must be developed now. The closure plan indicates such a procedure will only be developed if needed at a later date. Therefore, the determination contains a condition requiring WMI to develop and submit that procedure for approval within 30 days.

RESPONSE TO COMMENTS

On September 13, 1989, WMI submitted, through its attorneys, comments on the Departments August 14, 1989 draft determination, along with other legal documents that requested various actions by the Department. The legal documents will be responded to under separate cover. A meeting was held on September 14, 1989 to discuss certain technical issues related to the draft determination.WMI submitted additional comments related to the statistical test used for groundwater monitoring on September 14, 1989, through its attorneys. WMI submitted additional comments on the final use plan issue and a copy of an August 13, 1976 soil documentation report prepared by STS Engineers, Inc. on September 19, 1989. WMI submitted information on a site in Pennsylvania on September 26, 1989. Department staff had additional conversations with WMI staff regarding statistical analysis issues on September 28, 1989. The Departments response to all the comments, submittals (except the legal documents) and the meeting are outlined below.

Condition No. 4

This condition sets out the requirements relating to the re-disposal of wastes in the landfill that are generated from on-site remedial actions and investigations, herein referred to as the "re-disposal issue." This issue involves both Department and U. S. EPA regulations and policies. U. S. EPA's policies relating to this issue are still evolving To give a clear response to the comments, it is helpful to briefly describe both the Department's and U.S. EPA's regulations and policies.

Under s. NR 181.44(1), Wis. Adm. Code, a landfill may not operate (i. e. accept hazardous waste for disposal) without having an operating or interim license or waiver issued under ch. NR 181, Wis. Adm. Code (variances aren't available to landfills under s. NR 181.55(10), Wis. Adm. Code). In accordance with the Chapter, hazardous waste can be generated from on-site remedial or investigative activities at the landfill. Under the "derived-from" and "mixture" rules, s. NR 181.12(1)(b)4. and 2., Wis. Adm. Code, material removed from the landfill, once removed for management, are hazardous wastes if they are contaminated by hazardous constituents from the past disposal of listed hazardous wastes. A closed landfill which doesn't have an operating or interim license may not accept such material for disposal, even if the material originated there, without violating the rule. The Department has, as a matter of policy, allowed closing landfills that formerly accepted hazardous waste (the Department may allow a closing hazardous waste landfill to continue to operate and accept solid waste under s. NR 181.44(12)(a), Wis. Adm. Code) and still have open hazardous waste units to continue to accept remedial waste generated on-site without a license or waiver, but only until the open hazardous waste unit closes.

U.S. EPA's regulations are similar and require a landfill to have a permit or interim status to continue to accept hazardous waste, and also require a landfill to close within 180 days after ceasing to accept hazardous waste (U.S. EPA is proposing regulations that would allow disposal facilities to continue to accept non-hazardous solid wastes without closing). It's regulations also include the "derived-from" and "mixture" rules. In addition, U. S. EPA has developed a "contained In" policy for non-solid waste media, such as soil or groundwater that is contaminated by hazardous wastes. Such contaminated media must be managed as a hazardous waste until all the contamination is removed, if contaminated by listed waste, or until the contaminated media no longer displays a characteristic, if contaminated by characteristic waste. U. S. EPA has been petitioned to develop a "deminimus" rule setting specific concentration levels for hazardous constituents in media below which it would no longer be regulated as a hazardous waste. Until such a rule is promulgated, U. S. EPA and the states may look at each situation involving potentially contaminated media an a case by case basis.

U. S. EPA has developed additional policy and guidance related to the application of the HSWA land disposal restrictions for on-site actions at sites remediated under a federal Superfund project. The Department understands that U. S. EPA intends that this policy apply to RCRA hazardous waste facilities. WMI's comments referred to some of this guidance, as related to Superfund sites. In summary, this guidance describes how to determine when a RCRA waste is being managed and when a disposal activity takes place on-site that triggers the land disposal restrictions. A new term, "placement", was developed to help determine when disposal occurs that cause the land disposal restrictions to apply. This term does not appear in the federal regulations. However, the Department understands that U. S. EPA plans to codify the policy in the future. In short, "placement", and hence disposal, takes place if waste is managed in a different unit than it came from, or in the same unit it came from if it is first managed in an intervening treatment or storage unit. If the waste is moved around or consolidated in the same unit or "area of contamination", consolidated without being managed in an intervening unit, then "placement" does not occur.

The Department has not yet incorporated the land disposal prohibitions into ch. NR 181, Wis. Adm. Code, but intends to do so in the future. Once those rules are adopted, the Department will consider adopting the U. S. EPA policies and guidance related to them. In the meantime, the Department can consider, on a case by case basis, U. S. EPA's policies when formulating its own policies on the re-disposal issue.

WMI has requested that the Department regulate wastes removed from the landfill differently. Specifically, WMI has requested that:

1. Material removed from the landfill that has "clearly been significantly contaminated by demonstrable mixing and are removed for placement at a different management unit..." would be the only material managed as a hazardous waste in accordance with the condition.

2. The Department grant a treatability variance for soil and debris from the landfill and allow removed waste to replaced In the existing fill or disposed of at Parkview Landfill.

3. That leachate from the landfill be assigned the hazardous waste number for all the hazardous wastes known to be accepted at the landfill.

In response to request 1, limiting the requirements to material that has "clearly been significantly contaminated by demonstrable mixing" would not meet the intent of the "derived-from" and "mixture" rules under ch. NR 181, Wis. Adm. Code. In addition, such a limit would be contrary to U. S. EPA's regulations; we are not aware of any federal policy that limits these two rules as this proposed language would. Finally, it is not clear who would make such a demonstration. Any material from the landfill that has the potential to be contaminated by hazardous constituents must be managed as a hazardous waste. However, in response to the submitted comments and the

September 14 meeting discussion, the Department can further refine the condition to more clearly indicate that if soil, including cover soil, and groundwater is demonstrated by WMI to not be contaminated, then it would not be regulated as a hazardous waste in accordance with the condition. This was the condition's original intent. Until a "deminimus" rule is in place, the Department has latitude in judging if a demonstration method is adequate. Generally, the Department's policy is to require testing of the material, and field screening methods can be considered, depending on the hazardous constituents of concern (i. e., if VOC's are of concern, an Hnu or OVA screening method may be appropriate). Also, Department field staff may determine, on a case by case basis, that certain materials are not considered contaminated based on field observations.

Request 1 also has language further limiting the requirements only to material "removed for placement in a different management unit". This limitation would defeat the purpose of the condition and would generally allow re-disposal on site without limits. This would be in clear violation of ch. NR 181, Wis. Adm. Code, as outlined in the second paragraph of the response to the Condition No. 4 comments, above. We also note this would be in conflict with the Closure and Long-Term Care plan, page 2-10. The Department does not intend to grant a "blanket" approval to the re-disposal of waste in the landfill during the entire long-term care period. Therefore, the condition will not be revised to conform with this request. However, in light of U. S. EPA's policies, as discussed above, the Department is willing to consider, on a case by case basis, requests for re-disposal of wastes associated with remedial actions and investigations, with each separate remedial action or investigation proposal. That will allow the Department to take into account any changes in U. S. EPA guidance or policy, the kinds of wastes being generated, any testing requirements, and the portion of the landfill the wastes are being re-disposed of in. The Department will not approve such proposals unless they conform with any U. S. EPA guidance, policy or regulations in effect at the time.

Request 2 refers to a variance authority under the HSWA land disposal prohibitions, which are not contained in ch. NR 181, Wis. Adm. Code at this time. Therefore, the Department does not have the authority to consider such a variance, so the condition can't be changed in response. In addition, it is not clear that U. S. EPA will grant this variance authority to a state as part of the authorization process.

Request 3 refers to a letter regarding a leachate pretreatment pilot facility that has since closed at the landfill. The Department has no objection to the suggested waste code designation. The proper procedure to formally notify the Department and U. S. EPA of a waste code designation is through specific correspondence and a revised notification form. However, it should be noted that if such material (or any other material from the site covered by this condition) is manifested, a specific waste code or code(s) will be needed on the manifest form. Questions on this issue should be directed to the Department's Southeast district hazardous waste staff. No revision to the determination appears to be necessary to respond to the request.

BEFORE THE
STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

CONDITIONAL CLOSURE AND
LONG-TERM CARE PLAN APPROVAL (MODIFICATION)
OMEGA HILLS NORTH LANDFILL
EPA ID# WID000808568

CONDITIONAL CLOSURE AND LONG-TERM CARE PLAN
APPROVAL (MODIFICATION)

The Department hereby approves the Closure and Long-Term Care Plan for the landfill, subject to the following conditions which hereby modify the plan:

4. All wastes, liquids, contaminated groundwater, contaminated soils or other materials removed from the landfill as a result of any construction, remediation or investigation shall be managed as a hazardous waste at a facility licensed, permitted or approved to accept such wastes, in accordance with s. NR 181.21(4), Wis. Adm. Code, regardless of where the material originates. The Department shall consider specific requests by WMI, on a case by case basis, on whether soil or groundwater to be removed from the landfill is contaminated and therefore subject to this condition. The Department shall consider specific requests by WMI, on a case by case basis, on whether material removed as part of a particular remedial action or investigation may be managed in an different fashion than set out in this condition, but only when such requests accompany the particular remedial action or investigation proposal.

Appendix B. **NOTE: This is a WDNR scanned version of this USEPA Quick Reference Fact Sheet. The WDNR believes it is an accurate facsimile of the Fact Sheet, but the reader should obtain a copy of the original if there is any question of accuracy.**

EPA-	Publication: 9345.3-O3FS April 1992 United States Environmental Protection Agency, Office of Solid Waste and Emergency Response **Office of Emergency and Remedial Response Hazardous Site Control Division OS-220W Quick Reference Fact Sheet**

Guide to Management of investigation—Derived Wastes

CERCLA field investigation activities (e.g., remedial investigation/feasibility studies and remedial designs) may result in the generation of waste materials that may pose a risk to human health and the environment These investigation-derived wastes (IDW) may include drilling muds, cuttings, and purge water from test pit and well installation; purge water, soil, and other materials from collection of samples; residues (e.g., ash, spent carbon, well development purge water) from testing of treatment technologies and pump and treat systems; contaminated personal protective equipment (PPE); and solutions (aqueous or otherwise) used to decontaminate non-disposable protective clothing and equipment. The management of IDW must ensure protection of human health and the environment and comply with (or waive) regulatory requirements that are applicable or relevant and appropriate requirements (ARAR). **This fact sheet presents an overview of possible IDW management options, discusses the protectiveness requirements and ARARs associated with these options, and outlines general objectives established for IDW management under Superfund.**

The general options for managing IDW (see Highlight 1) are collection and either (1) immediate disposal or (2) some type of interim management. Interim management may include storage or other temporary measures. As discussed below, the specific option selected will depend on the type of waste produced, its relative threat to human health and the environment, and other site-specific conditions.

IDW MANAGEMENT REQUIREMENTS

When managing IDW, site managers are required to choose an option that: (1) is protective of human health and the environment and (2) complies with (or waives) ARARs, as described below.

Protectiveness

In determining if a particular management/disposal option is protective, site managers should consider the following:

- The contaminants, their concentrations, and total volume of IDW;
- Media potentially affected (e.g., ground water, soil) under management options;
- Location of the nearest population(s) and the likelihood and/or degree of site access;
- Potential exposures to workers; and
- Potential for environmental impacts.

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[1] Management of treatability study and treatment pilot wastes is discussed in Guide for Conducting Treatability Studies Under CERCLA, Interim Final, December 1989, EPA/540/2-89/058. Information on management of IDW generated during Preliminary Assessments and Site Investigations is provided in Management of Investigation-Derived Waste During Site Investigations, May 1990, EPA/540/G-91/009.

As a general rule, it will be necessary to use best professional judgment, in light of the site-specific conditions, to determine whether an option is protective of human health and the environment. For example, a site manager may determine that storing IDW temporarily until the final action or returning IDW to its source is protective, based on knowledge that the material **poses** low risk and/or that the final action will address any risks posed by the wastes and there will be no unacceptable risks in the interim.

Alternatively, if the site includes or is near residential areas, the site is unsecured, and/or contaminants appear to be present at unacceptable levels, it may not be protective to return excavated soil to the source. Storing IDW in containers in an on-site, secure location, or sending it off site immediately may be more appropriate.

Site managers also need to consider the potential effects of IDW management-related activities on environmental media. For example, pouring contaminated purge water on the ground around a well may not be prudent, because such an action could mobilize any hazardous constituents present in the soil or introduce contaminants into clean soil.

Compliance with ARARs

Remedial Investigation/Feasibility Study (RI/FS) and Remedial Design (RD) actions must comply with ARARs "to the extent practicable, considering the exigencies of the situation" (NCP, 55 FR 8756, emphasis added); therefore, it generally will not be necessary to obtain a waiver if an ARAR cannot be attained during these actions. If a site manager determines that, based on site-

Highlight 1: IDW Management Options

Type of IDW	**Generation Processes**	**Management Options**
Soil	• Well/test pit installation • Borehole drilling • Soil sampling	• Return to boring, pit, or source immediately after generation • Spread around boring pit, or source within the AOC+ • Consolidate in a pit (within the AOC) • Send to on-site TDU+ • Send to TDU off site immediately • Store for future treatment and/or disposal
Sludges/sediment	• Sludge pit/sediment sampling	• Return to boring pit, or source immediately after generation • Send to on-site TDU • Send to TDU off site immediately • Store for future treatment and/or disposal
Aqueous liquids (ground water, surface water, drilling fluids, other wastewaters)	• Well installation/development • Well purging during sampling • Ground water discharge during pump tests • Surface water sampling	• Discharge to surface water • Pour onto ground close to well (non-hazardous waste) • Send to on-site TDU • Send to off-site commercial treatment unit • Send to POTW+ • Store for future treatment and/or disposal
Decontamination fluids	• Decontamination of PPE+ and equipment	• Send to on-site TDU • Evaporate (for small amounts of low contamination organic fluids) • Send to TDU off site immediately • Store for future treatment and/or disposal
Disposable PPE	• Sampling procedures or other on-site activities	• Send to on-site TDU • Place in on-site industrial dumpster • Send to TDU off site immediately • Store for future treatment and/or disposal

*The generation processes listed here are provided as examples. IDW may also be produced as a result of activities not listed here.
+AOC: Area of Contamination (AOCs at a site may not yet have been identified at the time of the RI/FS); TDU: Treatment/disposal Unit; POTW: Publicly Owned Treatment Works; PPE Personal Protective Equipment

specific factors, compliance with an ARAR is practicable but an ARAR waiver is warranted for an RI/FS or RD action, an interim action waiver may be available if the final remedy will attain the ARAR. An action memorandum should be prepared for the waiver, the state given an opportunity to comment, and the decision document placed in the administrative record.

Potential ARARs for IDW at CERCLA sites include regulations under the Resource Conservation and Recovery Act (RCRA) (including both Federal and State underground injection control (UIC) regulations), the Clean Water Act (CWA), the Clean Air Act (CAA), the Toxic Substances Control Act (TSCA), and other State environmental laws. How these various requirements may direct or influence IDW management decisions is described below.

Resource Conservation and Recovery Act (RCRA). Certain sections of the RCRA Subtitle C hazardous waste regulations (e.g., land disposal restrictions and storage restrictions) may be ARARs for IDW should RCRA hazardous waste be identified at a site. (Note that RCRA may be relevant and appropriate even if the IDW is not a RCRA hazardous waste.) A waste is hazardous under RCRA if it is listed as such in 40 CFR 261.31 - 261.33 or if it exhibits one of four characteristics: ignitability, corrosivity, reactivity, or toxicity.

Site managers should not assume that a waste considered to pose a potential risk at a CERCLA site is a listed or characteristic RCRA hazardous waste. Until there is positive evidence (records, test results, other knowledge of waste properties) that the IDW is a RCRA hazardous waste, site managers should manage it in a protective manner (but not necessarily in accordance with Subtitle C requirements). Business records or facility processes should be examined to determine whether RCRA listed wastes were generated and are present in the IDW. For characteristic wastes, site managers should rely on testing results or on knowledge of the material's properties. If best professional judgment and available information indicate that, for protectiveness reasons (or because RCRA requirements are relevant and appropriate), IDW is best managed as a "hazardous waste," management in accordance with Subtitle C requirements is prudent, regardless of whether it is known to be a RCRA waste.

If aqueous liquid IDW is considered a RCRA hazardous waste, the site manager should determine whether the Domestic Sewage Exclusion (DSE) applies to the discharge of that IDW to a POTW. The RCRA DSE exempts domestic sewage and any mixture of domestic sewage and other wastes that passes through a sewer system to a POTW for treatment from classification as a solid waste and, therefore, as a RCRA hazardous waste (40 CFR 261.4).

- Land Disposal Restrictions

If IDW is determined to be a RCRA hazardous waste and subject to the land disposal restrictions (LDRs), "land disposal" of the IDW will be prohibited unless specified treatment standards are met (see Superfund LDR Guides #5 and #7, Determining When LDRs Are Applicable to CERCLA Response Actions and Determining When LDRs Are Relevant and Appropriate to CERCLA Response Actions OSWER Directive 93473.05FS and 9347.3-08FS, June 1989 and December 1989 and the NCP, 55 FR 8759, March 8, 1990). "Land disposal" occurs when wastes from different AOCs are consolidated into one AOC; when wastes are moved outside an AOC (for treatment or storage) and returned to the same or a different AOC; or when wastes are excavated, placed in a separate hazardous waste management unit such as an incinerator or tank within the AOC, and then redeposited into the AOC.

Storing IDW in a container ("a portable device in which a material is stored, transported, treated, disposed of, or otherwise handled" (40 CFR 260.10)) within the AOC and then returning it to its source, however, is allowable without meeting the specified LDR treatment standards. Under the definition of "hazardous waste management unit" (40 CFR 260.10), EPA states that "a container alone does not constitute a unit; the unit includes the containers and the land or pad upon which they are placed." Therefore, returning IDW that has been stored in containers (not tanks or other RCRA-regulated units) within the AOC to its source does not constitute land disposal, as long as containers are not managed in such a manner as to constitute a RCRA storage unit as defined in 40 CFR 260.10. In addition, sampling and direct replacement of wastes within an AOC do not constitute land disposal.

- Storage

Subtitle C outlines the storage requirements for RCRA hazardous wastes. Under RCRA, "storage" is defined as "the holding of hazardous waste for a temporary period, at the end of which the hazardous waste is treated, disposed of, or stored elsewhere" (40 CFR 260.10).

On-site Superfund actions are only required to comply with the substantive standards of other laws (see 40 CFR 300.5, definitions of applicable or relevant and appropriate requirements). Superfund sites are also exempt from permit requirements under CERCLA §121(e). Therefore, site managers are not required to comply with administrative requirements triggered by RCRA storage deadlines (e.g., contingency planning, inspections, recordkeeping). Generally equivalent administrative activities are undertaken at Superfund sites, however, under existing Superfund management practices.

Site managers storing known RCRA hazardous waste must comply with the substantive, technical requirements of 40 CFR Parts 264 and 265 Subparts I (containers), J (tanks), and L (waste piles), to the extent practicable. (See Highlight 2 for a summary of these technical requirements for each type of unit). In addition, the ground-water monitoring requirements of 40 CFR Parts 264 and 265 Subpart F are potential ARARs, and to the extent they are determined to be ARARs at a site, they should be attained to the extent practicable (or waived). (In many cases, ground-water monitoring conducted during the RI/FS will provide protection equivalent to the Subpart F requirements.)

[NOTE: Under the LDRs, restricted RCRA hazardous waste may not be stored at a site unless the storage is solely for the purpose of accumulating sufficient quantities of the waste to facilitate proper disposal, treatment, or recovery (see 40 CFR 268.50). Generally, storing IDW until a final disposal option is selected in a Record of Decision (ROD) and Implemented during the remedial action is allowable storage under the RCRA LDR storage prohibition.]

- <u>Recordkeeping and Manifesting</u>

If hazardous wastes are sent off site, the site manager must comply with both administrative and substantive elements of the RCRA generator requirements of 40 CFR Pan 262 and LDR notification and certification requirements of Part 268. (For example, a site manager must prepare an LDR notification and certification when restricted wastes are sent off site to a land disposal facility.) These standards include requirements such as manifests for shipping waste that list <u>all</u> hazardous waste listing and characteristics applicable to the waste (see 40 CFR 262.11), packaging and transport requirements, and recordkeeping requirements.

If the LDRs are applicable, the following information should be collected and available before the removal of wastes to an off-site disposal facility: EPA hazardous waste number, LDR treatment standards, manifest number for the waste shipment, and waste analysis data.

Highlight 2:

Examples of RCRA Technical Storage Requirements

RCRA storage requirements, applicable to both less-than-90-days generators and permitted or interim status storage facilities, may include the following substantive requirements:

<u>Containers</u> 40 CFR 264 Subpart I and 265 Subpart I

- Containers must be in good condition
- Wastes must be compatible with containers
- Container must be closed during storage
- Container storage areas must have a containment system that can contain 10 percent of the volume of containers or of the largest container
- Spilled or leaked waste must be removed from the collection area as necessary to prevent overflow

<u>Tanks</u> 40 CFR 264 Subpart J and 265 Subpart J

- Tanks must have a secondary containment system that includes a liner, a vault, a double-walled tank, or an equivalent device (applies only to certain tanks)

<u>Waste Piles</u> 40 CFR 264 Subpart L and 265 Subpart L

- Waste piles must have a liner and a leachate collection and removal system
- Owners/operators must have a run-on control system to prevent flow on to the active portion of the pile during peak discharge from at least 25 year storm
- Owners/operators must have a run-off management system to collect and control at least the water volume resulting from a 24-hour, 25-year storm

- This is a partial list of substantive requirements. For more detail, see 40 CFR Part 264 and 265.

- <u>Underground Injection Control (UIC) Program</u>

Under the UIC regulations, RCRA hazardous wastes may be injected into Class I permitted wells. In some cases, hazardous liquids, such as extracted ground water from pump and treat operations, may be injected into a Class IV

UIC well. For example, ground water contaminated with RCRA hazardous wastes may be injected into Class IV permitted wells if it is part of a CERCLA response action or a RCRA corrective action and if it has been treated to 'substantially reduce hazardous constituents prior to such injection..." (RCRA § 3020(b)). (See Applicability of Land Disposal Restrictions to RCRA and CERCLA Ground Water Treatment Reinjection OSWER Directive #9234,1-06, December 1989.)

- Non-RCRA Hazardous Wastes

Some non-RCRA hazardous waste may be subject to management requirements under Subtitle D of RCRA as solid wastes. Subtitle D regulates disposal of solid waste in facilities such as municipal landfills. Therefore, non-RCRA hazardous IDW, such as decontaminated PPE or equipment, may need to be disposed of in a Subtitle D facility (depending on State requirements).

Clean Water Act (CWA). Discharges of aqueous IDW to surface water and publicly owned treatment works (POTWs) may be required to comply with CWA Federal, State, and local requirements. Requirements to be met may include water quality criteria, pre-treatment standards, State water quality standards, and NPDES permit conditions. Direct discharges to on-site waters are subject only to substantive requirements, while discharges to POTWs and other off-site discharges must comply with both a substantive and administrative CWA requirements (including Permitting requirements). (See Guide to Discharging CERCLA Aqueous Wastes to POTWs. June 1991 and CERCLA Compliance with the CWA and SDWA, #9234.2-06FS, January 1991.)

Toxic Substances Control Act (TSCA). If IDW contains PCBs, TSCA treatment and/or disposal requirements may apply during its management TSCA requirements regulate the disposal of material contaminated with PCBs at concentrations of 50 ppm or greater as found on site (i.e., based on sample analysis and not the PCB concentration of the source material {e.g., transformer fluid}). (See PCB Guidance Manual, EPA/540/G-90/007, August 1990.) In addition, TSCA storage requirements may apply that limit the time that PCBs may be stored to one year. Furthermore, if PCB materials are mixed with a RCRA hazardous waste, they may be regulated by the LDR California list prohibitions. (See RCRA sections 3004(d)(2)(D) and (E).)

Department of Transportation (DOT) requirements. Where IDW will be disposed of off site or transported on public roads to a site, DOT requirements for containerizing, labeling, and transporting hazardous materials and substances may apply.

State requirements. Promulgated State regulations that are legally enforceable, timely identified, and more stringent than Federal regulations may be potential ARARs for IDW managed on site. Substantive requirements of State law that may be ARARs for IDW management include State water quality standards, direct discharge limits and RCRA requirements (including underground injection control regulations) promulgated m a State with an authorized RCRA hazardous waste management program (as well as programs authorized by State laws). Off-site, substantive and administrative requirements of State law may apply.

Off-Site Policy. In addition to complying with requirements of Federal and State laws all off-site disposal of wastes must comply with CERCLA section 121(d)(3) and the CERCLA Off-Site Policy (OSWER Directive No.9834.11 (November 13, 1987)). The Off-Site Policy establishes criteria for selecting an appropriate treatment, storage, or disposal facility (TSDF), including release criteria for all facilities that receive wastes from CERCL A authorized or funded response actions. In addition, receiving facilities must be in compliance with all "applicable laws."

Before shipping wastes off site, approval should be obtained for the proposed disposal facility from EPA's Regional Off-Site Policy Coordinator. In addition, EPA has adopted a policy for Superfund wastes shipped out of State that written notification should be provided to receiving States (OSWER Directive 9330.2-07, September 14, 1989).

GENERAL OBJECTIVES FOR IDW MANAGEMENT

In addition to the two requirements of protectiveness and compliance with ARARs to the extent practicable (on site) or compliance with applicable law (off site), EPA has identified two general objectives that Superfund site managers should consider when managing IDW: (1) minimization of IDW generation; and (2) management of IDW consistent with the final remedy for the site. The extent to which these objectives can be achieved is highly dependent on site-specific circumstances.

IDW Minimization

Site managers should strive to minimize the generation of IDW to reduce the need for special storage or disposal requirements that may result in substantial additional costs yet provide little or no reduction in site risks relative to the final remedial action. Generation of IDW can be minimized through proper planning of all remedial activities that may generate IDW, as well as through use of screening information from the site inspection. The potential problems of managing IDW should be a factor in choosing an investigative method. Site managers may wish to consider techniques such as replacing solvent-based cleaners with aqueous based cleaners for decontamination of equipment, reuse of equipment (where it can be decontaminated), limitation of traffic between clean and hot zones and drilling methods and sampling techniques that generate little waste. Examples of such techniques include using gridding techniques to minimize the number of test pits or using soil boring instead of test pits. Alternative drilling and subsurface sampling methods may include the use of small diameter boreholes, as well as borehole testing methods such as a core penetrometer instead of coring. Site managers should also be careful to keep hazardous wastes separate from nonhazardous wastes.

Management Consistent with Final Remedy

Most IDW (with the exception of non-indigenous IDW) generated during the course of an investigation are intrinsic elements of the site. If possible, IDW should be considered part of the site and should be managed with other wastes from the site, consistent with the final remedy. This will avoid the need for separate treatment and/or disposal arrangements.

Because early planning for IDW management can prevent unnecessary costs and the use of treatment or disposal capacity, IDW management should be considered as early as possible during the remedial process. A key decision to be made is whether the waste will best be treated/disposed of immediately or addressed with the final remedy. If addressed with the final remedy, IDW volumes should be considered in the FS. In addition, when IDW is stored on site, it should be managed as part of the first remedial action/operable unit that addresses the affected media.

SELECTION OF IDW DISPOSAL OPTIONS

The following sections present the Agency's presumptions for IDW management that have been established based on the above considerations. The actual option selected should be based upon best professional judgment and should take into account the following factors:

- The type and quantity of IDW generated (sludge/soil, aqueous liquid, non-indigenous IDW);
- Risk posed by managing the IDW on site (e.g., based on site access controls, contaminant concentrations);
- Compliance with ARARs, to the extent practicable (on site);
- IDW minimization; and
- Whether the final remedy is anticipated to be an off-site or on-site remedy (or this information is unknown) and whether IDW can be managed consistent with the final remedy.

Off-site Final Remedies

If a site manager believes that the final remedy will involve off-site disposal of wastes, EPA's presumption is to manage the IDW as part of the remedial action addressing the waste/medium. Thus, until the final action, the IDW may be stored (e.g., drummed, covered waste pile) or returned to its source. However, the management option selected should also take into account any protectiveness concerns, ARARs, and other relevant site-specific factors (e.g., weather, storage space, and public concern/perceptions).

There are several potential reasons why it may be advisable to store IDW until the final action. First, because wastes at the site will be shipped off site eventually, returning IDW (especially sludges and soil) to its source would require that it be excavated again. Thus, site managers may consider it practical to containerize IDW as soon as it is generated. Second, storing IDW in containers may be more protective than returning it to its source. Third, because off-site actions may trigger such requirements as the LDRs, temporary storage will eliminate the need to meet these additional requirements until the final remedy.

In some cases, circumstances may lead site managers to choose to return the IDW to its source. This may be appropriate if it is determined that returning IDW to the source is protective and that storage at the site is not possible or practicable (i.e., given State or community concerns). In other cases, long-term storage may not be protective, and immediate off-site disposal may be a better option.

> Example: A site involves volatile organic RCRA hazardous wastes that will likely be sent off site for final treatment and disposal. Site conditions are such that temporary storage of IDW is considered protective until the remedial action begins. Because off-site disposal will trigger RCRA disposal requirements such as the LDRs and immediate containerization would be more protective than redepositing into the source area at the time of sampling, the site manager decides to containerize the IDW (and comply with RCRA substantive technical tank and container standards) until the final action is initiated.

<u>On-site Final Remedies (or Final Management in an Unknown Location)</u>

When final management of wastes is likely to occur on site, the management presumptions vary depending on the type of IDW produced.

Sludge/soil

Generally, the Agency expects sludge or soil IDW will be returned to its source if short-term protectiveness is not an issue. The reason behind this presumption is that IDW that may pose a risk to human health and the environment in the long term will be addressed by the final action. Storage of RCRA hazardous IDW in container-s within the AOC prior to returning It to the source will not trigger the LDRs as long as the containers are not managed In such a way as to constitute a RCRA storage unit as defined in 40 CFR 260.10. Therefore, it may be possible to store IDW temporarily before redisposing of it. However, EPA believes that, in many cases, returning sludges and soils to their source immediately will be protective and will avoid potentially increased costs and requirements associated with storage. Site-specific decisions on how to manage sludge and soil IDW may ultimately vary from the presumption based on protectiveness, ARARs, and/or community concerns.

<u>Example 1</u>: The soil at a site contains wastes that are expected to be stabilized on site during the final remedial action. The site manager determines that sending soil IDW off site is not cost-effective, because off-site disposal would involve testing and transport costs for a relatively small amount of waste. Instead, knowing that the site is secure and that redisposing the waste at the source will not increase site risk or violate ARARs, the site manager decides to return soil IDW to the source area from which it originated.

<u>Example 2</u>: A site manager determines that returning highly contaminated PCB wastes to the ground at a site is not protective because of the potential risks associated with the material; instead, the site manager chooses to drum the waste and send it off site (in compliance with TSCA). (Off-site disposal may occur immediately or at a later date.)

<u>Example 3</u>: Soil IDW contaminated with a RCRA hazardous waste is generated from a soil boring. The site manager decides to put the IDW back into the borehole immediately after generation, but ensures that site risks will not be increased (e.g., the contaminated soil will not be replaced at a greater depth than where it was originally so that it will not contaminate “clean” areas) and that the contamination will be addressed in the final remedy.

Aqueous liquids

EPA has not established a presumption for the management of aqueous liquid IDW (e.g., ground water). Site managers should determine the most appropriate disposal option for aqueous liquids on a site-specific basis. Parameters to consider, especially in making the protectiveness decision, include the volume of IDW, the contaminants present in the ground water, the presence of contaminants in the soil at the site, whether the ground or surface water is a drinking water supply, and whether the ground-water plume is contained or moving. Special disposal/handling may be needed for drilling fluids because they may contain significant solid components. Examples of aqueous liquid management decisions considering these factors are presented in the following box.

Example 1: A site manager has large volumes of ground water IDW and does not know if it is contaminated. Pouring this IDW on the ground would not be protective, because it may contaminate previously uncontaminated soil or may mobilize contaminants that are present in the soil. Therefore, the site manager stores the water in a mobile tank until a determination is made as to whether the water and soil are contaminated or until the final action.

Example 2: IDW is generated from the sampling of background, upgradient wells. Because there are no community concerns or evidence of any soil contamination from other sources, the site manager decides to pour this presumably uncontaminated IDW on the pound around the well.

Example 3: Purge water from a deep aquifer is known to be contaminated with a RCRA hazardous waste. At this site, if this water were poured on the pound, it could contaminate a previously uncontaminated shallow aquifer that is a potential drinking water source and would have to comply with the LDRs. The site manager decides to containerize the water within the AOC and store it until the final remedy.

Non-indigenous IDW

Non-indigenous IDW (e.g., sampling materials, disposable PPE, decontamination fluids) should be stored until the final remedy or disposed of immediately. If contaminated, such waste may not be disposed of onto the ground because such an action would add contamination that was not present when activities began at the site (e.g., solvents used for decontamination). If non-indigenous IDW is contaminated with RCRA hazardous waste, it must be managed in accordance with RCRA Subtitle C requirements. Otherwise, site managers may generally dispose of it in an on-site dumpster (for PPE).

Example 1: Disposable PPE (e.g, gloves, shoe covers) becomes contaminated with RCRA hazardous waste during the field investigation. The site manager containerizes and disposes of this IDW in compliance with RCRA Subtitle C requirements.

Example 2: Disposable equipment becomes contaminated during a field investigation. The site manager decontaminates them and sends them to a Subtitle D facility.

COMMUNITY CONCERNS

Residents of communities near a CERCLA site, local governments or States may have concerns about certain disposal methods or long-term storage of IDW at the site. As with all CERCLA activities, site managers should evaluate community concerns regarding disposal of IDW in deciding what action to take. For example, if a community is concerned about the direct discharge of IDW water to surface water on site, site managers may want to consider sending the water to a POTW, if one is located nearby. In some instances, it may be appropriate to prepare fact sheets include options in other community relations documents or explain IDW management decisions at public meeting prior to actions.

NOTICE: The policies set out in this memorandum are not final agency action, but are intended solely a guidance. They are not intended, nor can they be relied upon, to create any rights enforceable by any party in litigation with the United States. EPA officials may decide to follow the guidance provided in this memorandum, or to act at variance with the guidance, based on an analysis of specific site circumstances. The Agency also reserves the right to change this guidance any time without public notice.

ATTACHMENT 2

SAMPLING AND TESTING OF INVESTIGATIVE WASTES

During the installation of monitoring wells and soil borings the amount of waste material generated in the form of drilling fluids and soil cuttings should be minimized. Waste materials generated from these activities will require containerization and sampling in order to determine proper disposal or treatment options. The following is a discussion of ways to not only minimize the amount of materials accumulated and thereby minimize the number of samples which have to be collected and analyzed, but also how to sample these wastes in order to best obtain representative results.

An attempt should be made to identify the exact depth within the formation where the soil cuttings originated or, in the case of drilling fluids, were in contact with the formation, if possible. When borings are extended into or below the water table it is advisable to segregate materials from a point approximately 10 feet above the top of the water table from those collected below the water table. In that way you can potentially minimize the amount of materials which may need to be sampled and characterized because they were in contact with contaminated groundwater.

When drilling off-site, or away from the area where a release occurred, an assumption can be made that soils above the water table do not contain contaminants, and therefore do not need to be containerized or sampled. This may not be true in those situations where soil gas migration may have carried contaminants off-site to adjacent properties. Field screening equipment, such as an OVM or PID, can be used to help isolate contaminated materials from `clean' soils and cuttings for the contaminants in question, when appropriate.

Materials collected as the result of drilling or soil boring activities which require containerization should be collected and stored in 55 gallon drums, roll-off containers, or similar containers which can be closed or covered watertight and are compatible with the wastes being stored in them. These drums or containers should be marked such that they can be clearly identified as to the exact location and depths the materials came from. These drums or containers should also be stored in a secured location, if possible, and labeled as special waste materials until an exact determination can be made.

If soil samples are being analyzed from a soil boring or well location, the results from those analyses must be directly tied back to the material collected and the container it was placed in. In certain cases, you may be analyzing specific samples based upon elevated readings from field screening devices. This is why very precise labeling and identification of containers is necessary. Should the samples be too widely distributed or should you be unable to field screen for elevated readings, such as with pesticide contamination, all samples will need to be analyzed for the contaminants of concern.

Samples should be taken such that they are representative of the waste material to be analyzed. For material stored in 55 gallon drums, if field readings do not detect a hot spot or area from the boring, a representative sample should be collected for every 5-55 gallon drums or portion thereof. This sample should be a discrete sample taken from approximately the middle of one of the 5 drums. If the drum contains both liquid and solid fractions, these should be sampled and analyzed separately. This assumes that soil formations for the material collected in the 5 drums are consistent in their unified soil classification system (USCS) rating and there was no visual or other indications of contamination present. Where visual observations or field readings detect elevated readings, the sample should be collected from that depth or from the container where those specific materials were placed. Standard sampling methods and procedures should be followed to ensure that the results are representative of the materials in question.

If materials are being stored in a large container, such as a covered rolloff, a minimum of two samples should be collected from opposite ends of the soil pile. Two additional samples should be collected for every additional 100 cubic yards of material being collected and stored. These should be discrete samples and should be taken from at least 18 inches below the surface of the soil pile. An attempt should be made to identify those areas of a soil pile which may contain elevated concentrations or hot spots and these areas should be segregated out and sampled individually.

Liquids collected as part of well installation or development should be segregated from soils as much as possible. If the area is served by a sanitary sewerage system, permission should be obtained from it's operator as well as the local District wastewater engineer for permission to directly discharge these liquids into that system. In most cases an analysis of the liquids will be required by the sewage treatment plant if information is not available on what contaminants are present.

All analyses should be performed using a method listed in EPA SW-846 designed to detect the target compounds. The method chosen should be one which gives an acceptable detection limit and will allow for characterization of the materials as hazardous or non-hazardous waste. Based upon these results, a determination will need to be made as to proper disposal or treatment options.

ATTACHMENT 3

LONG-TERM ON-SITE STORAGE OF INVESTIGATIVE WASTES (IW)

General

Storage of IW should be in above ground tanks or containers. Examples of tanks include large metal or fiberglass tanks and trailer tanks for hauling liquids on roads. Examples of containers are 55-gallon drums, rolloff boxes (also called "luggers") and U. S. DOT approved boxes for solids. Storage should not be in underground tanks, in-ground pits, surface impoundments, trenches or lagoons. The tanks or containers should be water tight and compatible with the IW being stored. Permanent labels that indicate the source of the wastes and their descriptions should be attached to all containers.

Containers or tanks should be stored in area with limited access, such as a fenced area or a building. If vandalism is a potential concern, consideration should be given to storing the IW in a building. Temporary buildings can be constructed for this purpose. For liquids, and especially highly contaminated liquids, consideration should be given to providing secondary containment for spills and leaks in accordance with the hazardous waste regulations (see below). For outdoor secondary containment, precipitation run on and run off control should be provided in accordance with those regulations.

Stored IW should be periodically inspected, with records kept. Deteriorating containers or tanks should be immediately replaced. Deteriorating 55-gallon drums can be overpacked. If a container label has deteriorated, it should also be replaced.

Hazardous IW Storage

Storage of hazardous IW should be in accordance with the Hazardous Waste Program regulation technical standards. The standards for containers are outlined in ss. NR 640.08 - 640.15. The standards for tanks are outlined in ss. NR 645.08 - 645.15.

SONAR BATHYMETRIC SURVEY
STANDARD OPERATING PROCEDURE #12
Revision: 05
Revision Date: 11/12/2010

I) Scope:

The following Standard Operating Procedure (SOP) outlines the procedures for a bathymetric survey using sonar. This procedure is used for Sediment Pre-Design Investigation, Sediment Remediation Verification, and Sediment Post Remediation Monitoring.

II) Equipment/Materials:

- Water safety devices and PPE as defined in the HASP
- Boat
- Global Positioning System (GPS)
- Echo sounder
- Laptop computer
- Field Logbook

III) Procedure Description:

A. Sonar Bathymetric Surveying

1. Before collecting bathymetric measurements, set-up base stations. The base stations will be establish by four surveyed control points along the river that will provide known X, Y, and Z coordinates. Vertical elevation (Z) will use North American Vertical Datum (NAVD) 88. Horizontal positions (X and Y) will use US State Plane 1983 (Northing/Easting) System, Wisconsin South Zone, and NAD 1983 (Conus) Datum. Since there is potential to convert between vertical datum the following conversions are provided:

   X ft (HGVD 29) – 0.10 ft = X ft (NAVD 88)
   X ft (NAVD 88) – 0.46 ft = X ft (IGLD 85)
   X ft (NAVD 88) – 581.0 ft = X ft (City Datum)

2. A bathymetric survey will be performed before and one week following completion of a dredged grid or sub-grid and placement of cover, if necessary. The before and after survey measurements will be compared to verify that sediment was removed or cover is placed to the required elevations and to establish a post-dredge/baseline river bottom contour. Sonar bathymetric surveying transects will be located at a traverse or cross-section frequency of 10 feet unless near a bridge structure that interferes with surveying. Here, bathymetric measurements will be taken at the best available traverse frequency and noted in the Field Logbook. The ends of each transect will extend from the land-water interface on one shore to the land-water interface of the opposite shore.
3. Mount the sonar device on the boat at the midpoint along the boat (front to back) to adjust for possible squat.
4. Establish the zero point for the Sonar by measuring the distance from the bottom of the Sonar to the top of the water. Enter this zero point into the laptop computer.
5. Check the zero point of the Sonar by lowering the barcheck at the midpoint along the boat into the water a known depth; adjust as necessary so that the Sonar is calibrated.
6. Measure the top of water elevation relevant to the established base station in the portion of the river bathymetric measurements are being collected.
7. At each bathymetric location on a transect, the following will be recorded in the laptop computer:

   X and Y location; and
   Depth to the top of sediment

Note: The measurements will begin at the furthest downstream river reach location and move upstream to the river reach endpoint to prevent kicking up sediment that might obscure the measurements. Boat speed is generally less than 2 knots to avoid causing boat squat.

IV) Related Activities

A) Typical Pre-Sonar Bathymetry Surveying Activities
   1. Trimble GeoXT Global Positioning System (SOP #31)

B) Typical Post-Sonar Bathymetry Surveying Activities
   1. Survey Data Processing
      a) The elevation to top of sediment will be determined by subtracting the measured depth of water from the measured top of water elevation established with the base station.
      b) Manually load and use AutoCAD or Surfer® to develop the topographic contours of the river bottom at 1 foot intervals. The contours will represent an actual elevation and allow consistent comparison over time.
      c) Maps will be drawn to at the smallest practical scale that allows locations to be shown on a single-sheet. The sheet size and scale will be based to allow the reader/reviewer a clear understanding of the presentation and the sheets could range from 8 ½" x 11" to 11" x 17" up to ANSI D (22" x 34").

I) Scope:

The following Standard Operating Procedure (SOP) outlines the procedures required for the accurate field measurement of turbidity. This procedure is used for Sediment Remediation Verification.

II) Equipment/Materials:

- Field Logbook
- Calibration Log
- Dredge Turbidity/TSS Log
- WWTP Turbidity/TSS Log
- Analite NEP160 turbidity meter
- Waterproof ink pen, calculator, and notepad

III) Procedure Description:

A. River Water

1. Don PPE as required by the *Health and Safety Plan* (HASP).
2. Assure that the weekly calibration has been performed. Calibration will be performed using a two point calibration with 0 and 100 Nephelometric Turbidity Unit (NTU) reference solutions in accordance with the manufacturer's guidelines. Complete attached Calibration Log.
3. Position boat at the upstream location using GPS unit. Upstream location should be approximately 150 feet from dredge. Record upstream station location in the Dredge Turbidity/TSS Log (Attached) and log coordinates in GPS unit.
4. Lower turbidity transducer to approximately the midpoint of the water column.
5. Record five (5) NTU readings in the Field Logbook. Calculate and record the average value (NTU) on the Dredge Turbidity/TSS Log (Attached). Using the correlation curve established prior to operations, obtain the corresponding Total Suspended Solid (TSS) value. Record TSS value in the Dredge Turbidity/TSS Log (Attached).
6. Repeat Steps 4 and 5 at the downstream location. Downstream location should be approximately 500 feet from dredge. Record downstream station location in the Dredge Turbidity/TSS Log (Attached) and log coordinates in GPS unit.
7. With the known upstream and downstream TSS values, calculate the delta (change) by subtracting the upstream TSS value from the downstream TSS value. Record delta value in Dredge Turbidity/TSS Log (Attached).
8. If the delta value is above 35 ppm, notify the project manager.
9. Repeat process every two hours. If dredge operations cease due to mechanical repairs or severe weather adjust measurement frequency accordingly.
10. Collect all field PPE and place into appropriate storage container for future disposal.
11. At the end of the day plug turbidity meter into outlet for charging.

B. Wastewater Treatment Plant (WWTP) Effluent

1. Don PPE as required by the *Health and Safety Plan* (HASP).
2. Assure that the weekly calibration has been performed. Calibration will be performed using a two point calibration with 0 and 100 Nephelometric Turbidity Unit (NTU) reference solutions in accordance with the manufacturer's guidelines. Complete attached Calibration Log.
3. Lower turbidity transducer into the WWTP effluent stream.
4. Record five (5) NTU readings in the Field Logbook. Calculate and record the average value (NTU) in the WWTP Turbidity/TSS Log (Attached). Using the correlation curve established prior to operations, obtain the corresponding Total Suspended Solid (TSS) value. Record TSS value in the WWTP Turbidity/TSS Log (Attached).
5. Notify the project manager if TSS value is above 10 ppm.
6. Repeat process every hour or, at minimum, when the WWTP is in operation.

7. Collect all field PPE and place into appropriate storage container for future disposal.
8. At the end of the day plug turbidity meter in to outlet for charging.

C. Reporting, Quality Assurance, Quality Control:
   1. Complete Field Logbook as detailed in SOP #1

IV) Related Activities

A. Typical Pre-Turbidity Measurement Activities
   1. Water Sampling for Correlation Curve Development (SOP #14)

B. Typical Post-Turbidity Measurement Activities
   1. Not applicable

CALLABRATION LOG

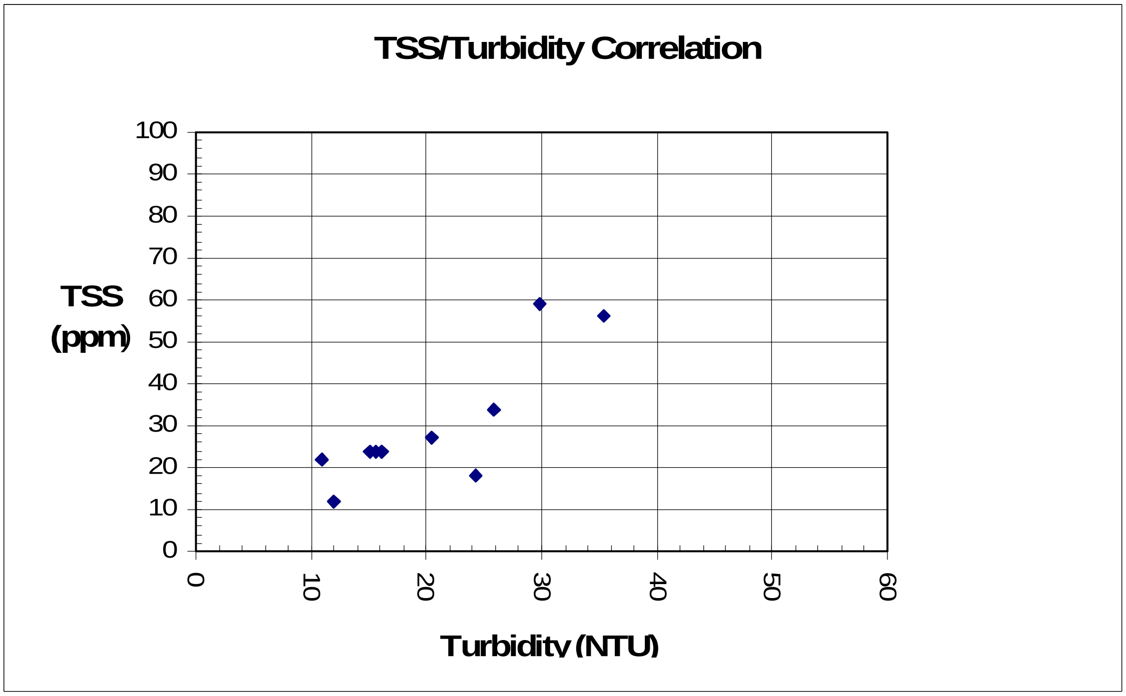
Date	0 NTU Solution Start	0 NTU Solution End	100 NTU Solution Start	100 NTU Solution End	Signature

DREDGE TURBIDITY/TSS LOG

Date:___________________

Time	Dredge Station	Up Stream Station	Turbidity (NTU)	A TSS (ppm) from Curve	Down Stream Station	Turbidity (NTU)	B TSS (ppm) from Curve	C Delta* (ppm)

***Delta: C = A - B. If delta is greater than 35 ppm notify dredge operator to reduce auger and/or ladder swing speed. Follow up notification should then be made to Project Manager or Field Coordinator. If delta is greater than 70 ppm notify dredge operator to shut down operation and notify Project Manager or Field Coordinator.**



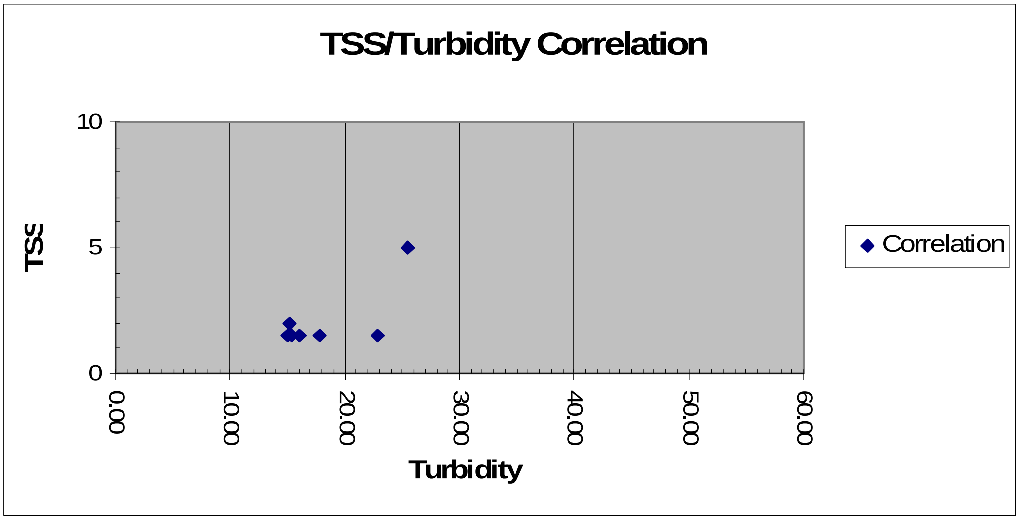
Note: This is an example correlation curve used from the Upper River. A new correlation curve will be established for the Lower River.

WWTP TURBIDITY/TSS LOG

Date:____________________

Time	Turbidity (NTU)	TSS (ppm) from Curve

If TSS is greater than 10 mg/L notify Project Manager or Field Coordinator



Note: This is an example correlation curve used from the Upper River. A new correlation curve will be established for the Lower River.

WATER SAMPLING FOR CORRELATION CURVE DEVELOPMENT
STANDARD OPERATING PROCEDURE #14

Revision: 02
Revision Date: 11/12/2010

I) Scope:

The following Standard Operating Procedure (SOP) outlines the procedures required for the development of a correlation between Turbidity and Total Suspended Solids (TSS). This procedure is used for Sediment Remediation Verification.

II) Equipment/Materials:

- Personal Protective Equipment (PPE)
- Boat/raft and/or chest waders, where applicable
- Sample Tags and/or Labels
- Sample containers, cooler and ice
- Chain-of-Custody Forms
- Paper Towels
- Water Proof Marker
- Water Chemical Testing Log
- Field Logbook

III) Procedure Description:

A. River Water

1. Don PPE as required by the *Health and Safety Plan* (HASP).
2. Position boat (if used) over the sampling location using a minimum of two points to secure the boat. Log coordinates using GPS unit. **Note: Samples will be collected over a range of flows and locations over multiple days.**
3. Measure the turbidity level in accordance with the Turbidity Measurement SOP #13.
4. Lower the sampling jar with lid on into the river at approximately the midpoint of the water column, remove lid to allow jar to fill, and place lid back on when full.
   Note: Sampling should progress in an upstream direction. Samples should be collected upstream from where the sampler is standing in order to avoid any potential disturbance.
5. Slowly pull the jar from the water.
6. Document river flow rate as reported from USGS gage station.
7. Move to the next location and repeat the above procedures (2-6) until all samples are collected.
8. Collect all field PPE and place into appropriate storage container for future disposal.

B. Wastewater Treatment Plant (WWTP) Effluent

1. Don PPE as required by the *Health and Safety Plan* (HASP).
2. Measure the turbidity level in accordance with the Turbidity Measurement SOP #13 in the effluent stream.
3. Place empty sample container at the end of the effluent sampling hose.
4. Open valve so that handle is in direction of flow.
5. Fill sample container to the top while removing any air bubbles.
6. Close valve so that handle is perpendicular to the direction of flow.
7. Place lid on sample container.
8. Repeat the above procedures until all are collected.
9. Collect all field PPE and place into appropriate storage container for future disposal.

C. Reporting, Quality Assurance, Quality Control:

1. Complete Field Logbook as detailed in SOP #1
2. Complete Water Chemical Testing Log (Attached)

IV) Related Activities

A. Typical Pre-Water Sampling Activities
   1. Turbidity Measurement (SOP #13)

B. Typical Post-Water Sampling Activities
   1. Sample Identification (SOP #6)
   2. Chain-of-Custody, Labeling, Packaging, and Sampling (SOP #7)
   3. Composite and Grab Sample Processing (SOP #30)

WATER CHEMICAL TESTING LOG

PROJECT TITLE: Lower River

DATE	*SAMPLE ID*	*COC #*	*ANALYSIS*	*CONTAINER*	*NO.*	*DATE SENT TO LAB*	*DATE LAB RECEIVED*

DISPOSAL SAMPLING
STANDARD OPERATING PROCEDURE #15
Revision: 02
Revision Date: 11/12/2010

I) Scope:

The following Standard Operating Procedure (SOP) outlines the procedures required to collect disposal samples. This procedure is used for Sediment Remediation Verification.

II) Equipment/Materials:

- Stainless steel container
- Personal Protective Equipment
- Hand auger
- Cooler and ice
- Sample tags and/or labels
- Sample containers
- Chain-of-Custody forms
- Paper towels
- Water Proof Marker
- Sediment Chemical Testing Log
- Field Logbook

III) Procedure Description:

A. Dewatering Area
1. Don PPE as required by the *Health and Safety Plan* (HASP).
2. Grab a sample of the dewatered sediment with hand auger to a depth of 4' or refusal, whichever comes first.
3. Deposit the contents (i.e. sediment) into the stainless steel container to create a composite sample.
4. Repeat the above procedures until all five (5) grab samples equally spaced along the non-TSCA geo-textile tube (i.e. every 40 feet) are collected for the composite.
5. After all grab locations are obtained to comprise the composite sample, decontaminate the hand auger and all sampling utensils.
6. Collect all field PPE and place into appropriate storage container for future disposal.

B. Reporting, Quality Assurance, Quality Control:
1. Complete Field Logbook as detailed in SOP #1
2. Complete Sediment Chemical Testing Log (Attached)
3. Field duplicates will be collected for sediment samples by replicating sub-samples of the composite sample in the stainless steel container.

IV) Related Activities

A. Typical Pre-Disposal Sampling Activities
1. Not applicable

B. Typical Post-Disposal Sampling Activities
1. Sample Identification (SOP #6)
2. Chain-of-Custody, Labeling, Packaging, and Sampling (SOP #7)
3. General Interim Guidance for the Management of Investigative Wastes (SOP #8)
4. Composite and Grab Sample Processing (SOP #30)

SEDIMENT CHEMICAL TESTING LOG

PROJECT TITLE: Lower River

DATE	***SAMPLE ID #***	***COC #***	***ANALYSIS***	***CONTAINER***	***NO.***	***DATE SENT TO LAB***	***DATE LAB RECEIVED***

AIR MONITORING
STANDARD OPERATING PROCEDURE #16
Revision: 02
Revision Date: 11/12/2010

I) Scope:

The following Standard Operating Procedure (SOP) outlines the procedures required to monitor the air during activities that may generate high levels of potentially PCB impacted dust. This procedure is used for Sediment Remediation Verification.

II) Equipment/Materials:

- Personal Protective Equipment
- Air sampling pump (supplied by laboratory)
- Low-flow tube holder (supplied by laboratory)
- Tygon tubing (supplied by laboratory)
- Tube breaker (supplied by laboratory)
- Filters (13-mm glass fiber with Florisil, supplied by laboratory)
- Chain-of-Custody forms
- Paper towels
- Water Proof Marker
- Other Chemical Testing Log
- Field Logbook

III) Procedure Description:

A) <u>Dewatering Area</u>

1. Don PPE as required by the *Health and Safety Plan* (HASP).
2. Using the tube breaker, break off both ends of the filter tube to provide an opening of at least one-half the internal diameter. Place the filter tube on the pump, mount the pump/tube assembly in the appropriate location, and turn on the pump. Record the beginning time on the log sheet provided by laboratory. Note the weather conditions on the log sheet provided by laboratory. **Note: Sampling should not be conducted during a rainfall event.**
3. Repeat this procedure for the second sample location.
4. At two down wind locations along the perimeter of the dewatering area, place the air sampling equipment at the breathing zone of the typical worker in the area. If the worker is located in a cab of a truck, loader, or other equipment, the sample will be collected at that height. Otherwise, the sample will be collected at a height of five feet above ground surface. At the end of the day (pumps should run a minimum of 8 hours), turn off the pumps, and remove the filter tubes. Place provided caps on each tube, place into provided plastic bags, and label. Record the time sampling ended on the log sheet. Ship the sample to the laboratory under proper chain-of-custody documentation.
5. Collect all field PPE and place into appropriate storage container for future disposal.

B) <u>Reporting, Quality Assurance, Quality Control:</u>

1. Complete Field Logbook as detailed in SOP #1
2. Complete Other Chemical Testing Log (Attached)

IV) Related Activities

A) <u>Typical Pre-Air Monitoring Activities</u>

1. Not applicable

B) <u>Typical Post-Air Monitoring Activities</u>

1. Sample Identification (SOP #6)
2. Chain-of-Custody, Labeling, Packaging, and Sampling (SOP #7)

OTHER CHEMICAL TESTING LOG

PROJECT TITLE: Lower River

DATE	*SAMPLE ID #*	*COC #*	*ANALYSIS*	*CONTAINER*	*NO.*	*DATE SENT TO LAB*	*DATE LAB RECEIVED*

WATER MONITORING
STANDARD OPERATING PROCEDURE #17
Revision: 01
Revision Date: 03/12/10

I) Scope:

The following Standard Operating Procedure (SOP) outlines the procedures required to monitor the influent and effluent water streams of the Wastewater Treatment Plant (WWTP). This procedure is used for Sediment Remediation Verification.

II) Equipment/Materials:

- ISCO sampler
- Personal Protective Equipment
- Cooler and ice
- Sample tags and/or labels
- Sample containers
- Chain-of-Custody forms
- Paper towels
- Water Proof Marker
- Water Chemical Testing Log
- Field Logbook

III) Procedure Description:

A) <u>Wastewater Treatment Plant – Effluent (TSS and PCB)</u>

1. Don PPE as required by the *Health and Safety Plan* (HASP).
2. Place empty sample jug (1-Liter) provided with ISCO sampler into refrigerator located underneath ISCO sampler.
3. Turn ISCO sampler on by pressing "ON" button located on top of ISCO sampler.
4. Follow the ISCO operational manual to set the sampling start time, interval, and volume.
5. Press the "Sample start button" on the top of the ISCO sampler. Sampling will begin at the entered start time and pull the entered volume of water into the sample container at the selected intervals.
6. At the beginning of the next day, remove full sample jug and replace with empty sample jug. Repeat steps 4 and 5.
7. Collect all field PPE and place into appropriate storage container for future disposal.

B) <u>Wastewater Treatment Plant – Influent (TSS, PCB, and Mercury), Effluent (Mercury)</u>

1. Don PPE as required by the *Health and Safety Plan* (HASP).
2. Place the appropriate empty sample container at the end of the selected (i.e., influent or effluent stream) sampling hose.
3. Open valve so that handle is in direction of flow.
4. Fill sample container to the top while removing any air bubbles.
5. Close valve so that handle is perpendicular to the direction of flow.
6. Place lid on sample container.
7. Proceed to the next sampling hose location.
8. Collect all field PPE and place into appropriate storage container for future disposal.

C) <u>Reporting, Quality Assurance, Quality Control:</u>

1. Complete Field Logbook as detailed in SOP #1
2. Complete Water Chemical Testing Log (Attached)

IV) Related Activities

A) <u>Typical Pre-Water Monitoring Activities</u>

1. Not applicable

B) Typical Post-Water Monitoring Activities

1. Sample Identification (SOP #6)
2. Chain-of-Custody, Labeling, Packaging, and Sampling (SOP #7)

WATER CHEMICAL TESTING LOG

PROJECT TITLE: Lower River

DATE	SAMPLE ID	COC #	ANALYSIS	CONTAINER	NO.	DATE SENT TO LAB	DATE LAB RECEIVED

SURFACE SEDIMENT SAMPLING – PONAR
STANDARD OPERATING PROCEDURE #24
Revision: 03
Revision Date: 11/12/2010

I) Scope:

The following Standard Operating Procedure (SOP) outlines the procedures required to collect Ponar samples. This procedure is used for Sediment Remediation Verification and Sediment Post Remediation Monitoring.

II) Equipment/Materials:

- Personal Protective Equipment (PPE) as defined in the HASP
- Boat anchors
- Boat/raft and/or chest waders
- Petite Ponar Dredge
- Field Location GPS (Trimble Geoexplorer 2005 Series, or equivalent)
- Cooler and Ice
- Sample Tags and/or Labels
- Sample Containers
- Paper Towels
- Water Proof Marker
- Storage container
- Chain-of-Custody Forms
- Sediment Chemical Testing Log
- Field Logbook

III) Procedure Description:

A) Upper River, Middle River, Lower River, and Inner Harbor

1. Don PPE as required by the *Health and Safety Plan* (HASP).
2. Log the sample location into the handheld GPS unit.
3. Attach the necessary length of rope (a bowline knot) to the Petite Ponar dredge.
4. Set the trip mechanism on the dredge. Be careful not to place fingers or hands on or into any pinch points
5. Position boat over the sampling location using anchor(s) to secure the boat. Record location in GPS.
6. Lower dredge through the water column to the sediment, causing minimal disturbance to the final 1-2 feet of water. Trip the dredge by allowing the line to slacken. The jaws will clamp shut when the rope is retrieved, grabbing a sediment sample.
7. Raise the dredge slowly through the water column, excess water poured off, and sediment placed into a stainless steel container for processing.
8. Place sediment into the stainless steel container.
9. Repeat procedures 5-8 until all Ponar samples of the defined unit are collected and placed into the stainless steel container for the composite sample.
10. Homogenize the sample in the field or identify the stainless steel container according to the defined unit location for transport to the processing area.
11. After all samples are collected, decontaminate the Ponar dredge and all sampling utensils.
12. Collect all field PPE and place into appropriate storage container for future disposal.

B) Reporting, Quality Assurance, Quality Control:

1. Complete Field Logbook as detailed in SOP #1
2. Complete Sediment Chemical Testing Log (Attached)
3. Field duplicates will be collected for sediment samples by replicating sub-samples of the composited sample in the stainless steel container.

4. Rinse blanks will be collected by rinsing distilled water into and over the decontaminated equipment collecting the rinse water in appropriate sample containers.

IV) Related Activities

A) Typical Pre-Vibrating Core Sampling Activities
   1. Not Applicable

B) Typical Post-Surface Sediment Sampling Activities
   1. Decontamination of Sampling Equipment (SOP #2)
   2. Sample Identification (SOP #6)
   3. Chain-of-Custody, Labeling, Packaging, and Sampling (SOP #7)
   4. General Interim Guidance for the Management of Investigative Wastes (SOP #8)
   5. Composite and Grab Sample Processing (SOP #30)

SEDIMENT CHEMICAL TESTING LOG

PROJECT TITLE: Lower River

DATE	*SAMPLE ID #*	*COC #*	*ANALYSIS*	*CONTAINER*	*NO.*	*DATE SENT TO LAB*	*DATE LAB RECEIVED*

I) Scope:

This Standard Operating Procedure (SOP) is used to collect samples using a vibrating core. This procedure is used for Sediment Pre-Design Investigation.

II) Equipment/Materials:

- Water safety devices and PPE as defined in the HASP
- Sample processing containers
- Boat anchors
- Boat/raft and/or chest waders
- Vibrating core components
- Lexan core tubes
- Global Positioning System (GPS)
- Paper towels
- Electrical tape
- Water proof marker
- Storage container
- Field data sheets
- Field logbook

III) Procedure Description:

A) <u>Vibrating Core Sampling</u>

1. Prior to collecting core samples, make sure that the tubes needed for that day have pre-drilled mounting holes and keepers installed per the manufacturers' requirements.
2. All data from the sediment core collection will be recorded on field data sheets. This manually recorded data will be transcribed into the field database at the end of each day.
3. Using the GPS unit, maneuver the sampling vessel to within 3 ft of the pre-determined target coordinates for each sample location. Secure the vessel in place using spuds and/or anchors. Log the actual location from which the core was collected into the GPS unit.
4. Use a calibrated steel rod to measure the depth of water. Record the depth on the field data sheet.
5. Select the appropriate length 3-inch (o.d.) clean Lexan core tube.
6. Install the core tube onto the core tube adapter and secure by backing out the set screws until approximately 1/8" of each of the set screws are exposed outside of the core tube. Seal the top of the core tube to the core tube adapter with vinyl electrical tape and apply approximately two to three layers of this tape over the exposed set screws. This will help retain the set screws and improve the air tight seal of the core tube to the Vibe-core head.
7. With the power switch on the control box turned to "off", wire the batteries in series and connect the white (positive) wire to the positive terminal of the battery stack and the black (negative) wire to the negative terminal of the battery stack.
8. Suspend the coring apparatus with core tube attached with the lifting cable. The air tight integrity can be tested by lowering the coring apparatus with core tube attached into the water and raising it so that the lower end of the core remains in the water. If the seal on the core is good, water will remain suspended in the tube until the lower end is raised to surface and air is allowed to enter the bottom.
9. Lower the coring apparatus with the core tube attached until the bottom of the core touches the top of water, this becomes the zero point.
10. Mark the coring apparatus corresponding to the measured depth of water. Lower the coring apparatus with the core tube attached through the water column until the mark is reached.

11. Turn on the vibrating device and lower it slowly so there is always some tension on the lowering cable until refusal is reached. Make a mark on the coring apparatus corresponding to the depth of sediment penetration
12. Wait for the vibrating device to stop and then start pulling it up. A good core you will usually feel a lot of initial resistance. Measure and record the depth of core tube penetration into the sediments on the field data sheet.
13. Continue pulling the coring apparatus with core tube attached until you can reach the bottom of the core tube and place a cap over the bottom to prevent loss of material from the core. Secure the cap in place with duct tape when brought on board the vessel. For longer core samples, tilt the coring apparatus with core tube attached and lift the bottom end of the core tube as this prevents mixing of you sample.
14. Once the bottom of the core tube is capped you can remove the core tube from the core tube adapter by screwing the set screws into the core tube adapter until they are free from the core tube. **Note: Do not screw out the set screws.**
15. Drill a hole in the side an inch or two above the sediment to allow the excess water to drain. Cut the core tube an inch or two above the drilled hole with a tubing cutter and cap the core sample. Secure the cap in place with duct tape. Rinse the outside of the core tube with a small amount of river water.
16. Draw an arrow on the core tube with permanent marker to mark the top of core. Label the core with permanent marker indicating location, data, and time.
17. Estimate the recovered length of sediment in the core and record on the field data sheet. The length of sediment in the Lexan core tube will be determined by direct measurement. The distance between the top of sediment in the core tube and the bottom of the core tube corresponds to the estimated length of the recovered sediment.
18. Compare the length of recovered sediment with the core penetration depth.
    a. If the recovered length of sediment is more than 75% of the penetration depth, keep the core.
    b. If insufficient material is recovered, prepare to make an additional attempt with a clean core following steps 6-14.
        i. An additional attempt will be made at a minimum distance of 1 ft from previously attempted locations.
        ii. A maximum of three attempts to collect a core will be made for a given location.
        iii. If all three attempts to collect a core are unsuccessful based on recover alone (i.e. less than 75% recovery), retain the final core for analysis and put a flag on the field data sheet that the targeted recovery was not achieved.
19. Store the core vertically with arrow pointing upward.
20. Transport core tubes to shore, as necessary
21. At the end of the day, collect all field PPE and place into appropriate storage container for bulk storage and future disposal.

B) <u>Reporting/Quality Assurance/Quality Control:</u>
1. Complete field logbook as detailed in SOP #1
2. Complete the information required in the field data sheet.
    a) By way of reference a sample field data sheet is attached.
3. Replicate sampling activity as a field duplicates, consistent with the QAPP, at a rate of 1:20.

IV) Related Activities

A) <u>Typical Pre-Vibrating Core Sampling Activities</u>
1. Not Applicable

B) Typical Post-Vibrating Core Sampling Activities
1. Decontamination of Sampling Equipment (SOP #2)
2. Sample Identification (SOP #6)
3. Chain-of-Custody, Labeling, Packaging, and Sampling (SOP #7)
4. General Interim Guidance for the Management of Investigative Wastes (SOP #8)
5. Core Processing (SOP #30)

SEDIMENT CHEMICAL TESTING LOG

PROJECT TITLE: Lower River

DATE	*SAMPLE ID #*	*COC #*	*ANALYSIS*	*CONTAINER*	*NO.*	*DATE SENT TO LAB*	*DATE LAB RECEIVED*

COMPOSITE AND GRAB SAMPLE PROCESSING
STANDARD OPERATING PROCEDURE #30

Revision: 03
Revision Date: 11/12/2010

I) Scope:

The following Standard Operating Procedure (SOP) outlines the procedures required for composite and grab sample processing. This procedure is used for Sediment Pre-Design Investigation, Sediment Remediation Verification, and Sediment Post Remediation Monitoring.

II) Equipment/Materials:

- 5-gallon stainless steel container or larger or Ziplock bag (1-2 gallon)
- Cooler and Ice
- Sample Tags and/or Labels
- Sample container
- Chain-of-Custody Forms
- Paper Towels
- Water Proof Marker
- Field Logbook

III) Procedure Description:

A. Composite Sample
1. Don PPE as required by the *Health and Safety Plan* (HASP).
2. Sample compositing will be performed in the processing area or in the field.
3. Process equipment is pre-cleaned according to SOP #2.
4. Place each grab sample, as defined in the applicable work plan, into a clean stainless steel container or Ziplock bag.
5. Mix the sample thoroughly or until visually homogeneous. Remove any obviously “non-sediment” objects from the sample; bottle caps, broken glass, sticks, large rocks, etc.
6. Fill the sample container with composite sample.
7. Label all sample containers and record all appropriate information in the Field Logbook.
8. Handle, pack and ship the samples.
9. Collect all field PPE and place into appropriate storage container for future disposal.

B. Grab Sample
1. Don PPE as required by the *Health and Safety Plan* (HASP).
2. Sample preparation will be performed in the processing area or in the field.
3. Process equipment is pre-cleaned according to SOP #2.
4. Place each grab sample, as defined in the applicable work plan, into a clean stainless steel container or Ziplock bag.
5. Mix the sample thoroughly or until visually homogeneous, where applicable. Remove any obviously “non-sediment” objects from the sample; bottle caps, broken glass, sticks, large rocks, etc.
6. Label all sample containers and record all appropriate information in the Field Logbook.
7. Handle, pack and ship the samples.
8. Collect all field PPE and place into appropriate storage container for future disposal.

C. Reporting/Quality Assurance/Quality Control:
1. Complete Field Logbook as detailed in SOP #1

IV) Related Activities

A) Typical Pre-Sample Processing Activities
1. Subsurface Sediment Sampling - Manual Core Tube (SOP #28)

2. Subsurface Sediment Sampling – Vibra Core (SOP #29)
3. Surface Sediment Sampling – Ponar (SOP #24)
4. Earthworm Sampling (SOP #9)
5. Water Sampling for Correlation Curve Development (SOP #14)
6. Water monitoring (SOP #17)
7. Disposal Sampling (SOP #15)
8. Emergent Invertebrates Sampling (SOP #20)
9. Dewatering Area Mitigation Soil Sampling (SOP #32)

B) Typical Post-Sample Process Activities
1. Sample Identification (SOP #6)
2. Chain-of-Custody, Labeling, Packaging, and Shipping (SOP #7)
3. Decontamination of Sampling Equipment (SOP #2)

TRIMBLE GEOXT GLOBAL POSITIONING SYSTEM (GPS)
STANDARD OPERATING PROCEDURE #31
Revision: 03
Date: 11/12/2010

I) Scope:

The 2005 series Trimble GeoXT Global Positioning System (GPS) is a satellite tracking device which enables you to obtain northing and easting coordinates. This procedure is used for Sediment Pre-design Investigation, Sediment Remediation Verification, and Sediment Post Remediation Monitoring.

II) Equipment/Materials:

- Trimble GeoXT Global Positioning System, with following settings:
  - Maximum PDOP = 6
  - Minimum SNR = 4
  - Minimum elevation = 15 degrees
- Trimble GeoBeacon
- Field logbook

III) Procedure Description:

1. Press the green power button on the GPS unit.
2. Press the green power button on the GeoBeacon.
3. A start menu will appear on the screen of the GPS unit. Place the GPS unit on a vehicle or on the ground in an open area. In the lower right hand corner of the screen select the GPS mode using the touch screen pen provided and stand back while the unit acquires satellites.
4. A terrasync screen will appear. On the screen is a large circle that shows the number of satellites in range.
5. Once the GPS acquires enough satellites (4-5) and links with the GeoBeacon, a yellow indicator will appear in the upper portion of the screen next to the satellite indicator and the screen will display the accuracy and geographic coordinates.
6. Take the GPS to a known survey location and record the X and Y coordinates.
7. Using the recorded X and Y coordinates calibrate the GPS unit to known survey location per the manufacturer instructions.
8. In the upper left-hand corner select the status button using the touch screen pen and hit map. This will bring you to the map screen.
9. In the map screen, select layer/background and scroll down to choose the river reach file you wish to load.
10. With the background file of the river reach loaded, you are now ready to navigate to the determined locations.

9. At the end of the day turn off the GPS unit by pressing the green button a place into the cradle to charge the battery. Turn off the GeoBeacon by pressing the green button a plug into cord to charge the battery.

IV) Related Activities

A) Typical Pre-GPS Activities
Not applicable

B) Typical Post-GPS Activities
1. Subsurface Sediment Sampling - Manual Core Tube (SOP #28)
2. Subsurface Sediment Sampling – Vibrating Core (SOP #29)
3. Surface Sediment Sampling – Ponar (SOP #24)
4. Hard Sediment/Soft Sediment Probing (SOP #27)
5. Measuring Riverbank Boundary (SOP #32)
6. Dewatering Area Mitigation Soil Sampling (SOP #32)

DEWATERING AREA MITIGATION SOIL SAMPLING
STANDARD OPERATING PROCEDURE #32
Revision: 01
Revision Date: 03/12/2010

I) Scope:

The following Standard Operating Procedure (SOP) outlines the procedures required to collect surface soil samples. This procedure is used for Sediment Remediation Verification.

II) Equipment/Materials:

- Personal Protective Equipment (PPE) as defined in the HASP
- Back-hoe
- Trowel
- Field Location GPS (Trimble Geoexplorer 2005 Series, or equivalent)
- Cooler and Ice
- Sample Tags and/or Labels
- Tape Measure
- Sample Containers
- Paper Towels
- Water Proof Marker
- Storage container
- Chain-of-Custody Forms
- Other Chemical Testing Log
- Field Logbook

III) Procedure Description:

A) Dewatering Area

1. Don PPE as required by the *Health and Safety Plan* (HASP).
2. Establish grid as illustrated below per the Work Plan frequency.

N ↑

	A	B	C
1	A1	B1	C1
2	A2	B2	C2
3	A3	B3	C3

3. Log the sample location into the handheld GPS unit.
4. Bore the soil to the specified interval with a back hoe.
5. Collect a grab sample by hand covered with Nitrile glove.
6. Place soil directly into laboratory supplied jars equipped with a Teflon-lined cap. Fill sample jar completely so that minimal air space remains in the sample containers, unless collection method requires a pre-measured quantity and/or field preservation. Remove any debris
7. Change glove after each sample location.
8. Repeat steps 2-5 until all samples are collected.
9. Place samples on ice in laboratory supplied coolers or refrigerator after collection.
10. Collect all field PPE and place into appropriate storage container for future disposal.

A) Reporting, Quality Assurance, Quality Control:
   1. Complete Field Logbook as detailed in SOP #1
   2. Complete Other Chemical Testing Log (Attached)
   3. Field duplicates will be collected for soil samples by replicating sub-samples of the composited sample in the stainless steel container.

IV) Related Activities

A) Typical Pre- Sampling Activities
   1. Not Applicable

B) Typical Post-Surface Sediment Sampling Activities
   1. Sample Identification (SOP #6)
   2. Chain-of-Custody, Labeling, Packaging, and Sampling (SOP #7)
   3. General Interim Guidance for the Management of Investigative Wastes (SOP #8)
   4. Composite and Grab Sample Processing (SOP #30)

OTHER CHEMICAL TESTING LOG

PROJECT TITLE: Lower River

DATE	SAMPLE ID #	COC #	ANALYSIS	CONTAINER	NO.	DATE SENT TO LAB	DATE LAB RECEIVED

Sheboygan River and Harbor Superfund Site
Lower River

Contingency Plan

November 2010

Prepared for
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Sheboygan River and Harbor Superfund Site
Lower River

Contingency Plan

Prepared for
United States Environmental Protection Agency
Region 5

Prepared By
Pollution Risk Services, LLC

November 2010

Contingency Plan
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1 Introduction

This Contingency Plan (CP) for the Lower River (i.e. Lower River and Inner Harbor) portion of the Sheboygan River and Harbor Superfund Site has been prepared in response of the selected remedy as set forth in the *Record of Decision* (ROD) and in accordance with the *Administrative Order on Consent for the Remedial Design for the Lower River Portions of the ROD* (AOC) and *Lower River Remedial Design Statement of Work* (LRRDSOW). This CP was developed consistent with the following U.S. EPA guidance documents:

- *Guidance on U.S. EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties, Interim Final,* OSWER Directive No. 9355.5-01. P5-6. April 1990
- *U.S. EPA Remedial Design/Remedial Action Handbook,* OSWER Directive No. 9355.0-4B. June 1995

This Plan is intended to provide immediate response to unplanned spills of contaminated material, severe weather, and fire during project activities. The project activities that will be performed in the Lower River include:

- Site mobilization
- Sediment, air, and water sampling
- Installation and management of the dewatering area
- Installation and management of the wastewater treatment plant (WWTP)
- Dredging, dewatering, and staging of PCB contaminated sediments
- Loading and transporting PCB contaminated sediments
- Restoration of disturbed areas
- Site clean-up and demobilization

The CP does not discuss the health and safety procedures outlined in the *Health and Safety Plan (HASP)*.

1.1 Site Description

The Sheboygan River and Harbor Superfund Site (the Site) is located on the western shore of Lake Michigan approximately fifty-five miles north of Milwaukee, Wisconsin, in Sheboygan County. The Lower River includes the 11 miles of the river from the Waelderhaus Dam downstream to Lake Michigan and is comprised of the Middle River, Lower River, and Inner Harbor reaches. These reaches were defined by the U.S. EPA during the Remedial Investigations (RI), based on physical characteristics such as average depth, width, and level of polychlorinated biphenyl (PCB) sediment contamination. Each Lower River reach is described below and presented on Figure 1:

Middle River - extends seven miles from the Waelderhaus Dam to the former Chicago & Northwestern (C&NW) railroad bridge.

Lower River - extends three miles from the C&NW railroad bridge to the Pennsylvania Avenue Bridge in downtown Sheboygan.

Inner Harbor - extends from the Pennsylvania Avenue Bridge to the river’s outlet to the Outer Harbor. The Outer Harbor is defined as the area formed by the two break-walls.

2 Pre-Emergency Planning

Prior to engaging in project activities at this Site, the following planning will be taken to meet the minimum requirements set forth herein and the applicable regulatory requirements:

1. Ensure that the lines of communication with local and state emergency response officials, Wisconsin Department of Natural Resources (WDNR), and United States Environmental Protection Agency (US EPA) are established. All organizations listed above shall be invited to a pre-startup meeting in order to familiarize with the project materials and operations.

2. Ensure that sufficient equipment and materials will be kept on-site and dedicated for emergency responses. Emergency response equipment will be available for use by personnel and will be located on equipment (i.e., dredge, booster pumps, boats), near the wastewater treatment plant, and in the office trailer. The emergency response equipment will include, but is not limited to, the following:

   - ABC type dry chemical fire extinguishers;
   - Approved first-aid kit;
   - Absorbent booms;
   - Sand bags;
   - Booms to block flow to sewers;
   - Pump and hose to pump standing water;
   - Shovels and brooms;
   - Silt curtains, if necessary, for PAHs
   - Absorbent pads; and
   - Oil dry.

   All fluids for operations as well as emergency response equipment located at the dewatering area will be stored out of the flood zone in order to prevent potential release or inaccessibility during a flood event. In addition, the field trailer will be located out of the flood zone.

3. Ensure that on-site emergency responders are trained in compliance with *29 CFR 1910.120*. Copies of all applicable certificates will be kept on file for on-site personnel required to respond.

3 Contingency Measures

This section discusses the measures necessary to respond to an on-site or off-site spill, severe weather, and fire during project activities. An on-site spill is defined as any unplanned release of contaminated material during sampling, dredging, sediment dewatering, wastewater treatment, or load-out. Secondary containment will be installed around the WWTP. All liquids at the dewatering area will be stored inside secondary containment (i.e. double walled fuel tanks or spill control pallets). An off-site spill is defined as any unplanned release during transportation of diesel fuel, sediment, gasoline, or WWTP chemicals.

3.1 Polyaromatic Hydrocarbons

Polyaromatic Hydrocarbons (PAH) will be encountered during the course of sediment removal activities. PAH's create an "oil sheen" during dredging and will be handled with the same protocols described below.

3.2 On-Site Spill

In order to reduce the possibility of an unplanned on-site spill, good housekeeping practices will be strictly followed and enforced. This may include prompt removal of a small spill, regular maintenance of walking areas, regular removal of refuse, and/or staging of similar materials together. Fluid and material staging shall be placed outside the flood zone.

In cases of a serious injury or spill, site personnel will immediately call 911 and then notify the Project Manager or designee. In the event of a minor injury or spill, notification from site personnel will be made immediately to the Project Manager or designee. On-site spill materials for this project include, but are not limited to, sediment, diesel fuel, WWTP chemicals, hydraulic fluid, gasoline, geo-textile tube bursting, and process water from WWTP operations. The Project Manager or designee will gather the following information from site personnel:

1. Name of the person reporting the incident
2. Phone number (or radio channel) where person reporting can be reached
3. Date, time, and location of the incident
4. The extent of release to land, water, or air
5. The extent of injuries, if any
6. Type of spill material, estimated quantity of spill, and whether a continued damage exists at the location

The Project Manager or designee will then perform the following (when necessary):

1. Notify the police, fire department, or ambulance if there is a serious injury to personnel or potential for affecting the surrounding community. A list of the local, state and federal phone number contacts in the event of an unplanned on-site spill is provided in Table 1. This phone list will also be posted in the office trailer during project activities.

2. Notify the United States Environmental Protection Agency (US EPA) and Wisconsin Department of Natural Resources (WDNR) Spill Hotline (Table 1) if over the Reportable Quantity (RQ). Reportable quantities are defined in WDNR *Publication # RR-559; NR 706* and *40 CFR 117 & 302* provided in Appendix A. The Project Manager will need to provide the following information when notifying the WDNR Spill Hotline:

    a. Name and USEPA number of the generator
    b. Product shipping, hazardous class and UN or NA number
    c. Estimated quantity of material spilled
    d. If possible, the extent of contamination to land, water or air

3. Notify emergency response personnel to contain the spill and initiate the cleanup procedures. Specific actions to be taken at the scene of the spill:

    a. Containment. The critical action is to prevent the escape of any material from entering into the ground or into a storm or sanitary sewer. Containment will be dependent on wind and weather conditions. Using sand bags or booms to contain the spilled wastes are effective means for the short term. Adjacent storm sewer/catch basins will be covered and/or protected with temporary berms or dams to prevent spilled wastes from entering into the storm water system.

    b. Cleanup. With the spillage source controlled or contained, cleanup is the next step. If the spill is contained on an impervious surface, solid materials will be collected (i.e., sweeping and shoveling) and properly disposed. Contaminated liquid materials will be absorbed into a compatible material (e.g., oil dry and/or absorbent boom/pad). Any of a number of commercial absorbent inert materials may be used, but make sure they are compatible with the waste. Once absorbed, the material will be properly disposed. In the case of process water from the dewatering area or WWTP, the water will be pumped back into the dewatering area for future treatment. If any spill has reached a non-impervious surface, the contaminated spill, whether solid or liquid, will be removed and the extent of contamination will be determined by sampling the area. Sampling frequency will be determined in the field based on the magnitude (i.e., area) of the spill. The samples will be analyzed for the known chemicals by a qualified laboratory. All contaminated material will be collected and disposed at the appropriate facility.

3.3 Off-Site Spills

Off-site spill materials for this project include, but are not limited to, sediment, diesel fuel, hydraulic fluid, and gasoline. In cases of a serious injury or spill, site personnel or material handler will immediately call 911 and then notify the Project Manager or designee. In the event of a minor injury or spill, site personnel or material handler will follow these procedures:

1. Notify the Project Manager or designee via cell phone, and

2. Remain with the vehicle and warn all pedestrians and motorists to stay away from the spill area.

The Project Manager or designee will then gather the following information from the driver:

1. Name of the person reporting the incident
2. Name, address, and USEPA number of the transporter
3. Phone number (or radio channel) where person reporting can be reached
4. Date, time, and location of the incident
5. The extent of injuries, if any
6. Type of transport vehicles involved,
7. Type of spill material, estimated quantity of spill, and whether a continued damage exists at the location
8. For each material involved provide;

    a. Name and USEPA number of the generator
    b. Product shipping, hazardous class, and UN or NA number
    c. Estimated quantity of material spilled
    d. If possible, the extent of contamination to land, water or air

Finally, the Project Manager or designee will perform the following (when necessary):

1. Notify the police, fire department, or ambulance if there is serious injury to driver, pedestrians/motorists, or potential for affecting the surrounding community. A list of the local, state and federal phone number contacts in the event of an off-site spill is provided in Table 1. This phone list will also be posted in the office trailer.

2. Notify the United States Environmental Protection Agency (US EPA) and Wisconsin Department of Natural Resources (WDNR) Spill Hotline (Table 1) if over the Reportable Quantity (RQ). Reportable quantities are defined in WDNR *Publication # RR-559; NR 706* and *40 CFR 117 & 302* provided in Appendix A. The Project Manager will need to provide the following information when notifying the WDNR Spill Hotline:

    a. Name and USEPA number of the generator
    b. Product shipping, hazardous class and UN or NA number
    c. Estimated quantity of material spilled
    d. If possible, the extent of contamination to land, water or air

3. Notify emergency response personnel to contain the spill and initiate the cleanup procedures. Specific actions to be taken at the scene of the spill:

    a. Containment. The critical action is to prevent the escape of any material from entering into the ground or into a storm or sanitary sewer. Containment will be dependent on wind and weather conditions. Using sand bags or booms to contain the spilled wastes are effective means for the short term. Adjacent storm sewer/catch basins will be covered and/or protected with temporary berms or dams to prevent spilled wastes from entering into the storm water system.

    b. Cleanup. With the spillage source controlled or contained, cleanup is the next step. If the spill is contained on an impervious surface, solid materials will be collected (i.e., sweeping and shoveling) and properly disposed. Contaminated liquid materials will be absorbed into a compatible material (e.g., oil dry and/or absorbent boom/pad). Any of a number of commercial absorbent inert materials may be used, but make sure they are compatible with the waste. Once absorbed, the material will be properly disposed. If any spill has reached a non-impervious surface, the contaminated spill, whether solid or liquid, will be removed and the extent of contamination will be determined by sampling the area. Sampling frequency will be determined in the field based on the magnitude (i.e., area) of the spill. The samples will be analyzed for the known chemicals by a qualified laboratory. All contaminated material will be collected and disposed at the appropriate facility.

3.4 Hazardous Weather

The following procedures will be implemented in the event of hazardous weather conditions:

1. In the event of lightning, heavy rains/snow, high winds, or high water/flood conditions in the Sheboygan River, the Project Manager or designee will notify personnel via radio and/or cell phone to shut down equipment, secure to prevent damage, seek shelter in the office trailer or vehicle, and notify USEPA and WDNR if there is potential injury to site personnel or the public. The all clear will be given when the National Weather Service has indicated that the sever weather has moved through the area.
2. In the event of a tornado watch (i.e., weather is permissible for a tornado), personnel will be notified via radio and/or cell phone by the Project Manager or designee to shut down equipment,

secure to prevent damage, return to the office trailer for further direction, and notify USEPA and WDNR if there is potential injury to site personnel or the public. The all clear will be given when the National Weather Service has indicated that the sever weather has moved through the area.

3. In the event of a tornado warning (i.e., tornado has been sighted nearby), personnel will be notified via radio and/or cell phone by the Project Manager or designee to shut down equipment, secure to prevent damage, seek shelter in the interior room or basement of a nearby community building or in a low lying ditch or culvert, and notify USEPA and WDNR if there is potential injury to site personnel or the public. The all clear will be given when the National Weather Service has indicated that the sever weather has moved through the area.
4. In the event of flooding, personnel will be notified via radio and/or cell phone by the Project Manager or designee to shut down/de-energize equipment, move/secure equipment and material to prevent them from floating away, install barriers (if necessary) to prevent washing away of dewatered sediment, seek shelter in an area outside the flood zone, and notify USEPA and WDNR if there is potential injury to site personnel or the public. The all clear will be given when the National Weather Service has indicated that the river has dropped below the flood stage.

3.5 Fire

Because flammable materials are present at this site, fire is an ever-present hazard. The site personnel are not trained professional firefighters. If there is any doubt that a fire cannot be quickly contained and extinguished, notify the Project Manager by radio and vacate the area.

The following procedures will be implemented in the event of a fire:

1. For fires that cannot be contained and extinguished, vacate the area, call 911, and then notify the Project Manager by radio. The Project Manager will notify the USEPA and WDNR if there is a potential injury to site personnel or the public.
2. For fires that can be contained and extinguished, use designated fire extinguisher to put out fire, notify the Project Manager by radio that the fire has been extinguished by site personnel, and at the end of the day return the fire extinguisher to be replaced and recharged.

4 Post-Emergency Actions

After an emergency or spill event has occurred and has been resolved, the Project Manager or designee will conduct a meeting with all concerned individuals and all personnel. This meeting will be held as soon as possible after the event. This meeting will be for discussions of the following topics, at a minimum:

1. What was the cause of the event?
2. What parts of the Contingency Plan worked well?
3. What parts of the Contingency Plan did not work well?
4. What is being done to correct the results of the incident?
5. What is being done to prevent similar events from happening again?

Following the meeting, the Project Manager will document all findings and discussion on an Incident Report. A copy of the Incident Report is provided in Appendix B. Any changes to enhance the Contingency Plan will be made and forwarded to the agencies as an addendum.

5 References

United States Environmental Protection Agency. *EPA Superfund Record of Decision (ROD).* May 2000.

Pollution Risk Services, LLC. *Site Specific Health and Safety Plan (HASP)*. February 2008.

Pollution Risk Services, LLC. *Specifications.* February 2008.

United States Environmental Protection Agency. *Statement of Work for the Lower River Sediment at the Sheboygan River and Harbor Superfund Site (LRSOW).* March 2008.

United States Environmental Protection Agency. *Consent Decree for the Lower River Work on the Sheboygan River (CD).* March 2008.

Table 1
Emergency Telephone Numbers

General Emergency (Sheboygan Falls Sheriff's Dept.)	911
Ambulance (Sheboygan Falls)	911
Hospital (Sheboygan Memorial Medical Center)	(920) 451-5000
Wisconsin Department of Public Health	(608) 266-1865
Sheboygan County Health Department	(920) 459-6400
Wisconsin Department of Natural Resources (WDNR)	(414) 263-8500
Wisconsin Hazardous Material Spill Hotline	(800) 943-0003
WDNR Southeast Regional Spill Coordinator	(414) 263-8685
Wisconsin Poison Control Center	(800) 222-1212
USEPA Emergency Response & Removal Branch	(404) 562-8705
USEPA Emergency Response & Removal Branch – 24 Hour	(404) 562-8700
Wisconsin State Police	(920) 929-3700
Pollution Emergency Alert System (PEAS)	(517) 373-7660
Health & Safety Coordinator (Scott McGee)	(270) 589-9041
Project Manager (Ken Aukerman)	(513) 518-2762 Mobile (920) 449-5193 Home
Office Trailer	(920) 208-7150

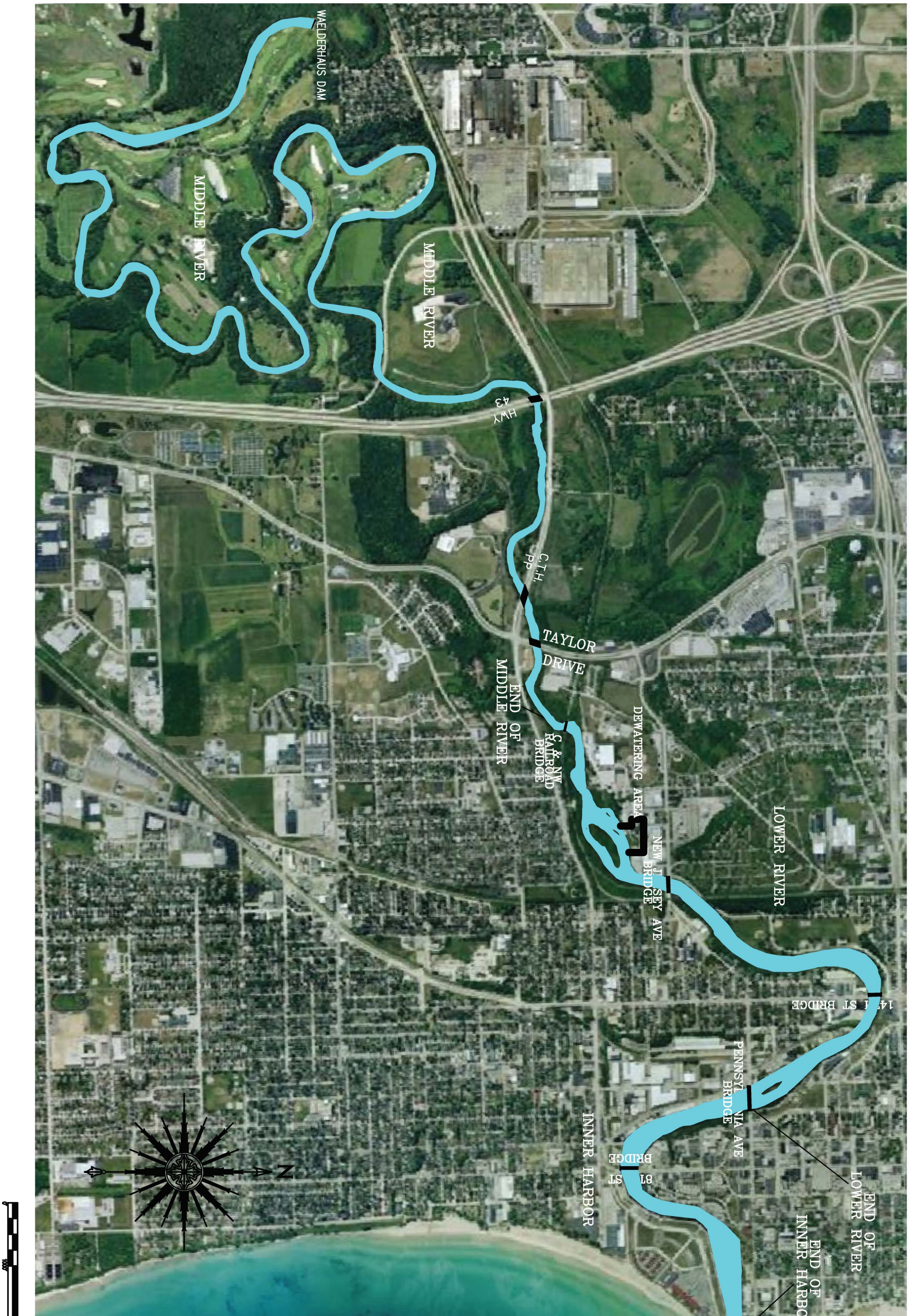


FIGURE NO. 1

Scale: SHOWN

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
LOWER RIVER DESIGN
SHEBOYGAN FALLS, WISCONSIN

RIVER REACHES

PRS Pollution Risk Services
7870 East Kemper Road, Suite 240
Cincinnati, Ohio 45249
Phone: 513-489-2793
Fax: 513-489-2794

REVISIONS			SIGNATURES	
NO.	BY	DATE	BY	DATE
△	KDA	NOVEMBER 17, 2010	APPROVED	
△			REVIEWED	
△			DESIGNED	

RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS. BY ______ DATE ______

FILE NAME:
DRAWN BY: KDA DATE: NOVEMBER 2009

(iii) Which are used or could be used for industrial purposes by industries in interstate commerce;

(4) All impoundments of waters otherwise defined as navigable waters under this paragraph;

(5) Tributaries of waters identified in paragraphs (i) (1) through (4) of this section, including adjacent wetlands; and

(6) Wetlands adjacent to waters identified in paragraphs (i) (1) through (5) of this section (''Wetlands'' means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally included playa lakes, swamps, marshes, bogs, and similar areas such as sloughs, prairie potholes, wet meadows, prairie river overflows, mudflats, and natural ponds): *Provided*, That waste treatment systems (other than cooling ponds meeting the criteria of this paragraph) are not waters of the United States.

Navigable waters do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA.

(j) *Process waste water* means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product.

[44 FR 50776, Aug. 29, 1979, as amended at 58 FR 45039, Aug. 25, 1993; 65 FR 30904, May 15, 2000]

§ 117.2 Abbreviations.

NPDES equals National Pollutant Discharge Elimination System. RQ equals reportable quantity.

§ 117.3 Determination of reportable quantities.

Each substance in Table 117.3 that is listed in Table 302.4, 40 CFR part 302, is assigned the reportable quantity listed in Table 302.4 for that substance.

TABLE 117.3—REPORTABLE QUANTITIES OF HAZARDOUS SUBSTANCES DESIGNATED PURSUANT TO SECTION 311 OF THE CLEAN WATER ACT

NOTE: The first number under the column headed ''RQ'' is the reportable quantity in pounds. The number in parentheses is the metric equivalent in kilograms. For convenience, the table contains a column headed ''Category'' which lists the code letters ''X'', ''A'', ''B'', ''C'', and ''D'' associated with reportable quantities of 1, 10, 100, 1000, and 5000 pounds, respectively.

TABLE 117.3—REPORTABLE QUANTITIES OF HAZARDOUS SUBSTANCES DESIGNATED PURSUANT TO SECTION 311 OF THE CLEAN WATER ACT

Material	Category	RQ in pounds (kilograms)
Acetaldehyde	C	1,000 (454)
Acetic acid	D	5,000 (2,270)
Acetic anhydride	D	5,000 (2,270)
Acetone cyanohydrin	A	10 (4.54)
Acetyl bromide	D	5,000 (2,270)
Acetyl chloride	D	5,000 (2,270)
Acrolein	X	1 (0.454)
Acrylonitrile	B	100 (45.4)
Adipic acid	D	5,000 (2,270)
Aldrin	X	1 (0.454)
Allyl alcohol	B	100 (45.4)
Allyl chloride	C	1,000 (454)
Aluminum sulfate	D	5,000 (2,270)
Ammonia	B	100 (45.4)
Ammonium acetate	D	5,000 (2,270)
Ammonium benzoate	D	5,000 (2,270)
Ammonium bicarbonate	D	5,000 (2,270)
Ammonium bichromate	A	10 (4.54)
Ammonium bifluoride	B	100 (45.4)
Ammonium bisulfite	D	5,000 (2,270)
Ammonium carbamate	D	5,000 (2,270)
Ammonium carbonate	D	5,000 (2,270)

TABLE 117.3—REPORTABLE QUANTITIES OF HAZARDOUS SUBSTANCES DESIGNATED PURSUANT TO SECTION 311 OF THE CLEAN WATER ACT—Continued

Material	Category	RQ in pounds (kilograms)
Ammonium chloride	D	5,000 (2,270)
Ammonium chromate	A	10 (4.54)
Ammonium citrate dibasic	D	5,000 (2,270)
Ammonium fluoborate	D	5,000 (2,270)
Ammonium fluoride	B	100 (45.4)
Ammonium hydroxide	C	1,000 (454)
Ammonium oxalate	D	5,000 (2,270)
Ammonium silicofluoride	C	1,000 (454)
Ammonium sulfamate	D	5,000 (2,270)
Ammonium sulfide	B	100 (45.4)
Ammonium sulfite	D	5,000 (2,270)
Ammonium tartrate	D	5,000 (2,270)
Ammonium thiocyanate	D	5,000 (2,270)
Amyl acetate	D	5,000 (2,270)
Aniline	D	5,000 (2,270)
Antimony pentachloride	C	1,000 (454)
Antimony potassium tartrate	B	100 (45.4)
Antimony tribromide	C	1,000 (454)
Antimony trichloride	C	1,000 (454)
Antimony trifluoride	C	1,000 (454)
Antimony trioxide	C	1,000 (454)
Arsenic disulfide	X	1 (0.454)
Arsenic pentoxide	X	1 (0.454)
Arsenic trichloride	X	1 (0.454)
Arsenic trioxide	X	1 (0.454)
Arsenic trisulfide	X	1 (0.454)
Barium cyanide	A	10 (4.54)
Benzene	A	10 (4.54)
Benzoic acid	D	5,000 (2,270)
Benzonitrile	D	5,000 (2,270)
Benzoyl chloride	C	1,000 (454)
Benzyl chloride	B	100 (45.4)
Beryllium chloride	X	1 (0.454)
Beryllium fluoride	X	1 (0.454)
Beryllium nitrate	X	1 (0.454)
Butyl acetate	D	5,000 (2,270)
Butylamine	C	1,000 (454)
n-Butyl phthalate	A	10 (4.54)
Butyric acid	D	5,000 (2,270)
Cadmium acetate	A	10 (4.54)
Cadmium bromide	A	10 (4.54)
Cadmium chloride	A	10 (4.54)
Calcium arsenate	X	1 (0.454)
Calcium arsenite	X	1 (0.454)
Calcium carbide	A	10 (4.54)
Calcium chromate	A	10 (4.54)
Calcium cyanide	A	10 (4.54)
Calcium dodecylbenzenesulfonate	C	1,000 (454)
Calcium hypochlorite	A	10 (4.54)
Captan	A	10 (4.54)
Carbaryl	B	100 (45.4)
Carbofuran	A	10 (4.54)
Carbon disulfide	B	100 (45.4)
Carbon tetrachloride	A	10 (4.54)
Chlordane	X	1 (0.454)
Chlorine	A	10 (4.54)
Chlorobenzene	B	100 (45.4)
Chloroform	A	10 (4.54)
Chlorosulfonic acid	C	1,000 (454)
Chlorpyrifos	X	1 (0.454)
Chromic acetate	C	1,000 (454)
Chromic acid	A	10 (4.54)
Chromic sulfate	C	1,000 (454)
Chromous chloride	C	1,000 (454)
Cobaltous bromide	C	1,000 (454)
Cobaltous formate	C	1,000 (454)
Cobaltous sulfamate	C	1,000 (454)
Coumaphos	A	10 (4.54)
Cresol	B	100 (45.4)
Crotonaldehyde	B	100 (45.4)
Cupric acetate	B	100 (45.4)

TABLE 117.3—REPORTABLE QUANTITIES OF HAZARDOUS SUBSTANCES DESIGNATED PURSUANT TO SECTION 311 OF THE CLEAN WATER ACT—Continued

Material	Category	RQ in pounds (kilograms)
Cupric acetoarsenite	X	1 (0.454)
Cupric chloride	A	10 (4.54)
Cupric nitrate	B	100 (45.4)
Cupric oxalate	B	100 (45.4)
Cupric sulfate	A	10 (4.54)
Cupric sulfate, ammoniated	B	100 (45.4)
Cupric tartrate	B	100 (45.4)
Cyanogen chloride	A	10 (4.54)
Cyclohexane	C	1,000 (454)
2,4-D Acid	B	100 (45.4)
2,4-D Esters	B	100 (45.4)
DDT	X	1 (0.454)
Diazinon	X	1 (0.454)
Dicamba	C	1,000 (454)
Dichlobenil	B	100 (45.4)
Dichlone	X	1 (0.454)
Dichlorobenzene	B	100 (45.4)
Dichloropropane	C	1,000 (454)
Dichloropropene	B	100 (45.4)
Dichloropropene-Dichloropropane (mixture)	B	100 (45.4)
2,2-Dichloropropionic acid	D	5,000 (2,270)
Dichlorvos	A	10 (4.54)
Dicofol	A	10 (4.54)
Dieldrin	X	1 (0.454)
Diethylamine	B	100 (45.4)
Dimethylamine	C	1,000 (454)
Dinitrobenzene (mixed)	B	100 (45.4)
Dinitrophenol	A	10 (45.4)
Dinitrotoluene	A	10 (4.54)
Diquat	C	1,000 (454)
Disulfoton	X	1 (0.454)
Diuron	B	100 (45.4)
Dodecylbenzenesulfonic acid	C	1,000 (454)
Endosulfan	X	1 (0.454)
Endrin	X	1 (0.454)
Epichlorohydrin	B	100 (45.4)
Ethion	A	10 (4.54)
Ethylbenzene	C	1,000 (454)
Ethylenediamine	D	5,000 (2,270)
Ethylenediamine-tetraacetic acid (EDTA)	D	5,000 (2,270)
Ethylene dibromide	X	1 (0.454)
Ethylene dichloride	B	100 (45.4)
Ferric ammonium citrate	C	1,000 (454)
Ferric ammonium oxalate	C	1,000 (454)
Ferric chloride	C	1,000 (454)
Ferric fluoride	B	100 (45.4)
Ferric nitrate	C	1,000 (454)
Ferric sulfate	C	1,000 (454)
Ferrous ammonium sulfate	C	1,000 (454)
Ferrous chloride	B	100 (45.4)
Ferrous sulfate	C	1,000 (454)
Formaldehyde	B	100 (45.4)
Formic acid	D	5,000 (2,270)
Fumaric acid	D	5,000 (2,270)
Furfural	D	5,000 (2,270)
Guthion	X	1 (0.454)
Heptachlor	X	1 (0.454)
Hexachlorocyclopentadiene	A	10 (4.54)
Hydrochloric acid	D	5,000 (2,270)
Hydrofluoric acid	B	100 (45.4)
Hydrogen cyanide	A	10 (4.54)
Hydrogen sulfide	B	100 (45.4)
Isoprene	B	100 (45.4)
Isopropanolamine dodecylbenzenesulfonate	C	1,000 (454)
Kepone	X	1 (0.454)
Lead acetate	A	10 (4.54)
Lead arsenate	X	1 (0.454)
Lead chloride	A	10 (4.54)
Lead fluoborate	A	10 (4.54)
Lead fluoride	A	10 (4.54)
Lead iodide	A	10 (4.54)

TABLE 117.3—REPORTABLE QUANTITIES OF HAZARDOUS SUBSTANCES DESIGNATED PURSUANT TO SECTION 311 OF THE CLEAN WATER ACT—Continued

Material	Category	RQ in pounds (kilograms)
Lead nitrate	A	10 (4.54)
Lead stearate	A	10 (4.54)
Lead sulfate	A	10 (4.54)
Lead sulfide	A	10 (4.54)
Lead thiocyanate	A	10 (4.54)
Lindane	X	1 (0.454)
Lithium chromate	A	10 (4.54)
Malathion	B	100 (45.4)
Maleic acid	D	5,000 (2,270)
Maleic anhydride	D	5,000 (2,270)
Mercaptodimethur	A	10 (4.54)
Mercuric cyanide	X	1 (0.454)
Mercuric nitrate	A	10 (4.54)
Mercuric sulfate	A	10 (4.54)
Mercuric thiocyanate	A	10 (4.54)
Mercurous nitrate	A	10 (4.54)
Methoxychlor	X	1 (0.454)
Methyl mercaptan	B	100 (45.4)
Methyl methacrylate	C	1,000 (454)
Methyl parathion	B	100 (45.4)
Mevinphos	A	10 (4.54)
Mexacarbate	C	1,000 (454)
Monoethylamine	B	100 (45.4)
Monomethylamine	B	100 (45.4)
Naled	A	10 (4.54)
Naphthalene	B	100 (45.4)
Naphthenic acid	B	100 (45.4)
Nickel ammonium sulfate	B	100 (45.4)
Nickel chloride	B	100 (45.4)
Nickel hydroxide	A	10 (4.54)
Nickel nitrate	B	100 (45.4)
Nickel sulfate	B	100 (45.4)
Nitric acid	C	1,000 (454)
Nitrobenzene	C	1,000 (454)
Nitrogen dioxide	A	10 (4.54)
Nitrophenol (mixed)	B	100 (45.4)
Nitrotoluene	C	1,000 (454)
Paraformaldehyde	C	1,000 (454)
Parathion	A	10 (4.54)
Pentachlorophenol	A	10 (4.54)
Phenol	C	1,000 (454)
Phosgene	A	10 (4.54)
Phosphoric acid	D	5,000 (2,270)
Phosphorus	X	1 (0.454)
Phosphorus oxychloride	C	1,000 (454)
Phosphorus pentasulfide	B	100 (45.4)
Phosphorus trichloride	C	1,000 (454)
Polychlorinated biphenyls	X	1 (0.454)
Potassium arsenate	X	1 (0.454)
Potassium arsenite	X	1 (0.454)
Potassium bichromate	A	10 (4.54)
Potassium chromate	A	10 (4.54)
Potassium cyanide	A	10 (4.54)
Potassium hydroxide	C	1,000 (454)
Potassium permanganate	B	100 (45.4)
Propargite	A	10 (4.54)
Propionic acid	D	5,000 (2,270)
Propionic anhydride	D	5,000 (2,270)
Propylene oxide	B	100 (45.4)
Pyrethrins	X	1 (0.454)
Quinoline	D	5,000 (2,270)
Resorcinol	D	5,000 (2,270)
Selenium oxide	A	10 (4.54)
Silver nitrate	X	1 (0.454)
Sodium	A	10 (4.54)
Sodium arsenate	X	1 (0.454)
Sodium arsenite	X	1 (0.454)
Sodium bichromate	A	10 (4.54)
Sodium bifluoride	B	100 (45.4)
Sodium bisulfite	D	5,000 (2,270)
Sodium chromate	A	10 (4.54)

TABLE 117.3—REPORTABLE QUANTITIES OF HAZARDOUS SUBSTANCES DESIGNATED PURSUANT TO SECTION 311 OF THE CLEAN WATER ACT—Continued

Material	Category	RQ in pounds (kilograms)
Sodium cyanide	A	10 (4.54)
Sodium dodecylbenzenesulfonate	C	1,000 (454)
Sodium fluoride	C	1,000 (454)
Sodium hydrosulfide	D	5,000 (2,270)
Sodium hydroxide	C	1,000 (454)
Sodium hypochlorite	B	100 (45.4)
Sodium methylate	C	1,000 (454)
Sodium nitrite	B	100 (45.4)
Sodium phosphate, dibasic	D	5,000 (2,270)
Sodium phosphate, tribasic	D	5,000 (2,270)
Sodium selenite	B	100 (45.4)
Strontium chromate	A	10 (4.54)
Strychnine	A	10 (4.54)
Styrene	C	1,000 (454)
Sulfuric acid	C	1,000 (454)
Sulfur monochloride	C	1,000 (454)
2,4,5-T acid	C	1,000 (454)
2,4,5-T amines	D	5,000 (2,270)
2,4,5-T esters	C	1,000 (454)
2,4,5-T salts	C	1,000 (454)
TDE	X	1 (0.454)
2,4,5-TP acid	B	100 (45.4)
2,4,5-TP acid esters	B	100 (45.4)
Tetraethyl lead	A	10 (4.54)
Tetraethyl pyrophosphate	A	10 (4.54)
Thallium sulfate	B	100 (45.4)
Toluene	C	1,000 (454)
Toxaphene	X	1 (0.454)
Trichlorfon	B	100 (45.4)
Trichloroethylene	B	100 (45.4)
Trichlorophenol	A	10 (4.54)
Triethanolamine dodecylbenzenesulfonate	C	1,000 (454)
Triethylamine	D	5,000 (2,270)
Trimethylamine	B	100 (45.4)
Uranyl acetate	B	100 (45.4)
Uranyl nitrate	B	100 (45.4)
Vanadium pentoxide	C	1,000 (454)
Vanadyl sulfate	C	1,000 (454)
Vinyl acetate	D	5,000 (2,270)
Vinylidene chloride	B	100 (45.4)
Xylene (mixed)	B	100 (45.4)
Xylenol	C	1,000 (454)
Zinc acetate	C	1,000 (454)
Zinc ammonium chloride	C	1,000 (454)
Zinc borate	C	1,000 (454)
Zinc bromide	C	1,000 (454)
Zinc carbonate	C	1,000 (454)
Zinc chloride	C	1,000 (454)
Zinc cyanide	A	10 (4.54)
Zinc fluoride	C	1,000 (454)
Zinc formate	C	1,000 (454)
Zinc hydrosulfite	C	1,000 (454)
Zinc nitrate	C	1,000 (454)
Zinc phenolsulfonate	D	5,000 (2,270)
Zinc phosphide	B	100 (45.4)
Zinc silicofluoride	D	5,000 (2,270)
Zinc sulfate	C	1,000 (454)
Zirconium nitrate	D	5,000 (2,270)
Zirconium potassium fluoride	C	1,000 (454)
Zirconium sulfate	D	5,000 (2,270)
Zirconium tetrachloride	D	5,000 (2,270)

[50 FR 13513, Apr. 4, 1985, as amended at 51 FR 34547, Sept. 29, 1986; 54 FR 33482, Aug. 14, 1989; 58 FR 35327, June 30, 1993; 60 FR 30937, June 12, 1995]

PART 302—DESIGNATION, REPORTABLE QUANTITIES, AND NOTIFICATION

Sec.
302.1 Applicability.
302.2 Abbreviations.
302.3 Definitions.
302.4 Designation of hazardous substances.
302.5 Determination of reportable quantities.
302.6 Notification requirements.
302.7 Penalties.
302.8 Continuous releases.

AUTHORITY: 42 U.S.C. 9602, 9603, and 9604; 33 U.S.C. 1321 and 1361.

SOURCE: 50 FR 13474, Apr. 4, 1985, unless otherwise noted.

§ 302.1 Applicability.

This regulation designates under section 102(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (''the Act'') those substances in the statutes referred to in section 101(14) of the Act, identifies reportable quantities for these substances, and sets forth the notification requirements for releases of these substances. This regulation also sets forth reportable quantities for hazardous substances designated under section 311(b)(2)(A) of the Clean Water Act.

§ 302.2 Abbreviations.

CASRN=Chemical Abstracts Service Registry Number
RCRA=Resource Conservation and Recovery Act of 1976, as amended
lb=pound
kg=kilogram
RQ=reportable quantity

§ 302.3 Definitions.

As used in this part, all terms shall have the meaning set forth below:

The Act, *CERCLA*, or *Superfund* means the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Pub. L. 96–510);

Administrator means the Administrator of the United States Environmental Protection Agency (''EPA'');

Consumer product shall have the meaning stated in 15 U.S.C. 2052;

Environment means (1) the navigable waters, the waters of the contiguous zone, and the ocean waters of which the natural resources are under the exclusive management authority of the United States under the Fishery Conservation and Management Act of 1976, and (2) any other surface water, ground water, drinking water supply, land surface or subsurface strata, or ambient air within the United States or under the jurisdiction of the United States;

Facility means (1) any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, motor vehicle, rolling stock, or aircraft, or (2) any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located; but does not include any consumer product in consumer use or any vessel;

Hazardous substance means any substance designated pursuant to 40 CFR part 302;

Hazardous waste shall have the meaning provided in 40 CFR 261.3;

Navigable waters or *navigable waters of the United States* means waters of the United States, including the territorial seas;

Offshore facility means any facility of any kind located in, on, or under, any of the navigable waters of the United States, and any facility of any kind which is subject to the jurisdiction of the United States and is located in, on, or under any other waters, other than a vessel or a public vessel;

Onshore facility means any facility (including, but not limited to, motor vehicles and rolling stock) of any kind located in, on, or under, any land or non-navigable waters within the United States;

Person means an individual, firm, corporation, association, partnership, consortium, joint venture, commercial entity, United States Government, State, municipality, commission, political subdivision of a State, or any interstate body;

Release means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment, but excludes (1) any release which results in exposure to persons solely within a workplace, with respect to a claim which such persons may assert against the employer of such persons, (2) emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station engine, (3) release of source, byproduct, or special nuclear material from a nuclear incident, as those terms are defined in the Atomic Energy Act of 1954, if such release is subject to requirements with respect to financial protection established by the Nuclear Regulatory Commission under section 170 of such Act, or for the purposes of section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act or any other response action, any release of source, byproduct, or special nuclear material from any processing site designated under section 102(a)(1) or 302(a) of the Uranium Mill Tailings Radiation Control Act of 1978, and (4) the normal application of fertilizer;

Reportable quantity means that quantity, as set forth in this part, the release of which requires notification pursuant to this part;

United States include the several States of the United States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the United States Virgin Islands, the Commonwealth of the Northern Marianas, and any other territory or possession over which the United States has jurisdiction; and

Vessel means every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water.

§ 302.4 Designation of hazardous substances.

(a) *Listed hazardous substances.* The elements and compounds and hazardous wastes appearing in table 302.4 are designated as hazardous substances under section 102(a) of the Act.

(b) *Unlisted hazardous substances.* A solid waste, as defined in 40 CFR 261.2, which is not excluded from regulation as a hazardous waste under 40 CFR 261.4(b), is a hazardous substance under section 101(14) of the Act if it exhibits any of the characteristics identified in 40 CFR 261.20 through 261.24.

NOTE: The numbers under the column headed ''CASRN'' are the Chemical Abstracts Service Registry Numbers for each hazardous substance. Other names by which each hazardous substance is identified in other statutes and their implementing regulations are provided in the ''Regulatory Synonyms'' column. The ''Statutory RQ'' column lists the RQs for hazardous substances established by section 102 of CERCLA. The ''Statutory Code'' column indicates the statutory source for designating each substance as a CERCLA hazardous substance: ''1'' indicates that the statutory source is section 311(b)(4) of the Clean Water Act, ''2'' indicates that the source is section 307(a) of the Clean Water Act, ''3'' indicates that the source is section 112 of the Clean Air Act, and ''4'' indicates that the source is RCRA section 3001. The ''RCRA Waste Number'' column provides the waste identification numbers assigned to various substances by RCRA regulations. The column headed ''Category'' lists the code letters ''X,'' ''A,'' ''B,'' ''C,'' and ''D,'' which are associated with reportable quantities of 1, 10, 100, 1000, and 5000 pounds, respectively. The ''Pounds (kg)'' column provides the reportable quantity adjustment for each hazardous substance in pounds and kilograms.

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA waste Number	Category	Pounds (Kg)
Acenaphthene	83329		1*	2		B	100 (45.4)
Acenaphthylene	208968		1*	2		D	5000 (2270)
Acetaldehyde	75070	Ethanal	1000	1,3,4	U001	C	1000 (454)
Acetaldehyde, chloro-	107200	Chloroacetaldehyde	1*	4	P023	C	1000 (454)
Acetaldehyde, trichloro-	75876	Chloral	1*	4	U034	D	5000 (2270)
Acetamide	60355		1*	3		B	100 (45.4)
Acetamide, N-(aminothioxomethyl)-	591082	1-Acetyl-2-thiourea	1*	4	P002	C	1000 (454)
Acetamide, N-(4-ethoxyphenyl)-	62442	Phenacetin	1*	4	U187	B	100 (45.4)
Acetamide, 2-fluoro-	640197	Fluoroacetamide	1*	4	P057	B	100 (45.4)
Acetamide, N-9H-fluoren-2-yl-	53963	2-Acetylaminofluorene	1*	3,4	U005	X	1 (0.454)
Acetic acid	64197		1000	1		D	5000 (2270)
Acetic acid (2,4-dichlorophenoxy)-, salts & esters	94757	2,4-D Acid, 2,4-D,salts and esters	100	1,3,4	U240	B	100 (45.4)
Acetic acid, Lead(2+) salt	301042	Lead acetate	5000	1,4	U144	A	10 (4.54)
Acetic acid, thallium (1+) salt	563688	Thallium(I) acetate	1*	4	U214	B	100 (45.4)
Acetic acid, (2,4,5-trichlorophenoxy)	93765	2,4,5-T 2,4,5-T acid	100	1,4	U232	C	1000 (454)
Acetic acid, ethyl ester	141786	Ethyl acetate	1*	4	U112	D	5000 (2270)
Acetic acid, fluoro-, sodium salt	62748	Fluoroacetic acid, sodium salt	1*	4	P058	A	10 (4.54)
Acetic anhydride	108247		1000	1		D	5000 (2270)
Acetone	67641	2-Propanone	1*	4	U002	D	5000 (2270)
Acetone cyanohydrin	75865	Propanenitrile, 2-hydroxy-2-methyl-2-Methyllactonitrile.	10	1,4	P069	A	10 (4.54)
Acetonitrile	75058		1*	3,4	U003	D	5000 (2270)
Acetophenone	98862	Ethanone, 1-phenyl-	1*	3,4	U004	D	5000 (2270)
2-Acetylaminofluorene	53963	Acetamide, N-9H-fluoren-2-yl-	1*	3,4	U005	X	1 (0.454)
Acetyl bromide	506967		5000	1		D	5000 (2270)
Acetyl chloride	75365		5000	1,4	U006	D	5000 (2270)
1-Acetyl-2-thiourea	591082	Acetamide, N-(aminothioxomethyl)-	1*	4	P002	C	1000 (454)
Acrolein	107028	2-Propenal	1	1,2,3,4	P003	X	1 (0.454)
Acrylamide	79061	2-Propenamide	1*	3,4	U007	D	5000 (2270)
Acrylic acid	79107	2-Propenoic acid	1*	3,4	U008	D	5000 (2270)
Acrylonitrile	107131	2-Propenenitrile	100	1,2,3,4	U009	B	100 (45.4)
Adipic acid	124049		5000	1		D	5000 (2270)
Aldicarb	116063	Propanal, 2-methyl-2-(methylthio)-,O-[(methylamino)carbonyl]oxime.	1*	4	P070	X	1 (0.454)
Aldrin	309002	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha, 4alpha,4abeta,5alpha,8alpha,8abeta)-.	1	1,2,4	P004	X	1 (0.454)
Allyl alcohol	107186	2-Propen-1-ol	100	1,4	P005	B	100 (45.4)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste Number	Category	Pounds (Kg)
Allyl chloride	107051		1000	1,3		C	1000 (454)
Aluminum phosphide	20859738		1*	4	P006	B	100 (45.4)
Aluminum sulfate	10043013		5000	1		D	5000 (2270)
4-Aminobiphenyl	92671		1*	3		X	1 (0.454)
5-(Aminomethyl)-3-isoxazolol	2763964	Muscimol 3(2H)-Isoxazolone, 5-(aminomethyl)-	1*	4	P007	C	1000 (454)
4-Aminopyridine	504245	4-Pyridinamine	1*	4	P008	C	1000 (454)
Amitrole	61825	1H-1,2,4-Triazol-3-amine	1*	4	U011	A	10 (4.54)
Ammonia	7664417		100	1		B	100 (45.4)
Ammonium acetate	631618		5000	1		D	5000 (2270)
Ammonium benzoate	1863634		5000	1		D	5000 (2270)
Ammonium bicarbonate	1066337		5000	1		D	5000 (2270)
Ammonium bichromate	7789095		1000	1		A	10 (4.54)
Ammonium bifluoride	1341497		5000	1		B	100 (45.4)
Ammonium bisulfite	10192300		5000	1		D	5000 (2270)
Ammonium carbamate	1111780		5000	1		D	5000 (2270)
Ammonium carbonate	506876		5000	1		D	5000 (2270)
Ammonium chloride	12125029		5000	1		D	5000 (2270)
Ammonium chromate	7788989		1000	1		A	10 (4.54)
Ammonium citrate, dibasic	3012655		5000	1		D	5000 (2270)
Ammonium fluoborate	13826830		5000	1		D	5000 (2270)
Ammonium fluoride	12125018		5000	1		B	100 (45.4)
Ammonium hydroxide	1336216		1000	1		C	1000 (454)
Ammonium oxalate	6009707		5000	1		D	5000 (2270)
	5972736						
	14258492						
Ammonium picrate	131748	Phenol, 2,4,6-trinitro-, ammonium salt	1*	4	P009	A	10 (4.54)
Ammonium silicofluoride	16919190		1000	1		C	1000 (454)
Ammonium sulfamate	7773060		5000	1		D	5000 (2270)
Ammonium sulfide	12135761		5000	1		B	100 (45.4)
Ammonium sulfite	10196040		5000	1		D	5000 (2270)
Ammonium tartrate	14307438		5000	1		D	5000 (2270)
	3164292						
Ammonium thiocyanate	1762954		5000	1		D	5000 (2270)
Ammonium vanadate	7803556	Vanadic acid, ammonium salt	1*	4	P119	C	1000 (454)
Amyl acetate	628637		1000	1		D	5000 (2270)
iso-Amyl acetate	123922						
sec-Amyl acetate	626380						
tert-Amyl acetate	625161						
Aniline	62533	Benzenamine	1000	1,3,4	U012	D	5000 (2270)
o-Anisidine	90040		1*	3		B	100 (45.4)
Anthracene	120127		1*	2		D	5000 (2270)

Antimony††	7440360		1*	2		D	5000 (2270)
ANTIMONY AND COMPOUNDS	N.A.	Antimony Compounds	1*	2,3			**
Antimony Compounds	N.A.	ANTIMONY AND COMPOUNDS	1*	2,3			**
Antimony pentachloride	7647189		1000	1		C	1000 (454)
Antimony potassium tartrate	28300745		1000	1		B	100 (45.4)
Antimony tribromide	7789619		1000	1		C	1000 (454)
Antimony trichloride	10025919		1000	1		C	1000 (454)
Antimony trifluoride	7783564		1000	1		C	1000 (454)
Antimony trioxide	1309644		5000	1		C	1000 (454)
Argentate(1-), bis(cyano-C)-, potassium	506616	Potassium silver cyanide	1*	4	P099	X	1 (0.454)
Aroclor 1016	12674112	Aroclors PCBs POLYCHLORINATED BIPHENYLS	10	1,2,3		X	1 (0.454)
Aroclor 1221	11104282	Aroclors PCBs POLYCHLORINATED BIPHENYLS	10	1,2,3		X	1 (0.454)
Aroclor 1232	11141165	Aroclors PCBs POLYCHLORINATED BIPHENYLS	10	1,2,3		X	1 (0.454)
Aroclor 1242	53469219	Aroclors PCBs POLYCHLORINATED BIPHENYLS	10	1,2,3		X	1 (0.454)
Aroclor 1248	12672296	Aroclors PCBs POLYCHLORINATED BIPHENYLS	10	1,2,3		X	1 (0.454)
Aroclor 1254	11097691	Aroclors PCBs POLYCHLORINATED BIPHENYLS	10	1,2,3		X	1 (0.454)
Aroclor 1260	11096825	Aroclors PCBs POLYCHLORINATED BIPHENYLS	10	1,2,3		X	1 (0.454)
Aroclors	1336363	PCBs POLYCHLORINATED BIPHENYLS	10	1,2,3		X	1 (0.454)
Aroclor 1016	12674112		10	1,2,3		X	1 (0.454)
Aroclor 1221	11104282		10	1,2,3		X	1 (0.454)
Aroclor 1232	11141165		10	1,2,3		X	1 (0.454)
Aroclor 1242	53469219		10	1,2,3		X	1 (0.454)
Aroclor 1248	12672296		10	1,2,3		X	1 (0.454)
Aroclor 1254	11097691		10	1,2,3		X	1 (0.454)
Aroclor 1260	11096825		10	1,2,3		X	1 (0.454)
Arsenic††	7440382		1*	2,3		X	1 (0.454)
Arsenic acid	1327522 7778394	Arsenic acid H_3AsO_4	1*	4	P010	X	1 (0.454)
Arsenic acid H_3AsO_4	1327522 7778394	Arsenic acid	1*	4	P010	X	1 (0.454)
ARSENIC AND COMPOUNDS	N.A.	Arsenic Compounds (inorganic including arsine).	1*	2,3			**
Arsenic Compounds (inorganic including arsine)	N.A.	ARSENIC AND COMPOUNDS	1*	2,3			**
Arsenic disulfide	1303328		5000	1		X	1 (0.454)
Arsenic oxide As_2O_3	1327533	Arsenic trioxide	5000	1,4	P012	X	1 (0.454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste Number	Category	Pounds (Kg)
Arsenic oxide As_2O_5	1303282	Arsenic pentoxide	5000	1,4	P011	X	1 (0.454)
Arsenic pentoxide	1303282	Arsenic oxide As_2O_5	5000	1,4	P011	X	1 (0.454)
Arsenic trichloride	7784341		5000	1		X	1 (0.454)
Arsenic trioxide	1327533	Arsenic oxide As_2O_3	5000	1,4	P012	X	1 (0.454)
Arsenic trisulfide	1303339		5000	1		X	1 (0.454)
Arsine, diethyl-	692422	Diethylarsine	1*	4	P038	X	1 (0.454)
Arsinic acid, dimethyl-	75605	Cacodylic acid	1*	4	U136	X	1 (0.454)
Arsonous dichloride, phenyl-	696286	Dichlorophenylarsine	1*	4	P036	X	1 (0.454)
Asbestos †††	1332214		1*	2,3		X	1 (0.454)
Auramine	492808	Benzenamine, 4,4′-carbonimidoylbis (N,N-dimethyl-.	1*	4	U014	B	100 (45.4)
Azaserine	115026	L-Serine, diazoacetate (ester)	1*	4	U015	X	1 (0.454)
Aziridine	151564	Ethyleneimine	1*	3,4	P054	X	1 (0.454)
Aziridine, 2-methyl-	75558	2-Methyl aziridine 1,2-Propylenemine	1*	3,4	P067	X	1 (0.454)
Azirino[2′,3′:3,4]pyrrolo[1,2-a]indole-4,7-dione,6-amino-8-[[(aminocarbonylooxy]methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-,[1aS-(1aalpha,8beta,8aalpha,8balpha)]-.	50077	Mitomycin C	1*	4	U010	A	10 (4.54)
Barium cyanide	542621		10	1,4	P013	A	10 (4.54)
Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	56495	3-Methylcholanthrene	1*	4	U157	A	10 (4.54)
Benz[c]acridine	225514		1*	4	U016	B	100 (45.4)
Benzal chloride	98873	Benzene, dichloromethyl-	1*	4	U017	D	5000 (2270)
Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-	23950585	Pronamide	1*	4	U192	D	5000 (2270)
Benz[a]anthracene	56553	Benzo[a]anthracene 1,2-Benzanthracene	1*	2,4	U018	A	10 (4.54)
1,2-Benzanthracene	56553	Benz[a]anthracene Benzo[a]anthracene	1*	2,4	U018	A	10 (4.54)
Benz[a]anthracene, 7,12-dimethyl-	57976	7,12-Dimethylbenz[a]anthracene	1*	4	U094	X	1 (0.454)
Benzenamine	62533	Aniline	1000	1,3,4	U012	D	5000 (2270)
Benzenamine, 4,4′-carbonimidoylbis (N,N-dimethyl-	492808	Auramine	1*	4	U014	B	100 (45.4)
Benzenamine, 4-chloro-	106478	p-Chloroaniline	1*	4	P024	C	1000 (454)
Benzenamine, 4-chloro-2-methyl-, hydrochloride	3165933	4-Chloro-o-toluidine, hydrochloride	1*	4	U049	B	100 (45.4)
Benzenamine, N,N-dimethyl-4-(phenylazo-)	60117	Dimethyl aminoazobenzene p-Dimethylaminoazobenzene	1*	3,4	U093	A	10 (4.54)
Benzenamine, 2-methyl-	95534	o-Toluidine	1*	3,4	U328	B	100 (45.4)
Benzenamine, 4-methyl-	106490	p-Toluidine	1*	4	U353	B	100 (45.4)
Benzenamine, 4,4′-methylenebis(2-chloro-	101144	4,4′-Methylenebis(2-chloroaniline)	1*	3,4	U158	A	10 (4.54)
Benzenamine, 2-methyl-, hydrochloride	636215	o-Toluidine hydrochloride	1*	4	U222	B	100 (45.4)
Benzenamine, 2-methyl-5-nitro-	99558	5-Nitro-o-toluidine	1*	4	U181	B	100 (45.4)
Benzenamine, 4-nitro-	100016	p-Nitroaniline	1*	4	P077	D	5000 (2270)
Benzene [a]	71432		1000	1,2,3,4	U109	A	10 (4.54)
Benzeneacetic acid, 4-chloro-α-(4-chlorophenyl)-α-hydroxy-, ethyl ester	510156	Chlorobenzilate	1*	3,4	U038	A	10 (4.54)

Benzene, 1-bromo-4-phenoxy-	101553	4-Bromophenyl phenyl ether	1*	2,4	U030	B	100 (45.4)
Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]-	305033	Chlorambucil	1*	4	U035	A	10 (4.54)
Benzene, chloro-	108907	Chlorobenzene	100	1,2,3,4	U037	B	100 (45.4)
Benzene, chloromethyl-	100447	Benzyl chloride	100	1,3,4	P028	B	100 (45.4)
Benzenediamine, ar-methyl-	95807	Toluenediamine	1*	3,4	U221	A	10 (4.54)
	496720	2,4-Toluene diamine					
	823405						
	25376458						
1,2-Benzenedicarboxylic acid, dioctyl ester	117840	Di-n-octyl phthalate	1*	2,4	U107	D	5000 (2270)
1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester	117817	Bis(2-ethylhexyl)phthalate	1*	2,3,4	U028	B	100 (45.4)
		DEHP					
		Diethylhexyl phthalate					
1,2-Benzenedicarboxylic acid, dibutyl ester	84742	n-Butyl phthalate	100	1,2,3,4	U069	A	10 (4.54)
		Dibutyl phthalate					
		Di-n-butyl phthalate					
1,2-Benzenedicarboxylic acid, diethyl ester	84662	Diethyl phthalate	1*	2,4	U088	C	1000 (454)
1,2-Benzenedicarboxylic acid, dimethyl ester	131113	Dimethyl phthalate	1*	2,3,4	U102	D	5000 (2270)
Benzene, 1,2-dichloro-	95501	o-Dichlorobenzene	100	1,2,4	U070	B	100 (45.4)
		1,2-Dichlorobenzene					
Benzene, 1,3-dichloro-	541731	m-Dichlorobenzene	1*	2,4	U071	B	100 (45.4)
		1,3-Dichlorobenzene					
Benzene, 1,4-dichloro-	106467	p-Dichlorobenzene	100	1,2,3,4	U072	B	100 (45.4)
		1,4-Dichlorobenzene					
Benzene, 1,1′-(2,2-dichloroethylidene)bis[4-chloro-	72548	DDD	1	1,2,4	U060	X	1 (0.454)
		TDE					
		4,4′ DDD					
Benzene, dichloromethyl-	98873	Benzal chloride	1*	4	U017	D	5000 (2270)
Benzene, 1,3-diisocyanatomethyl-	91087	Toluene diisocyanate	1*	3,4	U223	B	100 (45.4)
	584849	2,4-Toluene diisocyanate					
	26471625						
Benzene, dimethyl-	1330207	Xylene	1000	1,3,4	U239	B	100 (45.4)
		Xylene (mixed)					
		Xylenes (isomers and mixture)					
Benzene,m-dimethyl-	108383	m-Xylene	1*	3		C	1000 (454)
Benzene, o-dimethyl-	95476	o-Xylene	1*	3		C	1000 (454)
Benzene, p-dimethyl-	106423	p-Xylene	1*	3		B	100 (45.4)
1,3-Benzenediol	108463	Resorcinol	1000	1,4	U201	D	5000 (2270)
1,2-Benzenediol,4-[1-hydroxy-2-(methylamino)ethyl]-	51434	Epinephrine	1*	4	P042	C	1000 (454)
Benzeneethanamine, alpha,alpha-dimethyl-	122098	alpha,alpha-Dimethylphenethylamine	1*	4	P046	D	5000 (2270)
Benzene, hexachloro-	118741	Hexachlorobenzene	1*	2,3,4	U127	A	10 (4.54)
Benzene, hexahydro-	110827	Cyclohexane	1000	1,4	U056	C	1000 (454)
Benzene, hydroxy-	108952	Phenol	1000	1,2,3,4	U188	C	1000 (454)
Benzene, methyl-	108883	Toluene	1000	1,2,3,4	U220	C	1000 (454)
Benzene, 2-methyl-1,3-dinitro-	606202	2,6-Dinitrotoluene	1000	1,2,4	U106	B	100 (45.4)
Benzene, 1-methyl-2,4-dinitro-	121142	2,4-Dinitrotoluene	1000	1,2,3,4	U105	A	10 (4.54)
Benzene, (1-methylethyl)-	98828	Cumene	1*	3,4	U055	D	5000 (2270)
Benzene, nitro-	98953	Nitrobenzene	1000	1,2,3,4	U169	C	1000 (454)
Benzene, pentachloro-	608935	Pentachlorobenzene	1*	4	U183	A	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste Number	Category	Pounds (Kg)
Benzene, pentachloronitro-	82688	PCNB	1*	3,4	U185	B	100 (45.4)
		Pentachloronitrobenzene					
		Quintobenzene					
Benzenesulfonic acid chloride	98099	Benzenesulfonyl chloride	1*	4	U020	B	100 (45.4)
Benzenesulfonyl chloride	98099	Benzenesulfonic acid chloride	1*	4	U020	B	100 (45.4)
Benzene, 1,2,4,5-tetrachloro-	95943	1,2,4,5-Tetrachlorobenzene	1*	4	U207	D	5000 (2270)
Benzenethiol	108985	Thiophenol	1*	4	P014	B	100 (45.4)
Benzene, 1,1′-(2,2,2-tri- chloroethylidene)bis[4-chloro-	50293	DDT	1	1,2,4	U061	X	1 (0.454)
		4,4′DDT					
Benzene, 1,1′-(2,2,2-trichloroethylidene) bis[4-methoxy-	72435	Methoxychlor	1	1,3,4	U247	X	1 (0.454)
Benzene, (trichloromethyl)-	98077	Benzotrichloride	1*	3,4	U023	A	10 (4.54)
Benzene, 1,3,5-trinitro-	99354	1,3,5-Trinitrobenzene	1*	4	U234	A	10 (4.54)
Benzidine	92875	[1,1′-Biphenyl]-4,4′-diamine	1*	2,3,4	U021	X	1 (0.454)
1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide	81072	Saccharin and salts	1*	4	U202	B	100 (45.4)
Benzo[a]anthracene	56553	Benz[a]anthracene	1*	2,4	U018	A	10 (4.54)
		1,2-Benzanthracene					
Benzo[b]fluoranthene	205992		1*	2		X	1 (0.454)
Benzo(k)fluoranthene	207089		1*	2		D	5000 (2270)
Benzo[j,k]fluorene	206440	Fluoranthene	1*	2,4	U120	B	100 (45.4)
1,3-Benzodioxol-4-ol, 2,2-dimethyl-, (Bendiocarb phenol)	22961826		1*	4	U364		##
1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate (Bendiocarb)	22781233		1*	4	U278		##
1,3-Benzodioxole, 5-)1-propenyl)-	120581	Isosafrole	1*	4	U141	B	100 (45.4)
1,3-Benzodioxole,5-(2-propenyl)-	94597	Safrole	1*	4	U203	B	100 (45.4)
1,3-Benzodioxole, 5-propyl-	94586	Dihydrosafrole	1*	4	U090	A	10 (4.54)
7-Benzofuranol, 2,3-dihydro-2,2-dimethyl- (Carbofuran phenol)	1563388		1*	4	U367		##
Benzoic acid	65850		5000	1		D	5000 (2270)
Benzoic acid, 2-hydroxy-, compd. with (3aS-cis)-1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethylpyrrolo[2,3-b]indol-5-yl methylcarbamate ester (1:1) (Physostigmine salicylate).	57647		1*	4	P188		##
Benzonitrile	100470		1000	1		D	5000 (2270)
Benzo [rst]pentaphene	189559	Dibenz[a,i]pyrene	1*	4	U064	A	10 (4.54)
Benzo[ghi]perylene	191242		1*	2		D	5000 (2270)
2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenyl-butyl)-, & salts, when present at concentrations greater than 0.3%	81812	Warfarin, & salts, when present at concentrations greater than 0.3%.	1*	4	P001	B	100 (45.4)
Benzo[a]pyrene	50328	3,4-Benzopyrene	1*	2,4	U022	X	1 (0.454)
3,4-Benzopyrene	50328	Benzo[a]pyrene	1*	2,4	U022	X	1 (0.454)
ρ-Benzoquinone	106514	2,5-Cyclohexadiene-1,4-dione	1*	3,4	U197	A	10 (4.54)
		Quinone					
Benzotrichloride	98077	Benzene, (trichloromethyl)-	1*	3,4	U023	A	10 (4.54)
Benzoyl chloride	98884		1000	1		C	1000 (454)
1,2-Benzphenanthrene	218019	Chrysene	1*	2,4	U050	B	100 (45.4)

Benzyl chloride	100447	Benzene, chloromethyl-	100	1,3,4	P028	B	100 (45.4)
BERYLLIUM AND COMPOUNDS	N.A.	Beryllium Compounds	1*	2,3			**
Beryllium Compounds	N.A.	BERYLLIUM AND COMPOUNDS	1*	2,3			**
Beryllium chloride	7787475		5000	1		X	1 (0.454)
Beryllium fluoride	7787497		5000	1		X	1 (0.454)
Beryllium nitrate	13597994 7787555		5000	1		X	1 (0.454)
Beryllium powder ††	7440417	Beryllium ††	1*	2,3,4	P015	A	10 (4.54)
alpha—BHC	319846		1*	2		A	10 (4.54)
beta—BHC	319857		1*	2		X	1 (0.454)
delta—BHC	319868		1*	2		X	1 (0.454)
γ-BHC	58899	Cyclohexane, 1,2,3,4,5,6-hexa chloro- (1α, 2α, 3β,4α,5α,6β)-. Hexachlorocyclohexane (gamma isomer) Lindane	1	1,2,3,4	U129	X	1 (0.454)
2,2′-Bioxirane	1464535	1,2:3,4-Diepoxybutane	1*	4	U085	A	10 (4.54)
(1,1′-Biphenyl)-4,4′diamine	92875	Benzidine	1*	2,4	U021	X	1 (0.454)
[1,1′-Biphenyl]-4,4′diamine,3,3′dichloro-	91941	3,3′-Dichlorobenzidine	1*	2,4	U073	X	1 (0.454)
[1,1′-Biphenyl]-4,4′diamine,3,3′dimethoxy-	119904	3,3′-Dimethoxybenzidine	1*	4	U091	B	100 (45.4)
[1,1′Biphenyl]-4,4′-diamine,3,3′-dimethyl-	119937	3,3′-Dimethylbenzidine	1*	4	U095	A	10 (4.54)
Biphenyl	92524		1*	3		B	100 (45.4)
Bis (2-chloroethyl) ether	111444	Dichloroethyl ether Ethane,1,1′-oxybis[2-chloro-	1*	2,4	U025	A	10 (4.54)
Bis(2-chloroethoxy) methane	111911	Dichloromethoxy ethane Ethane, 1,1′-[methylenebis(oxy)]bis(2-chloro-	1*	2,4	U024	C	1000 (454)
Bis (2-ethylhexyl)phthalate	117817	Diethylhexyl phthalate 1,2-Benzenedicarboxylic acid, [bis(2-ethylhexyl)] ester	1*	2,4	U028	B	100 (45.4)
Bromoacetone	598312	2-Propanone, 1-bromo-	1*	4	P017	C	1000 (454)
Bromoform	75252	Methane, tribromo-	1*	2,4	U225	B	100 (45.4)
4-Bromophenyl phenyl ether	101553	Benzene, 1-bromo-4-phenoxy-	1*	2,4	U030	B	100 (45.4)
Brucine	357573	Strychnidin-10-one, 2,3-dimethoxy-	1*	4	P018	B	100 (45.4)
1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	87683	Hexachlorobutadiene	1*	2,4	U128	X	1 (0.454)
1,3-Butadiene	106990		1*	3		A	10 (4.54)
1-Butanamine, N-butyl-N-nitroso-	924163	N-Nitrosodi-n-butylamine	1*	4	U172	A	10 (4.54)
1-Butanol	71363	n-Butyl alcohol	1*	4	U031	D	5000 (2270)
2-Butanone	78933	MEK Methyl ethyl ketone	1*	3,4	U159	D	5000 (2270)
2-Butanone peroxide	1338234	Methyl ethyl ketone peroxide	1*	4	U160	A	10 (4.54)
2-Butanone, 3,3-dimethyl-1-(methylthio)-, O[(methylamino)carbonyl] oxime.	39196184	Thiofanox	1*	4	P045	B	100 (45.4)
2-Butenal	123739 4170303	Crotonaldehyde	100	1,4	U053	B	100 (45.4)
2-Butene, 1,4-dichloro-	764410	1,4-Dichloro-2-butene	1*	4	U074	X	1 (0.454)
2-Butenoic acid, 2-methyl-, 7[[2,3-dihydroxy-2-(1-methoxyethyl)-3-methyl-1-oxobutoxy]methyl]-2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl ester, [1S-[1alpha(Z),7(2S*,3R*),7aalpha]]-	303344	Lasiocarpine	1*	4	U143	A	10 (4.54)
Butyl acetate	123864		5000	1		D	5000 (2270)
iso-Butyl acetate	110190						
sec-Butyl acetate	105464						

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste Number	Category	Pounds (Kg)
tert-Butyl acetate	540885						
n-Butyl alcohol	71363	1-Butanol	1*	4	U031	D	5000 (2270)
Butylamine	109739		1000	1		C	1000 (454)
iso-Butylamine	78819						
sec-Butylamine	513495						
	13952846						
tert-Butylamine	75649						
Butyl benzyl phthalate	85687		1*	2		B	100 (45.4)
η-Butyl phthalate	84742	1,2-Benzenedicarboxylic acid, dibutyl ester Dibutyl phthalate Di-n-butyl phthalate	100	1,2,3,4	U069	A	10 (4.54)
Butyric acid	107926		5000	1		D	5000 (2270)
iso-Butyric acid	79312						
Cacodylic acid	75605	Arsinic acid, dimethyl-	1*	4	U136	X	1 (0.454)
Cadmium ††	7440439		1*	2		A	10 (4.54)
Cadmium acetate	543908		100	1		A	10 (4.54)
CADMIUM AND COMPOUNDS	N.A.	Cadmium Compounds	1*	2,3			**
Cadmium Compounds	N.A.	CADMIUM AND COMPOUNDS	1*	2,3			**
Cadmium bromide	7789426		100	1		A	10 (4.54)
Cadmium chloride	10108642		100	1		A	10 (4.54)
Calcium arsenate	7778441		1000	1		X	1 (0.454)
Calcium arsenite	52740166		1000	1		X	1 (0.454)
Calcium carbide	75207		5000	1		A	10 (4.54)
Calcium chromate	13765190	Chromic acid H_2 CrO_4, calcium salt	1000	1,4	U032	A	10 (4.54)
Calcium cyanamide	156627		1*	3		C	1000 (454)
Calcium cyanide	592018	Calcium cyanide Ca(CN)2	10	1,4	P021	A	10 (4.54)
Calcium cyanide Ca(CN)2	592018	Calcium cyanide	10	1,4	P021	A	10 (4.54)
Calcium dodecylbenzenesulfonate	26264062		1000	1		C	1000 (454)
Calcium hypochlorite	7778543		100	1		A	10 (4.54)
Camphene, octachloro-	8001352	Chlorinated camphene Toxaphene	1	1,2,3,4	P123	X	1 (0.454)
Captan	133062		10	1,3		A	10 (4.54)
Carbamic acid, [1-[(butylamino)carbonyl]-1H-benzimidazol-2-yl, methyl ester (Benomyl).	17804352		1*	4	U271		##
Carbamic acid, 1H-benzimidazol-2-yl, methyl ester (Carbendazim)	10605217		1*	4	U372		##
Carbamic acid, (3-chlorophenyl)-, 4-chloro-2-butynyl ester (Barban)	101279		1*	4	U280		##
Carbamic acid, [(dibutylamino)thio]methyl-, 2,3-dihydro-2,2-dimethyl-7-benzofuranyl ester (Carbosulfan).	55285148		1*	4	P189		##
Carbamic acid, dimethyl-,1- [(dimethylamino)carbonyl]-5-methyl-1H-pyrazol-3-yl ester (Dimetilan).	644644		1*	4	P191		##

Carbamic acid, dimethyl-, 3-methyl-1-(1-methylethyl)-1H-pyrazol-5-yl ester (Isolan).	119380	....	1*	4	P192		##
Carbamic acid, ethyl ester	51796	Ethyl carbamate Urethane	1*	3,4	U238	B	100 (45.4)
Carbamic acid, methylnitroso-, ethyl ester	615532	N-Nitroso-N-methylurethane	1*	4	U178	X	1 (0.454)
Carbamic acid, methyl-, 3-methylphenyl ester (Metolcarb)	1129415	....	1*	4	P190		##
Carbamic acid, [1,2- phenylenebis(iminocarbonothioyl)]bis-, dimethyl ester (Thiophanate-methyl).	23564058	....	1*	4	U409		##
Carbamic acid, phenyl-, 1-methylethyl ester (Propham)	122429	....	1*	4	U373		##
Carbamic chloride, dimethyl-	79447	Dimethylcarbamoyl chloride	1*	3,4	U097	X	1 (0.454)
Carbamodithioic acid, 1,2-ethanediylbis, salts & esters	111546	Ethylenebisdithiocarbamic acid, salts & esters	1*	4	U114	D	5000 (2270)
Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester	2303164	Diallate	1*	4	U062	B	100 (45.4)
Carbamothioic acid, bis(1-methylethyl)-, S-(2,3,3-trichloro-2-propenyl) ester (Triallate).	2303175	....	1*	4	U389		##
Carbamothioic acid, dipropyl-, S-(phenylmethyl) ester (Prosulfocarb)	52888809	....	1*	4	U387		##
Carbaryl	63252	....	100	1,3		B	100 (45.4)
Carbofuran	1563662	....	10	1		A	10 (4.54)
Carbon disulfide	75150	....	5000	1,3,4	P022	B	100 (45.4)
Carbon oxyfluoride	353504	Carbonic difluoride	1*	4	U033	C	1000 (454)
Carbonic acid, dithallium(1+) salt	6533739	Thallium(I) carbonate	1*	4	U215	B	100 (45.4)
Carbonic dichloride	75445	Phosgene	5000	1,3,4	P095	A	10 (4.54)
Carbonic difluoride	353504	Carbon oxyfluoride	1*	4	U033	C	1000 (454)
Carbonochloridic acid, methyl ester	79221	Methyl chlorocarbonate Methyl chloroformate	1*	4	U156	C	1000 (454)
Carbon tetrachloride	56235	Methane, tetrachloro-	5000	1,2,3,4	U211	A	10 (4.54)
Carbonyl sulfide	463581	....	1*	3		B	100 (45.4)
Catechol	120809	....	1*	3		B	100 (45.4)
Chloral	75876	Acetaldehyde, trichloro-	1*	4	U034	D	5000 (2270)
Chloramben	133904	....	1*	3		B	100 (45.4)
Chlorambucil	305033	Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]-.	1*	4	U035	A	10 (4.54)
Chlordane	57749	Chlordane, alpha & gamma isomers CHLORDANE (TECHNICAL MIXTURE AND METABOLITES) 4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-.	1	1,2,3,4	U036	X	1 (0.454)
CHLORDANE (TECHNICAL MIXTURE AND METABOLITES)	N.A.	....	1*	2			**
Chlordane, alpha & gamma isomers	57749	Chlordane CHLORDANE (TECHNICAL MIXTURE AND METABOLITES) 4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-.	1	1,2,3,4	U036	X	1 (0.454)
CHLORDANE (TECHNICAL MIXTURE AND METABOLITES)	57749	Chlordane, alpha & gamma isomers Chlordane, alpha & gamma isomers 4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-	1	1,2,3,4	U036	X	1 (0.454)
CHLORINATED BENZENES	N.A.	....	1*	2			**
Chlorinated camphene	8001352	Camphene, octachloro- Toxaphene	1	1,2,3,4	P123	X	1 (0.454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste Number	Cat-egory	Pounds (Kg)
CHLORINATED ETHANES	N.A.		1*	2			**
CHLORINATED NAPHTHALENE	N.A.		1*	2			**
CHLORINATED PHENOLS	N.A.		1*	2			**
Chlorine	7782505		10	1,3		A	10 (4.54)
Chlornaphazine	494031	Naphthalenamine, N,N′-bis(2-chloroethyl)-	1*	4	U026	B	100 (45.4)
Chloroacetaldehyde	107200	Acetaldehyde, chloro-	1*	4	P023	C	1000 (454)
Chloroacetic acid	79118		1*	3		B	100 (45.4)
2-Chloroacetophenone	532274		1*	3		B	100 (45.4)
CHLOROALKYL ETHERS	N.A.		1*	2			**
p-Chloroaniline	106478	Benzenamine, 4-chloro-	1*	4	P024	C	1000 (454)
Chlorobenzene	108907	Benzene, chloro-	100	1,2,3,4	U037	B	100 (45.4)
Chlorobenzilate	510156	Benzeneacetic acid, 4-chloro-α-(4-chlorophenyl)-α-hydroxy-, ethyl ester.	1*	3,4	U038	A	10 (4.54)
4-Chloro-m-cresol	59507	p-Chloro-m-cresol Phenol, 4-chloro-3-methyl-	1*	2,4	U039	D	5000 (2270)
p-Chloro-m-cresol	59507	Phenol, 4-chloro-3-methyl- 4-Chloro-m-cresol	1*	2,4	U039	D	5000 (2270)
Chloroethane	75003	Ethyl chloride	1*	2,3		B	100 (45.4)
Chlorodibromomethane	124481		1*	2		B	100 (45.4)
1-Chloro-2,3-epoxypropane	106898	Epichlorohydrin Oxirane, (chloromethyl)-	1000	1,3,4	U041	B	100 (45.4)
2-Chloroethyl vinyl ether	110758	Ethene, 2-chloroethoxy-	1*	2,4	U042	C	1000 (454)
Chloroform	67663	Methane, trichloro-	5000	1,2,3,4	U044	A	10 (4.54)
Chloromethane	74873	Methane, chloro- Methyl chloride	1*	2,3,4	U045	B	100 (45.4)
Chloromethyl methyl ether	107302	Methane, chloromethoxy-	1*	3,4	U046	A	10 (4.54)
beta-Chloronaphthalene	91587	Naphthalene, 2-chloro- 2-Chloronaphthalene	1*	2,4	U047	D	5000 (2270)
2-Chloronaphthalene	91587	beta-Chloronaphthalene Naphthalene, 2-chloro-	1*	2,4	U047	D	5000 (2270)
2-Chlorophenol	95578	o-Chlorophenol Phenol, 2-chloro-	1*	2,4	U048	B	100 (45.4)
o-Chlorophenol	95578	Phenol, 2-chloro- 2-Chlorophenol	1*	2,4	U048	B	100 (45.4)
4-Chlorophenyl phenyl ether	7005723		1*	2		D	5000 (2270)
1-(o-Chlorophenyl)thiourea	5344821	Thiourea, (2-chlorophenyl)-	1*	4	P026	B	100 (45.4)
Chloroprene	126998		1*	3		B	100 (45.4)
3-Chloropropionitrile	542767	Propanenitrile, 3-chloro-	1*	4	P027	C	1000 (454)
Chlorosulfonic acid	7790945		1000	1		C	1000 (454)
4-Chloro-o-toluidine, hydrochloride	3165933	Benzenamine, 4-chloro-2-methyl-, hydrochloride.	1*	4	U049	B	100 (45.4)

Chlorpyrifos	2921882		1	1		X	1 (0.454)
Chromic acetate	1066304		1000	1		C	1000 (454)
Chromic acid	11115745		1000	1		A	10 (4.54)
	7738945						
Chromic acid H_2 CrO_4, calcium salt	13765190	Calcium chromate	1000	1,4	U032	A	10 (4.54)
Chromic sulfate	10101538		1000	1		C	1000 (454)
Chromium ††	7440473		1*	2		D	5000 (2270)
CHROMIUM AND COMPOUNDS	N.A.	Chromium Compounds	1*	2,3			**
Chromium Compounds	N.A.	CHROMIUM AND COMPOUNDS	1*	2,3			**
Chromous chloride	10049055		1000	1		C	1000 (454)
Chrysene	218019	1,2-Benzphenanthrene	1*	2,4	U050	B	100 (45.4)
Cobalt compounds	N.A.		1*	3			**
Cobaltous bromide	7789437		1000	1		C	1000 (454)
Cobaltous formate	544183		1000	1		C	1000 (454)
Cobaltous sulfamate	14017415		1000	1		C	1000 (454)
Coke Oven Emissions	N.A.		1*	3		X	1 (0.454)
Copper ††	7440508		1*	2		D	5000 (2270)
COPPER AND COMPOUNDS	N.A.		1*	2			**
Copper cyanide	544923	Copper cyanide CuCN	1*	4	P029	A	10 (4.54)
Copper cyanide CuCN	544923	Copper cyanide	1*	4	P029	A	10 (4.54)
Coumaphos	56724		10	1		A	10 (4.54)
Creosote	8001589		1*	4	U051	X	1 (0.454)
Cresols (isomers and mixture)	1319773	Cresylic acid (isomers and mixture)	1000	1,3,4	U052	B	100 (45.4)
		Phenol, methyl					
m-Cresol	108394	m-Cresylic acid	1*	3		B	100 (45.4)
o-Cresol	95487	o-Cresylic acid	1*	3		B	100 (45.4)
p-Cresol	106445	p-Cresylic acid	1*	3		B	100 (45.4)
Cresylic acid (isomers and mixture)	1319773	Cresols (isomers and mixture)	1000	1,3,4	U052	B	100 (45.4)
		Phenol, methyl					
m-Cresylic acid	108394	m-Cresol	1*	3		B	100 (45.4)
o-Cresylic acid	95487	o-Cresol	1*	3		B	100 (45.4)
p-Cresylic acid	106445	p-Cresol	1*	3		B	100 (45.4)
Crotonaldehyde	123739	2-Butenal	100	1,4	U053	B	100 (45.4)
	4170303						
Cumene	98828	Benzene, (1-methylethyl)-	1*	3,4	U055	D	5000 (2270)
Cupric acetate	142712		100	1		B	100 (45.4)
Cupric acetoarsenite	12002038		100	1		X	1 (0.454)
Cupric chloride	7447394		10	1		A	10 (4.54)
Cupric nitrate	3251238		100	1		B	100 (45.4)
Cupric oxalate	5893663		100	1		B	100 (45.4)
Cupric sulfate	7758987		10	1		A	10 (4.54)
Cupric sulfate, ammoniated	10380297		100	1		B	100 (45.4)
Cupric tartrate	815827		100	1		B	100 (45.4)
Cyanide Compounds	N.A.	CYANIDES	1*	2,3			**
CYANIDES	N.A.	Cyanide Compounds	1*	2,3			**
Cyanides (soluble salts and complexes) not otherwise specified	57125		1*	4	P030	A	10 (4.54)
Cyanogen	460195	Ethanedinitrile	1*	4	P031	B	100 (45.4)
Cyanogen bromide	506683	Cyanogen bromide (CN)Br	1*	4	U246	C	1000 (454)
Cyanogen bromide (CN)Br	506683	Cyanogen bromide	1*	4	U246	C	1000 (454)
Cyanogen chloride	506774	Cyanogen chloride (CN)Cl	10	1,4	P033	A	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA waste Number	Category	Pounds (Kg)
Cyanogen chloride (CN)Cl	506774	Cyanogen chloride	10	1,4	P033	A	10 (4.54)
2,5-Cyclohexadiene-1,4-dione	106514	p-Benzoquinone Quinone	1*	3,4	U197	A	10 (4.54)
Cyclohexane	110827	Benzene, hexahydro-	1000	1,4	U056	C	1000 (454)
Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3β,4α,5α,6β)-	58899	γ-BHC Hexachlorocyclohexane (gamma isomer) Lindane Lindane (all isomers)	1	1,2,3,4	U129	X	1 (0.454)
Cyclohexanone	108941		1*	4	U057	D	5000 (2270)
2-Cyclohexyl-4,6-dinitrophenol	131895	Phenol, 2-cyclohexyl-4,6-dinitro-	1*	4	P034	B	100 (45.4)
1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	77474	Hexachlorocyclopentadiene	1	1,2,3,4	U130	A	10 (4.54)
Cyclophosphamide	50180	2H-1,3,2-Oxazaphosphorin-2-amine, N,N-bis(2-chloroethyl)tetrahydro-,2-oxide	1*	4	U058	A	10 (4.54)
2,4-D Acid	94757	Acetic acid, (2,4-dichlorophenoxy)-, salts & esters. 2,4-D, salts and esters	100	1,3,4	U240	B	100 (45.4)
2,4-D Ester	94111 94791 94804 1320189 1928387 1928616 1929733 2971382 25168267 53467111		100	1		B	100 (45.4)
2,4-D salts and esters	94757	Acetic acid, (2,4-dichlorophenoxy)-, salts & esters. 2,4-D Acid	100	1,3,4	U240	B	100 (45.4)
Daunomycin	20830813	5,12-Naphthacenedione, 8-acetyl-10-[3-amino-2,3,6- trideoxy-alpha-L-lyxo-hexo-pyranosyl)oxy]-7,8,9,10- tetrahydro-6,8,11-trihydroxy-1-methoxy-, (8S-cis)-.	1*	4	U059	A	10 (4.54)
DDD	72548	Benzene, 1,1′-(2,2-dichloroethylidene)bis[4-chloro-. TDE 4,4′ DDD	1	1,2,4	U060	X	1 (0.454)
4,4′ DDD	72548	Benzene, 1,1′-(2,2-dichloroethylidene)bis[4-chloro- DDD TDE	1	1,2,4	U060	X	1 (0.454)

DDE	72559	4,4′-DDE	1*	2,3		X	1 (0.454)
4,4′-DDE	72559	DDE	1*	2,3		X	1 (0.454)
DDE [b]	3547044		1*	3		D	5000 (2270)
DDT	50293	Benzene, 1,1′-(2,2,2-trichloroethylidene)bis[4-chloro- 4,4′DDT	1	1,2,4	U061	X	1 (0.454)
4,4′DDT	50293	Benzene, 1,1′-(2,2,2-trichloroethylidene)bis[4-chloro- DDT	1	1,2,4	U061	X	1 (0.454)
DDT AND METABOLITES	N.A.		1*	2			**
DEHP	117817	1,2-Benzenedicarboxylic acid, bis(2-ethyl-hexyl) ester. Bis(2-ethylhexyl)phthalate Diethylhexyl phthalate	1*	2,3,4	U028	B	100 (45.4)
Diallate	2303164	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester.	1*	4	U062	B	100 (45.4)
Diazinon	333415		1	1		X	1 (0.454)
Diazomethane	334883		1*	3		B	100 (45.4)
Dibenz[a,h]anthracene	53703	Dibenzo[a,h]anthracene 1,2:5,6-Dibenzanthracene	1*	2,4	U063	X	1 (0.454)
1,2:5,6-Dibenzanthracene	53703	Dibenz[a,h]anthracene Dibenzo[a,h]anthracene	1*	2,4	U063	X	1 (0.454)
Dibenzo[a,h]anthracene	53703	Dibenz[a,h]anthracene ,2:5,6-Dibenzanthracene	1*	2,4	U063	X	1 (0.454)
Dibenz[a,i]pyrene	189559	Benzo[rst]pentaphene	1*	4	U064	A	10 (4.54)
Dibenzofuran	132649		1*	3		B	100 (45.4)
1,2-Dibromo-3-chloropropane	96128	Propane, 1,2-dibromo-3-chloro-	1*	3,4	U066	X	1 (0.454)
Dibromoethane	106934	Ethane, 1,2-dibromo- Ethylene dibromide	1000	1,3,4	U067	X	1 (0.454)
Dibutyl phthalate	84742	1,2-Benzenedicarboxylic acid, dibutyl ester n-Butyl phthalate Di-n-butyl phthalate	100	1,2,3,4	U069	A	10 (4.54)
Di-n-butyl phthalate	84742	1,2-Benzenedicarboxylic acid, dibutyl ester n-Butyl phthalate Dibutyl phthalate	100	1,2,3,4	U069	A	10 (4.54)
Dicamba	1918009		1000	1		C	1000 (454)
Dichlobenil	1194656		1000	1		B	100 (45.4)
Dichlone	117806		1	1		X	1 (0.454)
Dichlorobenzene	25321226		100	1		B	100 (45.4)
1,2-Dichlorobenzene	95501	Benzene, 1,2-dichloro- o-Dichlorobenzene	100	1,2,4	U070	B	100 (45.4)
1,3-Dichlorobenzene	541731	Benzene, 1,3-dichloro m-Dichlorobenzene	1*	2,4	U071	B	100 (45.4)
1,4-Dichlorobenzene	106467	Benzene, 1,4-dichloro- p-Dichlorobenzene	100	1,2,3,4	U072	B	100 (45.4)
m-Dichlorobenzene	541731	Benzene, 1,3-dichloro 1,3-Dichlorobenzene	1*	2,4	U071	B	100 (45.4)
o-Dichlorobenzene	95501	Benzene, 1,2-dichloro 1,2-Dichlorobenzene	100	1,2,4	U070	B	100 (45.4)
p-Dichlorobenzene	106467	Benzene, 1,4-dichloro- 1,4-Dichlorobenzene	100	1,2,3,4	U072	B	100 (45.4)
DICHLOROBENZIDINE	N.A.		1*	2			**
3,3′-Dichlorobenzidine	91941	[1,1′-Biphenyl]-4,4′-diamine,3,3′-dichloro-	*	2,3,4	U073	X	1 (0.454)
Dichlorobromomethane	75274		1*	2		D	5000 (2270)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste Number	Cat-egory	Pounds (Kg)
1,4-Dichloro-2-butene	764410	2-Butene, 1,4-dichloro-	1*	4	U074	X	1 (0.454)
Dichlorodifluoromethane	75718	Methane, dichlorodifluoro-	1*	4	U075	D	5000 (2270)
1,1-Dichloroethane	75343	Ethane, 1,1-dichloro-	1*	2,3,4	U076	C	1000 (454)
		Ethylidene dichloride					
1,2-Dichloroethane	107062	Ethane, 1,2-dichloro-	5000	1,2,3,4	U077	B	100 (45.4)
		Ethylene dichloride					
1,1-Dichloroethylene	75354	Ethene, 1,1-dichloro-	5000	1,2,3,4	U078	B	100 (45.4)
		Vinylidene chloride					
1,2-Dichloroethylene	156605	Ethene, 1,2-dichloro- (E)	1*	2,4	U079	C	1000 (454)
Dichloroethyl ether	111444	Bis(2-chloroethyl) ether	1*	2,3,4	U025	A	10 (4.54)
		Ethane, 1,1′-oxybis[2-chloro-					
Dichloroisopropyl ether	108601	Propane, 2,2′-oxybis[2-chloro-	1*	2,4	U027	C	1000 (454)
Dichloromethane	75092	Methane, dichoro-	1*	2,3,4	U080	C	1000 (454)
		Methylene chloride					
Dichloromethoxy ethane	111911	Bis(2-chloroethoxy) methane	1*	2,4	U024	C	1000 (454)
		Ethane, 1,1′-[methylenebis(oxy)]bis(2-chloro-					
Dichloromethyl ether	542881	Bis(chloromethyl) ether	1*	3,4	P016	A	10 (4.54)
		Methane, oxybis(chloro-					
2,4-Dichlorophenol	120832	Phenol, 2,4-dichloro-	1*	2,4	U081	B	100 (45.4)
2,6-Dichlorophenol	87650	Phenol, 2,6-dichloro-	1*	4	U082	B	100(45.4)
Dichlorophenylarsine	696286	Arsonous dichloride, phenyl-	1*	4	P036	X	1 (0.454)
Dichloropropane	26638197		5000	1		C	1000 (454)
1,1-Dichloropropane	78999						
1,3-Dichloropropane	142289						
1,2-Dichloropropane	78875	Propane, 1,2-dichloro-	5000	1,2,3,4,	U083	C	1000 (454)
		Propylene dichloride					
Dichloropropane—Dichloropropene (mixture)	8003198		5000	1		B	100 (45.4)
Dichloropropene	26952238		5000	1		B	100 (45.4)
2,3-Dichloropropene	78886						
1,3-Dichloropropene	542756	1-Propene, 1,3-dichloro-	5000	1,2,3,4	U084	B	100 (45.4)
2,2-Dichloropropionic acid	75990		5000	1		D	5000 (2270)
Dichlorvos	62737		10	1,3		A	10 (4.54)
Dicofol	115322		5000	1		A	10 (4.54)
Dieldrin	60571	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2aalpha,3beta,6beta, 6aalpha,7beta, 7aalpha)-.	1	1,2,4	P037	X	1 (0.454)
1,2:3,4-Diepoxybutane	1464535	2,2′-Bioxirane	1*	4	U085	A	10 (4.54)
Diethanolamine	111422		1*	3		B	100 (45.4)
Diethylamine	109897		1000	1		B	100 (454.4)

N,N-Diethylaniline	91667		1*	3		C	1000 (454)
Diethylarsine	692422	Arsine, diethyl-	1*	4	P038	X	1 (0.454)
1,4-Diethylenedioxide	123911	1,4-Dioxane 1,4-Diethyleneoxide	1*	3,4	U108	B	100 (45.4)
1,4-Diethyleneoxide	123911	1,4-Dioxane 1,4-Diethylenedioxide	1*	3,4	U108	B	100 (45.4)
Diethylhexyl phthalate	117817	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester. Bis(2-ethylhexyl)phthalate DEHP	1*	2,3,4	U028	B	100 (45.4)
N,N′-Diethylhydrazine	1615801	Hydrazine, 1,2-diethyl-	1*	4	U086	A	10 (4.54)
O,O-Diethyl S-methyl dithiophosphate	3288582	Phosphorodithioic acid, O,O-diethyl S-methyl ester.	1*	4	U087	D	5000 (2270)
Diethyl-p-nitrophenyl phosphate	311455	Phosphoric acid, diethyl 4-nitrophenyl ester	1*	4	P041	B	100 (45.4)
Diethyl phthalate	84662	1,2-Benzenedicarboxylic acid, diethyl ester	1*	2,4	U088	C	1000 (454)
O,O-Diethyl O-pyrazinyl phosphorothioate	297972	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester.	1*	4	P040	B	100 (45.4)
Diethylstilbestrol	56531	Phenol, 4,4′-(1,2-diethyl-1,2-ethenediyl)bis-, (E)	1*	4	U089	X	1 (0.454)
Diethyl sulfate	64675		1*	3		A	10 (4.54)
Dihydrosafrole	94586	1,3-Benzodioxole, 5-propyl-	1*	4	U090	A	10 (4.54)
Diisopropylfluorophosphate	55914	Phosphorofluoridic acid, bis(1-methylethyl) ester.	1*	4	P043	B	100 (45.4)
1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-10-hexachloro- 1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5alpha,8alpha,	309002	Aldrin	1	1,2,4	P004	X	1 (0.454)
8abeta)-1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro- 1,4,4a,5,8,8a-hexahydro, (1alpha,4alpha,4abeta,5abeta,8beta,	465736	Isodrin	1*	4	P060	X	1 (0.454)
8abeta)-2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro- 1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2aalpha,3beta,6beta,	60571	Dieldrin	1	1,2,4	P037	X	1 (0.454)
6aalpha,7beta,7aalpha)-2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octa-hydro-, (1aalpha,2beta,2abeta,3alpha,6alpha,	72208	Endrin Endrin, & metabolites	1	1,2,4	P051	X	1 (0.454)
6abeta,7beta,7aalpha)-Dimethoate	60515	Phosphorodithioic acid, O,O-dimethyl S-[2(methylamino)-2-oxoethyl] ester.	1*	4	P044	A	10 (4.54)
3,3′-Dimethoxybenzidine	119904	[1,1′-Biphenyl]-4,4′-diamine,3,3′-dimethoxy-	1*	3,4	U091	B	100 (45.4)
Dimethylamine	124403	Methanamine, N-methyl-	1000	1,4	U092	C	1000 (454)
Dimethyl aminoazobenzene	60117	Benzenamine, N,N-dimethyl-4-(phenylazo-) P-Dimethylaminoazobenzene	1*	3,4	U093	A	10 (4.54)
p-Dimethylaminoazobenzene	60117	Benzenamine, N,N-dimethyl-4-(phenylazo-) Dimethyl aminoazobenzene	1*	3,4	U093	A	10 (4.54)
N,N-Dimethylaniline	121697		1*	3		B	100 (45.4)
7,12-Dimethylbenz[a]anthracene	57976	Benz[a]anthracene, 7,12-dimethyl-	1*	4	U094	X	1 (0.454)
3,3′-Dimethylbenzidine	119937	[1,1′-Biphenyl]-4,4′-diamine,3,3′-dimethyl-	1*	3,4	U095	A	10 (4.54)
alpha,alpha-Dimethylbenzylhydroperoxide	80159	Hydroperoxide, 1-methyl-1-phenylethyl-	1*	4	U096	A	10 (4.54)
Dimethylcarbamoyl chloride	79447	Carbamic chloride, dimethyl-	1*	3,4	U097	X	1 (0.454)
Dimethylformamide	68122		1*	3		B	100 (45.4)
1,1-Dimethylhydrazine	57147	Hydrazine, 1,1-dimethyl-	1*	3,4	U098	A	10 (4.54)
1,2-Dimethylhydrazine	540738	Hydrazine, 1,2-dimethyl-	1*	4	U099	X	1 (0.454)
alpha,alpha-Dimethylphenethylamine	122098	Benzeneethanamine, alpha,alpha-dimethyl-	1*	4	P046	D	5000 (2270)
2,4-Dimethylphenol	105679	Phenol, 2,4-dimethyl-	1*	2,4	U101	B	100 (45.4)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste Number	Category	Pounds (Kg)
Dimethyl phthalate	131113	1,2-Benzenedicarboxylic acid, dimethyl ester	1*	2,3,4	U102	D	5000 (2270)
Dimethyl sulfate	77781	Sulfuric acid, dimethyl ester	1*	3,4	U103	B	100 (45.4)
Dinitrobenzene (mixed)	25154545		1000	1		B	100 (45.4)
m-Dinitrobenzene	99650						
o-Dinitrobenzene	528290						
p-Dinitrobenzene	100254						
4,6-Dinitro-o-cresol, and salts	534521	Phenol, 2-methyl-4,6-dinitro-, & salts	1*	2,3,4	P047	A	10 (4.54)
Dinitrophenol	25550587		1000	1		A	10 (4.54)
2,5-Dinitrophenol	329715						
2,6-Dinitrophenol	573568						
2,4-Dinitrophenol	51285	Phenol, 2,4-dinitro-	1000	1,2,3,4,	P048	A	10 (4.54)
Dinitrotoluene	25321146		1000	1,2		A	10 (4.54)
3,4-Dinitrotoluene	610399						
2,4-Dinitrotoluene	121142	Benzene, 1-methyl-2,4-dinitro-	1000	1,2,3,4	U105	A	10 (4.54)
2,6-Dinitrotoluene	606202	Benzene, 2-methyl-1,3-dinitro-	1000	1,2,4	U106	B	100 (45.4)
Dinoseb	88857	Phenol, 2-(1-methylpropyl)-4,6-dinitro	1*	4	P020	C	1000 (454)
Di-n-octyl phthalate	117840	1,2-Benzenedicarboxylic acid, dioctyl ester	1*	2,4	U107	D	5000 (2270)
1,4-Dioxane	123911	1,4-Diethyleneoxide 1,4-Diethlyenedioxide	1*	3,4	U108	B	100 (45.4)
DIPHENYLHYDRAZINE	N.A.		1*	2			**
1,2-Diphenyl-hydrazine	122667	Hydrazine, 1,2-diphenyl-	1*	2,3,4	U109	A	10(4.54)
Diphosphoramide, octamethyl-	152169	Octamethylpyrophosphoramide	1*	4	P085	B	100 (45.4)
Diphosphoric acid, tetraethyl ester	107493	Tetraethyl pyrophosphate	100	1,4	P111	A	10 (4.54)
Dipropylamine	142847	1-Propanamine, N-propyl-	1*	4	U110	D	5000 (2270)
Di-n-propylnitrosamine	621647	1-Propanamine, N-nitroso-N-propyl-	1*	2,4	U111	A	10 (4.54)
Diquat	85007 2764729		1000	1		C	1000 (454)
Disulfoton	298044	Phosphorodithioic acid, o,o-diethyl S-[2-(ethylthio)ethyl]ester.	1	1,4	P039	X	1 (0.454)
Dithiobiuret	541537	Thioimidodicarbonic diamide [(HG2KN) C(S)]2NH	1*	4	P049	B	100 (45.4)
1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-, O-[(methylamino)carbonyl]oxime (Tirpate).	26419738		1*	4	P185		##
Diuron	330541		100	1		B	100 (45.4)
Dodecylbenzenesulfonic acid	27176870		1000	1		C	1000 (454)
Endosulfan	115297	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide.	1	1,2,4	P050	X	1 (0.454)

alpha - Endosulfan	959988		1*	2		X	1 (0.454)
beta - Endosulfan	33213659		1*	2		X	1 (0.454)
ENDOSALFAN AND METABOLITES	N.A.		1*	2			**
Endosulfan sulfate	1031078		1*	2		X	1 (0.454)
Endothall	145733	7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid.	1*	4	P088	C	1000 (454)
Endrin	72208	Endrin, & metabolites 2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9 -hexachloro-1a,2,2a,3, 6,6a,7,7a-octa-hydro-, (1aalpha, 2beta,2abeta,3alpha,6alpha, 6abeta,7beta, 7aalpha)-	1	1,2,4	P051	X	1 (0.454)
Endrin aldehyde	7421934		1*	2		X	1 (0.454)
ENDRIN AND METABOLITES	N.A.		1*	2			**
Endrin, & metabolites	72208	Endrin 2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3, 6,6a,7,7a-octa-hydro-, (1aalpha, 2beta,2abeta,3alpha,6alpha, 6abeta,7beta, 7aalpha)-	1	1,2,4	P051	X	1 (0.454)
Epichlorohydrin	106898	1-Chloro-2,3-epoxypropane Oxirane, (chloromethyl)-	1000	1,3,4	U041	B	100(45.4)
Epinephrine	51434	1,2-Benzenediol,4-[1-hydroxy-2-(methylamino)ethyl]-.	1*	4	P042	C	1000 (454)
1,2-Epoxybutane	106887		1*	3		B	100 (45.4)
Ethanal	75070	Acetaldehyde	1000	1,3,4	U001	C	1000(454)
Ethanamine, N-ethyl-N-nitroso-	55185	N-Nitrosodiethylamine	1*	4	U174	X	1 (0.454)
1,2-Ethanediamine, N,N-dimethyl-N′-2-pyridinyl-N′-(2-thienylmethyl)-	91805	Methapyrilene	1*	4	U155	D	5000 (2270)
Ethane, 1,2-dibromo	106934	Dibromoethane Ethylene dibromide	1000	1,3,4	U067	X	1(0.454)
Ethane, 1,1-dichloro	75343	1,1-Dichloroethane Ethylidene dichloride	1*	2,3,4	U076	C	1000(454)
Ethane, 1,2-dichloro	107062	1,2-Dichloroethane Ethylene dichloride	5000	1,2,3,4	U077	B	100(45.4)
Ethanedinitrile	460195	Cyanogen	1*	4	P031	B	100 (45.4)
Ethane, hexachloro-	67721	Hexachloroethane	1*	2,3,4	U131	B	100(45.4)
Ethane, 1,1′-[methylenebis(oxy)]bis(2-chloro-	111911	Bis(2-chloroethoxy) methane Dichloromethoxy ethane	1*	2,4	U024	C	1000 (454)
Ethane, 1,1′-oxybis-	60297	Ethyl ether	1*	4	U117	B	100 (45.4)
Ethane, 1,1′-oxybis[2-chloro-	111444	Bis(2-chloroethyl) ether Dichloroethyl ether	1*	2,3,4	U025	A	10(4.54)
Ethane, pentachloro-	76017	Pentachloroethane	1*	4	U184	A	10 (4.54)
Ethane, 1,1,1,2-tetrachloro-	630206	1,1,1,2-Tetrachloroethane	1*	4	U208	B	100 (45.4)
Ethane, 1,1,2,2-tetrachloro-	79345	1,1,2,2-Tetra-chloroethane	1*	2,3,4	U209	B	100(45.4)
Ethanethioamide	62555	Thioacetamide	1*	4	U218	A	10 (4.54)
Ethane, 1,1,1-trichloro-	71556	Methyl chloroform 1,1,1-Trichloroethane	1*	2,3,4	U226	C	1000(454)
Ehane, 1,1,2-trichloro-	79005	1,1,2-Trichloroethane	1*	2,3,4	U227	B	100(45.4)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA waste Number	Category	Pounds (Kg)
Ethanimidothioci acid, 2-(dimethylamino-N-hydroxy-2-oxo-, methyl ester (A2213).	30558431		1*	4	U394		##
Ethanimidothoic acid, 2-(dimethylamino)-N-[[(methylamino)carbonyl]oxy]-2-oxo-, methyl ester (Oxamyl).	23135220		1*	4	P194		##
Ethanimidothioic acid, N-[[(methyl- amino)carbonyl]oxy]-, methyl ester	16752775	Methomyl	1*	4	P066	B	100 (45.4)
Ethanimidothioic acid, N,N′- [thiobis[(methylimino)carbonyloxy]]bis-,dimethyl ester (Thiodicarb).	59669260		1*	4	U410		##
Ethanol, 2-ethoxy-	110805	Ethylene glycol monoethyl ether	1*	4	U359	C	1000 (454)
Ethanol, 2,2′-(nitrosoimino)bis-	1116547	N-Nitrosodiethanolamine	1*	4	U173	X	1 (0.454)
Ethanol, 2,2′-oxybis-, dicarbamate (Diethylene glycol, dicarbamate)	5952261		1*	4	U395		##
Ethanone, 1-phenyl-	98862	Acetophenone	1*	3,4	U004	D	5000(2270)
Ethene, chloro-	75014	Vinyl chloride	1*	2,3,4	U043	X	1 (0.454)
Ethene, 2-chloroethoxy-	110758	2-Chloroethyl vinyl ether	1*	2,4	U042	C	1000 (454)
Ethene, 1,1-dichloro-	75354	1,1-Dichloroethylene Vinylidene chloride	5000	1,2,3,4	U078	B	100(45.4)
Ethene, 1,2-dichloro- (E)	156605	1,2-Dichloroethylene	1*	2,4	U079	C	1000 (454)
Ethene, tetrachloro-	127184	Perchloroethylene Tetrachloroethene Tetrachloroethylene	1*	2,3,4	U210	B	100(45.4)
Ethene, trichloro-	79016	Trichloroethene Trichloroethylene	1000	1,2,3,4	U228	B	100(45.4)
Ethion	563122		10	1		A	10 (4.54)
Ethyl acetate	141786	Acetic acid, ethyl ester	1*	4	U112	D	5000 (2270)
Ethyl acrylate	140885	2-Propenoic acid, ethyl ester	1*	3,4	U113	C	1000(454)
Ethylbenzene	100414		1000	1,2,3		C	1000(454)
Ethyl carbamate	51796	Carbamic acid, ethyl ester Urethane	1*	3,4	U238	B	100(45.4)
Ethyl chloride	75003	Chloroethane	1*	2,3		B	100(45.4)
Ethyl cyanide	107120	Propanenitrile	1*	4	P101	A	10 (4.54)
Ethylenebisdithiocarbamic acid, salts & esters	111546	Carbamodithioic acid, 1,2-ethanediylbis, salts & esters.	1*	4	U114	D	5000 (2270)
Ethylenediamine	107153		1000	1		D	5000 (2270)
Ethylenediamine-tetraacetic acid (EDTA)	60004		5000	1		D	5000 (2270)
Ethylene dibromide	106934	Dibromoethane Ethane, 1,2-dibromo-	1000	1,3,4	U067	X	1(0.454)
Ethylene dichloride	107062	1,2-Dichloroethane Ethane, 1,2-dichloro-	5000	1,2,3,4	U077	B	100(45.4)
Ethylene glycol	107211		1*	3		D	5000 (2270)
Ethylene glycol monoethyl ether	110805	Ethanol, 2-ethoxy-	1*	4	U359	C	1000 (454)
Ethyleneimine	151564	Aziridine	1*	3,4	P054	X	1(0.454)
Ethylene oxide	75218	Oxirane	1*	3,4	U115	A	10(4.54)

Ethylenethiourea	96457	2-Imidazolidinethione	1*	3,4	U116	A	10(4.54)
Ethyl ether	60297	Ethane, 1,1′-oxybis-	1*	4	U117	B	100 (45.4)
Ethylidene dichloride	75343	1,1-Dichloroethane Ethane, 1,1-dichloro-	*	2,3,4	U076	C	1000 (454)
Ethyl methacrylate	97632	2-Propenoic acid, 2-methyl-, ethyl ester	1*	4	U118	C	1000 (454)
Ethyl methanesulfonate	62500	Methanesulfonic acid, ethyl ester	1*	4	U119	X	1 (0.454)
Famphur	52857	Phosphorothioic acid, O,[4-[(di- methylamino) sulfonyl] phenyl] O,O-dimethyl ester.	1*	4	P097	C	1000 (454)
Ferric ammonium citrate	1185575		1000	1		C	1000 (454)
Ferric ammonium oxalate	2944674 55488874		1000	1		C	1000 (454)
Ferric chloride	7705080		1000	1		C	1000 (454)
Ferric fluoride	7783508		100	1		B	100 (45.4)
Ferric nitrate	10421484		1000	1		C	1000 (454)
Ferric sulfate	10028225		1000	1		C	1000 (454)
Ferrous ammonium sulfate	10045893		1000	1		C	1000 (454)
Ferrous chloride	7758943		100	1		B	100 (45.4)
Ferrous sulfate	7720787 7782630		1000	1		C	1000 (454)
Fine mineral fibers [c]	N.A.		1*	3			**
Fluoranthene	206440	Benzo[j,k]fluorene	1*	2,4	U120	B	100 (45.4)
Fluorene	86737		1*	2		D	5000 (2270)
Fluorine	7782414		1*	4	P056	A	10 (4.54)
Fluoroacetamide	640197	Acetamide, 2-fluoro-	1*	4	P057	B	100 (45.4)
Fluoroacetic acid, sodium salt	62748	Acetic acid, fluoro-, sodium salt	1*	4	P058	A	10 (4.54)
Formaldehyde	50000		1000	1,3,4	U122	B	100 (45.4)
Formic acid	64186		5000	1,4	U123	D	5000 (2270)
Fulminic acid, mercury(2+)salt	628864	Mercury fulminate	1*	4	P065	A	10 (4.54)
Fumaric acid	110178		5000	1		D	5000 (2270)
Furan	110009	Furfuran	1*	4	U124	B	100 (45.4)
Furan, tetrahydro-	109999	Tetrahydrofuran	1*	4	U213	C	1000 (454)
2-Furancarboxaldehyde	98011	Furfural	1000	1,4	U125	D	5000 (2270)
2,5-Furandione	108316	Maleic anhydride	5000	1,3,4	U147	D	5000 (2270)
Furfural	98011	2-Furancarboxaldehyde	1000	1,4	U125	D	5000 (2270)
Furfuran	110009	Furan	1*	4	U124	B	100 (45.4)
Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-	18883664	D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl]amino] Streptozotocin.	1*	4	U206	X	1 (0.454)
D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl]amino]-	18883664	Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-. Streptozotocin	1*	4	U206	X	1 (0.454)
Glycidylaldehyde	765344	Oxiranecarboxyaldehyde	1*	4	U126	A	10 (4.54)
Glycol ethers [d]	N.A.		1*	3			**
Guanidine, N-methyl-N′-nitro-N-nitroso-	70257	MNNG	1*	4	U163	A	10 (4.54)
Guthion	86500		1	1		X	1 (0.454)
HALOETHERS	N.A.		1*	2			**
HALOMETHANES	N.A.		1*	2			**
Heptachlor	76448	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-	1	1,2,3,4	P059	X	1, (0.454)
HEPTACHLOR AND METABOLITES	N.A.		1*	2			**
Heptachlor epoxide	1024573		1*	2		X	1 (0.454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste Number	Category	Pounds (Kg)
Hexachlorobenzene	118741	Benzene, hexachloro-	1*	2,3,4	U127	A	10 (4.54)
Hexachlorobutadiene	87683	1,3-Butadiene 1,1,2,3,4,4-hexachloro-	1*	2,3,4	U128	X	1 (0.454)
HEXACHLOROCYCLOHEXANE (all isomers)	608731		1*	2			**
Hexachlorocyclohexane (gamma isomer)	58899	γ-BHC	1	1,2,3,4	U129	X	1 (0.454)
		Cyclohexane, 1,2,3,4,5,6- hexachloro-(1α,2α,3β,4α, 5α,6β)-					
		Lindane					
		Lindane (all isomers)					
Hexachlorocyclopentadiene	77474	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	1	1,2,3,4	U130	A	10 (4.54)
Hexachloroethane	67721	Ethane, hexachloro-	1*	2,3,4	U131	B	100 (45.4)
Hexachlorophene	70304	Phenol, 2,2′-methylenebis[3,4,6-trichloro-	1*	4	U132	B	100 (45.4)
Hexachloropropene	1888717	1-Propene, 1,1,2,3,3,3-hexachloro-	1*	4	U243	C	1000 (454)
Hexaethyl tetraphosphate	757584	Tetraphosphoric acid, hexaethyl ester	1*	4	P062	B	100 (45.4)
Hexamethylene-1,6-diisocyanate	822060		1*	3		B	100 (45.4)
Hexamethylphosphoramide	680319		1*	3		X	1 (0.454)
Hexane	110543		1*	3		D	5000 (2270)
Hexone	108101	Methyl isobutyl ketone	1*	3,4	U161	D	5000 (2270)
		4-Methyl-2-pentanone					
Hydrazine	302012		1*	3,4	U133	X	1 (0.454)
Hydrazine, 1,2-diethyl-	1615801	N,N′-Diethylhydrazine	1*	4	U086	A	10 (4.54)
Hydrazine, 1,1-dimethyl-	57147	1,1-Dimethylhydrazine	1*	3,4	U098	A	10 (4.54)
Hydrazine, 1,2-dimethyl-	540738	1,2-Dimethylhydrazine	1*	4	U099	X	1 (0.454)
Hydrazine, 1,2-diphenyl-	122667	1,2-Diphenylhydrazine	1*	2,3,4	U109	A	10 (4.54)
Hydrazine, methyl-	60344	Methyl hydrazine	1*	3,4	P068	A	10 (4.54)
Hydrazinecarbothioamide	79196	Thiosemicarbazide	1*	4	P116	B	100 (45.4)
Hydrochloric acid	7647010	Hydrogen chloride	5000	1,3		D	5000 (2270)
Hydrocyanic acid	74908	Hydrogen cyanide	10	1,4	P063	A	10 (4.54)
Hydrofluoric acid	7664393	Hydrogen fluoride	5000	1,3,4	U134	B	100 (45.4)
Hydrogen chloride	7647010	Hydrochloric acid	5000	1,3		D	5000 (2270)
Hydrogen cyanide	74908	Hydrocyanic acid	10	1,4	P063	A	10 (4.54)
Hydrogen fluoride	7664393	Hydrofluoric acid	5000	1,3,4	U134	B	100 (45.4)
Hydrogen phosphide	7803512	Phosphine	1*	3,4	P096	B	100 (45.4)
Hydrogen sulfide	7783064	Hydrogen sulfide H_2 S	100	1,4	U135	B	100 (45.4)
Hydrogen sulfide H_2 S	7783064	Hydrogen sulfide	100	1,4	U135	B	100 (45.4)
Hydroperoxide, 1-methyl-1-phenylethyl-	80159	alpha,alpha-Dimethylbenzylhydroperoxide	1*	4	U096	A	10 (4.54)
Hydroquinone	123319		1*	3		B	100 (45.4)
2-Imidazolidinethione	96457	Ethylenethiourea	1*	3,4	U116	A	10 (4.54)
Indeno(1,2,3-cd)pyrene	193395	1,10-(1,2-Phenylene)pyrene	1*	2,4	U137	B	100 (45.4)
Iodomethane	74884	Methane, iodo-	1*	3,4	U138	B	100 (45.4)
		Methyl iodide					
1,3-Isobenzofurandione	85449	Phthalic anhydride	1*	3,4	U190	D	5000 (2270)

Isobutyl alcohol	78831	1-Propanol, 2-methyl-	1*	4	U140	D	5000 (2270)
Isodrin	465736	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro, (1alpha,4alpha,4abeta,5beta, 8beta,8abeta)-.	1*	4	P060	X	1 (0.454)
Isophorone	78591		1*	2,3		D	5000 (2270)
Isoprene	78795		1000	1		B	100 (45.4)
Isopropanolamine dodecylbenzenesulfonate	42504461		1000	1		C	1000 (454)
Isosafrole	120581	1,3-Benzodioxole, 5-)1-propenyl)-	1*	4	U141	B	100 (45.4)
3(2H)-Isoxazolone, 5-(aminomethyl)-	2763964	Muscimol 5-(Aminomethyl)-3-isoxazolol	1*	4	P007	C	1000 (454)
Kepone	143500	1,3,4-Metheno-2H-cyclobutal[cd]pentalen-2-one, 1,1a,3,3a,4,5,5,5a,5b,6-decachloroctahydro-.	1	1,4	U142	X	1 (0.454)
Lasiocarpine	303344	2-Butenoic acid, 2-methyl-, 7[[2,3-dihydroxy-2-(1-methoxyethyl)-3-methyl-1-oxobutoxy]methyl]-2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl ester, [1S-[1alpha(Z), 7(2S*,3R*),7aalpha]]-.	1*	4	U143	A	10 (4.54)
Lead††	7439921		1*	2		A	10 (4.54)
Lead acetate	301042	Acetic acid, lead(2+) salt	5000	1,4	U144	A	10 (4.54)
LEAD AND COMPOUNDS	N.A.	Lead Compounds	1*	2,3			**
Lead Compounds	N.A.	LEAD AND COMPOUNDS	1*	2,3			**
Lead arsenate	7784409 7645252 10102484		5000	1		X	1 (0.454)
Lead, bis(acetatato-O)tetrahydroxytri-	1335326	Lead subacetate	1*	4	U146	A	10 (4.54)
Lead chloride	7758954		5000	1		A	10 (4.54)
Lead fluoborate	13814965		5000	1		A	10 (4.54)
Lead fluoride	7783462		1000	1		A	10 (4.54)
Leod iodide	10101630		5000	1		A	10 (4.54)
Lead nitrate	10099748		5000	1		A	10 (4.54)
Lead phosphate	7446277	Phosphoric acid, lead(2+) salt (2:3)	1*	4	U145	A	10 (4.54)
Lead stearate	1072351 7428480 52652592 56189094		5000	1		A	10 (4.54)
Lead subacetate	1335326	Lead, bis(acetato-O)tetrahydroxytri-	1*	4	U146	A	10 (4.54)
Lead sulfate	7446142 15739807		5000	1		A	10 (4.54)
Lead sulfide	1314870		5000	1		A	10 (4.54)
Lead thiocyanate	592870		5000	1		A	10 (4.54)
Lindane	58899	γ-BHC Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α, 3β,4α,5α,6β)-, Hexachlorocyclo-hexane (gamma isomer) Lindane (all isomers)	1	1,2,3,4	U129	X	1 (0.454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste Number	Category	Pounds (Kg)
Lindane (all isomers)	58899	γ-BHC Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3β,4α,5α,6β)-, Hexachlorocyclohexane (gamma isomer) Lindane	1	1,2,3,4	U129	X	1 (0.454)
Lithium chromate	14307358		1000	1		A	10 (4.54)
Malathion	121755		10	1		B	100 (45.4)
Maleic acid	110167		5000	1		D	5000 (2270)
Maleic anhydride	108316	2,5-Furandione	5000	1,3,4	U147	D	5000 (2270)
Maleic hydrazide	123331	3,6-Pyridazinedione, 1,2-dihydro-	1*	4	U148	D	5000 (2270)
Malononitrile	109773	Propanedinitrile	1*	4	U149	C	1000 (454)
Manganese, bis(dimethylcarbamodithioato-S,S′)-(Manganese dimethyldithiocarbamate).	15339363		1*	4	P196		##
Manganese Compounds	N.A.		1*	3			**
MDI	101688	Methylene diphenyl diisocyanate	1*	3		D	5000 (2270)
Melphalan	148823	L-Phenylalanine, 4-[bis(2-chloroethyl) aminol]	1*	4	U150	X	1 (0.454)
MEK	78933	2-Butanone Methyl ethyl ketone	1*	3,4	U159	D	5000 (2270)
Mercaptodimethur	2032657		100	1		A	10 (4.54)
Mercuric cyanide	592041		1	1		X	1 (0.454)
Mercuric nitrate	10045940		10	1		A	10 (4.54)
Mercuric sulfate	7783359		10	1		A	10 (4.54)
Mercuric thiocyanate	592858		10	1		A	10 (4.54)
Mercurous nitrate	10415755 7782867		10	1		A	10 (4.54)
Mercury	7439976		1*	2,3,4	U151	X	1 (0.454)
MERCURY AND COMPOUNDS	N.A.	Mercury Compounds	1*	2,3			**
Mercury Compounds	N.A.	MERCURY AND COMPOUNDS	1*	2,3			**
Mercury, (acetate-O)phenyl-	62384	Phenylmercury acetate	1*	4	P092	B	100 (45.4)
Mercury fulminate	628864	Fulminic acid, mercury(2+)salt	1*	4	P065	A	10 (4.54)
Methacrylonitrile	126987	2-Propenenitrile, 2-methyl-	1*	4	U152	C	1000 (454)
Methanamine, N-methyl-	124403	Dimethylamine	1000	1,4	U092	C	1000 (454)
Methanamine, N-methyl-N-nitroso-	62759	N-Nitrosodimethylamine	1*	2,3,4	P082	A	10 (4.54)
Methane, bromo-	74839	Bromomethane Methyl bromide	1*	2,3,4	U029	C	1000 (454)
Methane, chloro-	74873	Chloromethane Methyl chloride	1*	2,3,4	U045	B	100 (45.4)
Methane, chloromethoxy-	107302	Chloromethyl methyl ether	1*	3,4	U046	A	10 (4.54)
Methane, dibromo-	74953	Methylene bromide	1*	4	U068	C	1000 (454)

Methane, dichloro-	75092	Methylene chloride Dichloromethane	1*	2,3,4	U080	C	1000 (454)
Methane, dichlorodifluoro-	75718	Dichlorodifluoromethane	1*	4	U075	D	5000 (2270)
Methane, iodo-	74884	Iodomethane Methyl iodide	1*	3,4	U138	B	100 (45.4)
Methane, isocyanato-	624839	Methyl isocyanate	1*	3,4	P064	A	10 (4.54)
Methane, oxybis(chloro-	542881	Bis(chloromethyl)ether Dichloromethyl ether	1*	3,4	P016	A	10 (4.54)
Methanesulfenyl chloride, trichloro-	594423	Trichloromethanesulfenyl chloride	1*	4	P118	B	100 (45.4)
Methanesulfonic acid, ethyl ester	62500	Ethyl methanesulfonate	1*	4	U119	X	1 (0.454)
Methane, tetrachloro-	56235	Carbon tetrachloride	5000	1,2,3,4	U211	A	10 (4.54)
Methane, tetranitro-	509148	Tetranitromethane	1*	4	P112	A	10 (4.54)
Methane, tribromo-	75252	Bromoform	1*	2,3,4	U225	B	100 (45.4)
Methane, trichloro-	67663	Chloroform	5000	1,2,3,4	U044	A	10 (4.54)
Methane, trichlorofluoro-	75694	Trichloromonofluoromethane	1*	4	U121	D	5000 (2270)
Methanethiol	74931	Methylmercaptan Thiomethanol	100	1,4	U153	B	100 (45.4)
Methanimidamide, N,N-dimethyl-N′-[3-[[(methylamino)carbonyl]oxylphenyl]-, monohydrochioride (Formetanate hydrochloride).	23422539		1*	4	P198		##
Methanimidamide, N,N-dimethyl-N′-[2-methyl-4-[[(methylamino)carbonyl]oxy]phenyl]-(Formparanate).	17702577		1*	4	P197		##
6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a- hexahydro-, 3-oxide	115297	Endosulfan	1	1,2,4	P050	X	1 (0.454)
1,3,4-Metheno-2H-cyclobutal[cd]pentalen-2-one, 1,1a,3,3a,4,5,5,5a,5b,6-decachloroctahydro-	143500	Kepone	1	1,4	U142	X	1 (0.454)
4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-	76448	Heptachlor	1*	1,2,3,4	P059	X	1 (0.454)
4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-.	57749	Chlordane Chlordane, alpha & gamma isomers CHLORDANE (TECHNICAL MIXTURE AND METABOLITES)	1	1,2,3,4	U036	X	1 (0.454)
Methanol	67561	Methyl alcohol	1*	3,4	U154	D	5000 (2270)
Methapyrilene	91805	1,2-Ethanediamine, N,N-dimethyl-N′-2-pyridinyl-N′-(2-thienylmethyl)-.	1*	4	U155	D	5000 (2270)
Methomyl	16752775	Ethanimidothioic acid, N-[[(methyl-amino)carbonyl]oxy]-, methyl ester.	1*	4	P066	B	100 (45.4)
Methoxychlor	72435	Benzene, 1,1′-(2,2,2-trichloroethyl-idene)bis[4-methoxy-	1	1,3,4	U247	X	1 (0.454)
Methyl alcohol	67561	Methanol	1*	3,4	U154	D	5000 (2270)
2-Methyl aziridine	75558	Aziridine, 2-methyl- 1,2-Propylenimine	1*	3,4	P067	X	1 (0.454)
Methyl bromide	74839	Bromomethane Methane, bromo-	1*	2,3,4	U029	C	1000 (454)
1-Methylbutadiene	504609	1,3-Pentadiene	1*	4	U186	B	100 (45.4)
Methyl chloride	74873	Chloromethane Methane, chloro-	1*	2,3,4	U045	B	100 (45.4)
Methyl chlorocarbonate	79221	Carbonochloridic acid, methyl ester Methyl chloroformate	1*	4	U156	C	1000 (454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste Number	Category	Pounds (Kg)
Methyl chloroform	71556	Ethane, 1,1,1,-trichloro- 1,1,1-Trichloroethane	1*	2,3,4	U226	C	1000 (454)
Methyl chloroformate	79221	Carbonochloridic acid, methyl ester Methyl chlorocarbonate	1*	4	U156	C	1000 (454)
3-Methylcholanthrene	56495	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	1*	4	U157	A	10 (4.54)
4,4′-Methylenebis(2-chloroaniline)	101144	Benzenamine, 4,4′-methylene-bis(2-chloro-	1*	3,4	U158	A	10 (4.54)
Methylene bromide	74953	Methane, dibromo-	1*	4	U068	C	1000 (454)
Methylene chloride	75092	Dichloromethane Methane, dichloro-	1*	2,3,4	U080	C	1000 (454)
4,4′-Methylenedianiline	101779		1*	3		A	10 (4.54)
Methylene diphenyl diisocyanate	101688	MDI	1*	3		D	5000 (2270)
Methyl ethyl ketone	78933	2-Butanone MEK	1*	3,4	U159	D	5000 (2270)
Methyl ethyl ketone peroxide	1338234	2-Butanone peroxide	1*	4	U160	A	10 (4.54)
Methyl hydrazine	60344	Hydrazine, methyl-	1*	3,4	P068	A	10 (4.54)
Methyl iodide	74884	Iodomethane Methane, iodo-	1*	3,4	U138	B	100 (45.4)
Methyl isobutyl ketone	108101	Hexone 4-Methyl-2-pentanone	1*	3,4	U161	D	5000 (2270)
Methyl isocyanate	624839	Methane, isocyanato-	1*	3,4	P064	A	10 (4.54)
2-Methyllactonitrile	75865	Acetone cyanohydrin Propanenitrile, 2-hydroxy-2-methyl-	10	1,4	P069	A	10 (4.54)
Methylmercaptan	74931	Methanethiol Thiomethanol	100	1,4	U153	B	100 (45.4)
Methyl methacrylate	80626	2-Propenoic acid, 2-methyl-, methyl ester	5000	1,3,4	U162	C	1000 (454)
Methyl parathion	298000	Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester.	100	1,4	P071	B	100 (45.4)
4-Methyl-2-pentanone	108101	Hexone Methyl isobutyl ketone	1*	3,4	U161	D	5000 (2270)
Methyl tert-butyl ether	1634044		1*	3		C	1000 (454)
Methylthiouracil	56042	4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-.	1*	4	U164	A	10 (4.54)
Mevinphos	7786347		1	1		A	10 (4.54)
Mexacarbate	315184		1000	1		C	1000 (454)
Mitomycin C	50077	Azirino[2′,3′:3,4]pyrrolo[1,2-a]indole-4,7-dione,6-amino-8-[[(aminocarbonyl)oxy] methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-, [1aS-(1aalpha, 8beta, 8aalpha, 8balpha)]-.	1*	4	U010	A	10 (4.54)
MNNG	70257	Guanidine, N-methyl-N′-nitro-N-nitroso-	1*	4	U163	A	10 (4.54)
Monoethylamine	75047		1000	1		B	100 (45.4)

Monomethylamine	74895		1000	1		B	100 (45.4)
Multi Source Leachate			1*	4	F039	X	1 (0.454)
Muscimol	2763964	3(2H)-Isoxazolone, 5-(aminomethyl)- 5-(Aminomethyl)-3-isoxazolol.	1*	4	P007	C	1000 (454)
Naled	300765		10	1		A	10 (4.54)
5,12-Naphthacenedione, 8-acetyl-10-[3-amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-, (8S-cis)-	20830813	Daunomycin	1*	4	U059	A	10 (4.54)
1-Naphthalenamine	134327	alpha-Naphthylamine	1*	4	U167	B	100 (45.4)
2-Naphthalenamine	91598	beta-Naphthylamine	1*	4	U168	A	10 (4.54)
Naphthalenamine, N,N′-bis(2-chloroethyl)-	494031	Chlornaphazine	1*	4	U026	B	100 (45.4)
Naphthalene	91203		5000	1,2,3,4	U165	B	100 (45.4)
Naphthalene, 2-chloro-	91587	beta-Chloronaphthalene 2-Chloronaphthalene	1*	2,4	U047	D	5000 (2270)
1,4-Naphthalenedione	130154	1,4-Naphthoquinone	1*	4	U166	D	5000 (2270)
2,7-Naphthalenedisulfonic acid, 3,3′-[(3,3′-dimethyl-(1,1′-biphenyl)-4,4′-diyl)-bis(azo)]bis(5-amino-4-hydroxy)-tetrasodium salt.	72571	Trypan blue	1*	4	U236	A	10 (4.54)
Naphthenic acid	1338245		100	1		B	100 (45.4)
1,4-Naphthoquinone	130154	1,4-Naphthalenedione	1*	4	U166	D	5000 (2270)
alpha-Naphthylamine	134327	1-Naphthalenamine	1*	4	U167	B	100 (45.4)
beta-Naphthylamine	91598	2-Naphthalenamine	1*	4	U168	A	10 (4.54)
alpha-Naphthylthiourea	86884	Thiourea, 1-naphthalenyl-	1*	4	P072	B	100 (45.4)
Nickel ††	7440020		1*	2		B	100 (45.4)
Nickel ammonium sulfate	15699180		5000	1		B	100 (45.4)
NICKEL AND COMPOUNDS	N.A.	Nickel Compounds	1*	2,3			**
Nickel Compounds	N.A.	NICKEL AND COMPOUNDS	1*	2,3			**
Nickel carbonyl	13463393	Nickel carbonyl Ni(CO)4, (T-4)-	1*	4	P073	A	10 (4.54)
Nickel carbonyl Ni(CO)4, (T-4)-	13463393	Nickel carbonyl	1*	4	P073	A	10 (4.54)
Nickel chloride	7718549 37211055		5000	1		B	100 (45.4)
Nickel cyanide	557197	Nickel cyanide Ni(CN)2	1*	4	P074	A	10 (4.54)
Nickel cyanide Ni(CN)2	557197	Nickel cyanide	1*	4	P074	A	10 (4.54)
Nickel hydroxide	12054487		1000	1		A	10 (4.54)
Nickel nitrate	14216752		5000	1		B	100 (45.4)
Nickel sulfate	7786814		5000	1		B	100 (45.4)
Nicotine, & salts	54115	Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)-	1*	4	P075	B	100 (45.4)
Nitric acid	7697372		1000	1		C	1000 (454)
Nitric acid, thallium (1+) salt	10102451	Thallium (I) nitrate	1*	4	U217	B	100 (45.4)
Nitric oxide	10102439	Nitrogen oxide NO	1*	4	P076	A	10 (4.54)
p-Nitroaniline	100016	Benzenamine, 4-nitro-	1*	4	P077	D	5000 (2270)
Nitrobenzene	98953	Benzene, nitro-	1000	1,2,3,4	U169	C	1000 (454)
4-Nitrobiphenyl	92933		1*	3		A	10 (4.54)
Nitrogen dioxide	10102440 10544726	Nitrogen oxide NO_2	1000	1,4	P078	A	10 (4.54)
Nitrogen oxide NO	10102439	Nitric oxide	1*	4	P076	A	10 (4.54)
Nitrogen oxide NO_2	10102440 10544726	Nitrogen dioxide	1000	1,4	P078	A	10 (4.54)
Nitroglycerine	55630	1,2,3-Propanetriol, trinitrate-	1*	4	P081	A	10 (4.54)
Nitrophenol (mixed)	25154556		1000	1		B	100 (45.4)
m-Nitrophenol	554847		....	....		B	100 (45.4)
o-Nitrophenol	88755	2-Nitrophenol	....	....			....

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste Number	Category	Pounds (Kg)
p-Nitrophenol	100027	4-Nitrophenol Phenol, 4-nitro-	1000	1,2,3,4	U170	B	100 (45.4)
o-Nitrophenol	88755	2-Nitrophenol	1000	1,2		B	100 (45.4)
p-Nitrophenol	100027	Phenol, 4-nitro- 4-Nitrophenol	1000	1,2,4	U170	B	100 (45.4)
2-Nitrophenol	88755	o-Nitrophenol	1000	1,2		B	100 (45.4)
4-Nitrophenol	100027	p-Nitrophenol Phenol, 4-nitro-	1000	1,2,3,4	U170	B	100 (45.4)
NITROPHENOLS	N.A.		1*	2			**
2-Nitropropane	79469	Propane, 2-nitro	1*	3,4	U171	A	10 (4.54)
NITROSAMINES	N.A.		1*	2			**
N-Nitrosodi-n-butylamine	924163	1-Butanamine, N-butyl-N-nitroso-	1*	4	U172	A	10 (4.54)
N-Nitrosodiethanolamine	1116547	Ethanol, 2,2′-(nitrosoimino)bis-	1*	4	U173	X	1 (0.454)
N-Nitrosodiethylamine	55185	Ethanamine, N-ethyl-N-nitroso-	1*	4	U174	X	1 (0.454)
N-Nitrosodimethylamine	62759	Methanamine, N-methyl-N-nitroso-	1*	2,3,4	P082	A	10 (4.54)
N-Nitrosodiphenylamine	86306		1*	2		B	100 (45.4)
N-Nitroso-N-ethylurea	759739	Urea, N-ethyl-N-nitroso-	1*	4	U176	X	1 (0.454)
N-Nitroso-N-methylurea	684935	Urea, N-methyl-N-nitroso	1*	3,4	U177	X	1 (0.454)
N-Nitroso-N-methylurethane	615532	Carbamic acid, methylnitroso-, ethyl ester	1*	4	U178	X	1 (0.454)
N-Nitrosomethylvinylamine	4549400	Vinylamine, N-methyl-N-nitroso-	1*	4	P084	A	10 (4.54)
N-Nitrosomorpholine	59892		1*	3		X	1 (0.454)
N-Nitrosopiperidine	100754	Piperidine, 1-nitroso-	1*	4	U179	A	10 (4.54)
N-Nitrosopyrrolidine	930552	Pyrrolidine, 1-nitroso-	1*	4	U180	X	1 (0.454)
Nitrotoluene	1321126		1000	1		C	1000 (454)
m-Nitrotoluene	99081						
o-Nitrotoluene	88722						
p-Nitrotoluene	99990						
5-Nitro-o-toluidine	99558	Benzenamine, 2-methyl-5-nitro-	1*	4	U181	B	100 (45.4)
Octamethylpyrophosphoramide	152169	Diphosphoramide, octamethyl-	1*	4	P085	B	100 (45.4)
Osmium oxide OsO_4 (T-4)-	20816120	Osmium tetroxide	1*	4	P087	C	1000 (454)
Osmium tetroxide	20816120	Osmium oxide OsO_4 (T-4)-	1*	4	P087	C	1000 (454)
7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid	145733	Endothall	1*	4	P088	C	1000 (454)
1.2-Oxathiolane, 2,2-dioxide	1120714	1,3-Propane sultone	1*	3,4	U193	A	10 (4.54)
2H-1,3,2-Oxazaphosphorin-2-amine, N,N-bis(2-chloroethyl)tetrahydro-, 2-oxide	50180	Cyclophosphamide	1*	4	U058	A	10 (4.54)
Oxirane	75218	Ethylene oxide	1*	3,4	U115	A	10 (4.54)
Oxiranecarboxyaldehyde	765344	Glycidylaldehyde	1*	4	U126	A	10 (4.54)
Oxirane, (chloromethyl)-	106898	1-Chloro-2,3-epoxypropane Epichlorohydrin	1000	1,3,4	U041	B	100 (45.4)
Paraformaldehyde	30525894		1000	1		C	1000 (454)
Paraldehyde	123637	1,3,5-Trioxane, 2,4,6-trimethyl-	1*	4	U182	C	1000 (454)

Parathion	56382	Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester.	1	1,3,4	P089	A	10 (4.54)
PCBs	1336363	Aroclors POLYCHLORINATED BIPHENYLS	10	1,2,3		X	1 (0.454)
Aroclor 1016	12674112		10	1,2,3		X	1 (0.454)
Aroclor 1221	11104282		10	1,2,3		X	1 (0.454)
Aroclor 1232	11141165		10	1,2,3		X	1 (0.454)
Aroclor 1242	53469219		10	1,2,3		X	1 (0.454)
Aroclor 1248	12672296		10	1,2,3		X	1 (0.454)
Aroclor 1254	11097691		10	1,2,3		X	1 (0.454)
Aroclor 1260	11096825		10	1,2,3		X	1 (0.454)
PCNB	82688	Benzene, pentachloronitro- Pentachloronitro- benzene Quintobenzene	1*	3,4	U185	B	100 (45.4)
Pentachlorobenzene	608935	Benzene, pentachloro-	1*	4	U183	A	10 (4.54)
Pentachloroethane	76017	Ethane, pentachloro-	1*	4	U184	A	10 (4.54)
Pentachloronitrobenzene	82688	Benzene, pentachloronitro- PCNB Quintobenzene	1*	3,4	U185	B	100 (45.4)
Pentachlorophenol	87865	Phenol, pentachloro-	10	1,2,3,4	U242	A	10 (4.54)
1,3-Pentadiene	504609	1-Methylbutadiene	1*	4	U186	B	100 (45.4)
Perchloroethylene	127184	Ethene, tetrachloro- Tetrachloroethene Tetrachloroethylene	1*	2,3,4	U210	B	100 (45.4)
Phenacetin	62442	Acetamide, N-(4-ethoxyphenyl)-	1*	4	U187	B	100 (45.4)
Phenanthrene	85018		1*	2		D	5000 (2270)
Phenol	108952	Benzene, hydroxy-	1000	1,2,3,4	U188	C	1000 (454)
Phenol, 2-chloro-	95578	o-Chlorophenol 2-Chlorophenol	1*	2,4	U048	B	100 (45.4)
Phenol, 4-chloro-3-methyl-.	59507	p-Chloro-m-cresol 4-Chloro-m-cresol	1*	2,4	U039	D	5000 (2270)
Phenol, 2-cyclohexyl-4,6-dinitro-	131895	2-Cyclohexyl-4,6-dinitrophenol	1*	4	P034	B	100 (45.4)
Phenol, 2,4-dichloro-	120832	2,4-Dichlorophenol	1*	2,4	U081	B	100 (45.4)
Phenol, 2,6-dichloro-	87650	2,6-Dichlorophenol	1*	4	U082	B	100 (45.4)
Phenol, 4,4′-(1,2-diethyl-1,2-ethenediyl)bis-, (E)	56531	Diethylstilbestrol	1*	4	U089	X	1 (0.454)
Phenol, 2,4-dimethyl-	105679	2,4-Dimethylphenol	1*	2,4	U101	B	100(45.4)
Phenol, 2,4-dinitro-	51285	2,4-Dinitrophenol	1000	1,2,3,4	P048	A	10 (4.54)
Phenol, methyl-	1319773	Cresols (isomers and mixture) Cresylic acid (isomers and mixture)	1000	1,3,4	U052	B	100 (45.4)
Phenol, 2-methyl-4,6-dinitro-, & salts	534521	4,6-Dinitro-o-cresol, and salts	1*	2,3,4	P047	A	10 (4.54)
Phenol, 2,2′-methylenebis[3,4,6-trichloro-	70304	Hexachlorophene	1*	4	U132	B	100 (45.4)
Phenol, 3-(1-methylethyl)-, methyl carbamate (m-Cumenyl methylcarbamate).	64006		1*	4	P202		##
Phenol, 2-(1-methylpropyl)-4,6-dinitro	88857	Dinoseb	1*	4	P020	C	1000 (454)
Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate (Promecarb)	2631370		1*	4	P201		##
Phenol, 4-nitro-	100027	p-Nitrophenol 4-Nitrophenol	1000	1,2,3,4	U170	B	100 (45.4)
Phenol, pentachloro	87865	Pentachlorophenol	10	1,2,3,4	U242	A	10 (4.54)
Phenol, 2,3,4,6-tetrachloro-	58902	2,3,4,6-Tetrachlorophenol	1*	4	U212	A	10 (4.54)
Phenol, 2,4,5-trichloro-	95954	2-4,5-Trichlorophenol	10	1,3,4	U230	A	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste Number	Cat-egory	Pounds (Kg)
Phenol, 2,4,6-trichloro-	88062	2,4,6-Trichlorophenol	10	1,2,3,4	U231	A	10 (4.54)
Phenol, 2,4,6-trinitro-, ammonium salt	131748	Ammonium picrate	1*	4	P009	A	10 (4.54)
L-Phenylalanine, 4-[bis(2-chloroethyl) aminol]	148823	Melphalan	1*	4	U150	X	1 (0.454)
p-Phenylenediamine	106503		1*	3		D	5000 (2270)
1,10-(1,2-Phenylene)pyrene	193395	Indeno(1,2,3-cd)pyrene	1*	2,4	U137	B	100 (45.4)
Phenylmercury acetate	62384	Mercury, (acetato-O)phenyl-	1*	4	P092	B	100 (45.4)
Phenylthiourea	103855	Thiourea, phenyl-	1*	4	P093	B	100 (45.4)
Phorate	298022	Phosphorodithioic acid, O,O-diethyl S-(ethylthio), methyl ester.	1*	4	P094	A	10 (4.54)
Phosgene	75445	Carbonic dichloride	5000	1,3,4	P095	A	10 (4.54)
Phosphine	7803512	Hydrogen phosphide	1*	3,4	P096	B	100 (45.4)
Phosphoric acid	7664382		5000	1		D	5000 (2270)
Phosphoric acid, diethyl 4-nitrophenyl ester	311455	Diethyl-p-nitrophenyl phosphate	1*	4	P041	B	100 (45.4)
Phosphoric acid, lead(2+) salt (2:3)	7446277	Lead phosphate	1*	4	U145	A	10 (4.54)
Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl]ester	298044	Disulfoton	1	1,4	P039	X	1 (0.454)
Phosphorodithioic acid, O,O-diethyl S-(ethylthio), methyl ester	298022	Phorate	1*	4	P094	A	10 (4.54)
Phosphorodithioic acid, O,O-diethyl S-methyl ester	3288582	O,O-Diethyl S-methyl dithiophosphate	1*	4	U087	D	5000 (2270)
Phosphorodithioic acid, O,O-dimethyl S-[2(methylamino)-2-oxoethyl] ester	60515	Dimethoate	1*	4	P044	A	10 (4.54)
Phosphorofluoridic acid, bis(1-methylethyl) ester	55914	Diisopropylfluorophosphate	1*	4	P043	B	100 (45.4)
Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester	56382	Parathion	1	1,3,4	P089	A	10 (4.54)
Phosphorothioic acid, O,[4-[(dimethylamino) sulfonyl]phenyl]O,O-dimethyl ester	52857	Famphur	1*	4	P097	C	1000 (454)
Phosphorothioic acid, O,O-dimethyl O-(4- nitrophenyl) ester	298000	Methyl parathion	100	1,4	P071	B	100 (45.4)
Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	297972	O,O-Diethyl O-pyrazinyl phosphorothioate	1*	4	P040	B	100 (45.4)
Phosphorus	7723140		1	1,3		X	1 (0.454)
Phosphrous oxycloride	10025873		5000	1		C	1000 (454)
Phosphorus pentasulfide	1314803	Phosphorus sulfide Sulfur phosphide	100	1,4	U189	B	100 (45.4)
Phosphorus sulfide	1314803	Phosphorus pentasulfide Sulfur phosphide	100	1,4	U189	B	100 (45.4)
Phosphorus trichloride	7719122		5000	1		C	1000 (454)
PHTHALATE ESTERS	N.A.		1*	2			**
Phthalic anhydride	85449	1,3-Isobenzofurandione	1*	3,4	U190	D	5000 (2270)
2-Picoline	109068	Pyridine, 2-methyl-	1*	4	U191	D	5000 (2270)
Piperidine, 1-nitroso-	100754	N-Nitrosopiperidine	1*	4	U179	A	10 (4.54)
Plumbane, tetraethyl-	78002	Tetraethyl lead	100	1,4	P110	A	10 (4.54)
POLYCHLORINATED BIPHENYLS	1336363	Aroclors PCBs	10	1,2,3		X	1 (0.454)
Aroclor 1016	12674112		10	1,2,3		X	1 (0.454)
Aroclor 1221	11104282		10	1,2,3		X	1 (0.454)
Aroclor 1232	11141165		10	1,2,3		X	1 (0.454)
Aroclor 1242	53469219		10	1,2,3		X	1 (0.454)

Aroclor 1248	12672296		10	1,2,3		X	1 (0.454)
Aroclor 1254	11097691		10	1,2,3		X	1 (0.454)
Aroclor 1260	11096825		10	1,2,3		X	1 (0.454)
Polycyclic Organic Matter [e]	N.A.		1*	3			**
POLYNUCLEAR AROMATIC HYDROCARBONS	N.A.		1*	2			**
Potassium arsenate	7784410		1000	1		X	1 (0.454)
Potassium arsenite	10124502		1000	1		X	1 (0.454)
Potassium bichromate	7778509		1000	1		A	10 (4.54)
Potassium chromate	7789006		1000	1		A	10 (4.54)
Potassium cyanide	151508	Potassium cyanide K (CN)	10	1,4	P098	A	10 (4.54)
Potassium cyanide K(CN)	151508	Potassium cyanide	10	1,4	P098	A	10 (4.54)
Potassium hydroxide	1310583		1000	1		C	1000 (454)
Potassium permanganate	7722647		100	1		B	100 (45.4)
Potassium silver cyanide	506616	Argentate (1-), bis(cyano-C)-, potassium	1*	4	P099	X	1 (0.454)
Pronamide	23950585	Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-.	1*	4	U192	D	5000 (2270)
Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime	116063	Aldicarb	1*	4	P070	X	1 (0.454)
1-Propanamine	107108	n-Propylamine	1*	4	U194	D	5000 (2270)
1-Propanamine, N-propyl-	142847	Dipropylamine	1*	4	U110	D	5000 (2270)
1-Propanamine, N-nitroso-N-propyl-	621647	Di-n-propylnitrosamine	1*	2,4	U111	A	10 (4.54)
Propane, 2-nitro	79469	2-Nitropropane	1*	3,4	U171	A	10 (4.54)
1,3-Propane sultone	1120714	1,2-Oxathiolane, 2,2-dioxide	1*	3,4	U193	A	10 (4.54)
Propane, 1,2-dibromo-3-chloro	96128	1,2-Dibromo-3-chloropropane	1*	3,4	U066	X	1 (0.454)
Propane, 1,2-dichloro-	78875	1,2-Dichloropropane Propylene dichloride	5000	1,2,3,4	U083	C	1000 (454)
Propanedinitrile	109773	Malononitrile	1*	4	U149	C	1000 (454)
Propanenitrile	107120	Ethyl cyanide	1*	4	P101	A	10 (4.54)
Propanenitrile, 3-chloro-	542767	3-Chloropropionitrile	1*	4	P027	C	1000 (454)
Propanenitrile, 2-hydroxy-2-methyl-	75865	Acetone cyanohydrin 2-Methyllactonitrile	10	1,4	P069	A	10 (4.54)
Propane, 2,2′-oxybis[2-chloro-	108601	Dichloroisopropyl ether	1*	2,4	U027	C	1000 (454)
1,2,3-Propanetriol, trinitrate-	55630	Nitroglycerine	1*	4	P081	A	10 (4.54)
1-Propanol, 2,3-dibromo-, phosphate (3:1)	126727	Tris(2,3-dibromopropyl) phosphate	1*	4	U235	A	10 (4.54)
1-Propanol, 2-methyl-	78831	Isobutyl alcohol	1*	4	U140	D	5000 (2270)
Propanal, 2-methyl-2-(methylsulfonyl)-, O-[(methylamino)carbonyl] oxime (Aldicarb sulfone).	1646884		1*	4	P203		##
2-Propanone	67641	Acetone	1*	4	U002	D	5000 (2270)
2-Propanone, 1-bromo-	598312	Bromoacetone	1*	4	P017	C	1000 (454)
Propargite	2312358		10	1		A	10 (4.54)
Propargyl alcohol	107197	2-Propyn-1-ol	1*	4	P102	C	1000 (454)
2-Propenal	107028	Acrolein	1	1,2,3,4	P003	X	1 (0.454)
2-Propenamide	79061	Acrylamide	1*	3,4	U007	D	5000 (2270)
1-Propene, 1,1,2,3,3,3-hexachloro-	1888717	Hexachloropropene	1*	4	U243	C	1000 (454)
1-Propene, 1,3-dichloro-	542756	1,3-Dichloropropene	5000	1,2,3,4	U084	B	100 (45.4)
2-Propenenitrile	107131	Acrylonitrile	100	1,2,3,4	U009	B	100 (45.4)
2-Propenenitrile, 2-methyl-	126987	Methacrylonitrile	1*	4	U152	C	1000 (454)
2-Propenoic acid	79107	Acrylic acid	1*	3,4	U008	D	5000 (2270)
2-Propenoic acid, ethyl ester	140885	Ethyl acrylate	1*	3,4	U113	C	1000 (454)
2-Propenoic acid, 2-methyl-, ethyl ester	97632	Ethyl methacrylate	1*	4	U118	C	1000 (454)
2-Propenoic acid, 2-methyl-, methyl ester	80626	Methyl methacrylate	5000	1,3,4	U162	C	1000 (454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste Number	Category	Pounds (Kg)
2-Propen-1-o1	107186	Allyl alcohol	100	1,4	P005	B	100 (45.4)
beta-Propiolactone	57578		1*	3		A	10 (4.54)
Propionaldehyde	123386		1*	3		C	1000 (454)
Propionic acid	79094		5000	1		D	5000 (2270)
Propionic acid, 2-(2,4,5-trichlorophenoxy)-	93721	Silvex (2,4,5-TP) 2,4,5-TP acid	100	1,4	U233	B	100 (45.4)
Propionic anhydride	123626		5000	1		D	5000 (2270)
Propoxur (Baygon)	114261		1*	3		B	100 (45.4)
n-Propylamine	107108	1-Propanamine	1*	4	U194	D	5000 (2270)
Propylene dichloride	78875	1,2-Dichloropropane Propane, 1,2-dichloro-	5000	1,2,3,4	U083	C	1000 (454)
Propylene oxide	75569		5000	1,3		B	100 (45.4)
1,2-Propylenimine	75558	Aziridine, 2-methyl- 2-Methyl aziridine	1*	3,4	P067	X	1 (0.454)
2-Propyn-1-ol	107197	Propargyl alcohol	1*	4	P102	C	1000 (454)
Pyrene	129000		1*	2		D	5000 (2270)
Pyrethrins	121299 121211 8003347		1000	1		X	1 (0.545)
3,6-Pyridazinedione, 1,2-dihydro-	123331	Maleic hydrazide	1*	4	U148	D	5000 (2270)
4-Pyridinamine	504245	4-Aminopyridine	1*	4	P008	C	1000 (454)
Pyridine	110861		1*	4	U196	C	1000 (454)
Pyridine, 2-methyl-	109068	2-Picoline	1*	4	U191	D	5000 (2270)
Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)-	54115	Nicotine, & salts	1*	4	P075	B	100 (45.4)
2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]-	66751	Uracil mustard	1*	4	U237	A	10 (4.54)
4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	56042	Methylthiouracil	1*	4	U164	A	10 (4.54)
Pyrrolidine, 1-nitroso-	930552	N-Nitrosopyrrolidine	1*	4	U180	X	1 (0.454)
Pyrrolo[2,3-b] indol-5-ol, 1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethyl-, methylcarbamate (ester), (3aS-cis)-(Physostigmine.	57476		1*	4	P204		##
Quinoline	91225		1000	1,3		D	5000 (2270)
Quinone	106514	p-Benzoquinone 2,5-Cyclohexadiene-1,4-dione	1*	3,4	U197	A	10 (4.54)
Quintobenzene	82688	Benzene, pentachloronitro PCNB Pentachloronitro- benzene	1*	3,4	U185	B	100(45.4)
RADIONUCLIDES	N.A.		1*	3			§
Radionuclides (including radon)	N.A.		1*	3			§

Reserpine	50555	Yohimban-16-carboxylic acid, 11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyl)oxy-, methyl ester (3beta, 16beta,17alpha,18beta,20alpha)-.	1*	4	U200	D	5000 (2270)
Resorcinol	108463	1,3-Benzenediol	1000	1,4	U201	D	5000 (2270)
Saccharin and salts	81072	1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide	1*	4	U202	B	100 (45.4)
Safrole	94597	1,3-Benzodioxole, 5-(2-propenyl)-	1*	4	U203	B	100 (45.4)
Selenious acid	7783008		1*	4	U204	A	10 (4.54)
Selenious acid, dithallium (1+) salt	12039520	Thallium selenite	1*	4	P114	C	1000 (454)
Selenium ††	7782492		1*	2		B	100 (45.4)
SELENIUM AND COMPOUNDS	N.A.	Selenium Compounds	1*	2,3			**
Selenium Compounds	N.A.	SELENIUM COMPOUNDS	1*	2,3			**
Selenium dioxide	7446084	Selenium oxide	1000	1,4	U204	A	10 (4.54)
Selenium oxide	7446084	Selenium dioxide	1000	1,4	U204	A	10 (4.54)
Selenium sulfide	7488564	Selenium sulfide SeS_2	1*	4	U205	A	10 (4.54)
Selenium sulfide SeS_2	7488564	Selenium sulfide	1*	4	U205	A	10 (4.54)
Selenourea	630104		1*	4	P103	C	1000 (454)
L-Serine, diazoacetate (ester)	115026	Azaserine	1*	4	U015	X	1 (0.454)
Silver ††	7440224		1*	2		C	1000 (454)
SILVER AND COMPOUNDS	N.A.		1*	2			**
Silver cyanide	506649	Silver cyanide Ag (CN)	1*	4	P104	X	1 (0.454)
Silver cyanide Ag (CN)	506649	Silver cyanide	1*	4	P104	X	1 (0.454)
Silver nitrate	7761888		1	1		X	1 (0.454)
Silvex (2,4,5-TP)	93721	Propionic acid, 2-(2,4,5-trichlorophenoxy)- 2,4,5-TP acid	100	1,4	U233	B	100 (45.4)
Sodium	7440235		1000	1		A	10 (4.54)
Sodium arsenate	7631892		1000	1		X	1 (0.454)
Sodium arsenite	7784465		1000	1		X	1 (0.454)
Sodium azide	26628228		1*	4	P105	C	1000 (454)
Sodium bichromate	10588019		1000	1		A	10 (4.54)
Sodium bifluoride	1333831		5000	1		B	100 (45.4)
Sodium bisulfite	7631905		5000	1		D	5000 (2270)
Sodium chromate	7775113		1000	1		A	10 (4.54)
Sodium cyanide	143339	Sodium cyanide Na(CN)	10	1,4	P106	A	10 (4.54)
Sodium cyanide Na(CN)	143339	Sodium cyanide	10	1,4	P106	A	10 (4.54)
Sodium dodecylbenzenesulfonate	25155300		1000	1		C	1000 (454)
Sodium fluoride	7681494		5000	1		C	1000 (454)
Sodium hydrosulfide	16721805		5000	1		D	5000 (2270)
Sodium hydroxide	1310732		1000	1		C	1000 (454)
Sodium hypochlorite	7681529 10022705		100	1		B	100 (45.4)
Sodium methylate	124414		1000	1		C	1000 (454)
Sodium nitrite	7632000		100	1		B	100 (45.4)
Sodium phosphate, dibasic	7558794 10039324 10140655		5000	1		D	5000 (2270)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA waste Number	Category	Pounds (Kg)
Sodium phosphate, tribasic	7601549 7758294 7785844 10101890 10124568 10361894		5000	1		D	5000 (2270)
Sodium selenite	10102188 7782823		1000	1		B	100 (45.4)
Streptozotocin	18883664	D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl]amino]-. Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-	1*	4	U206	X	1 (0.454)
Strontium chromate	7789062		1000	1		A	10 (4.54)
Strychnidin-10-one	57249	Strychnine, & salts	10	1,4	P108	A	10 (4.54)
Strychnidin-10-one, 2,3-dimethoxy-	357573	Brucine	1*	4	P018	B	100 (45.4)
Strychnine, & salts	57249	Strychnidin-10-one	10	1,4	P108	A	10 (4.54)
Styrene	100425		1000	1,3		C	1000(454)
Styrene oxide	96093		1*	3		B	100 (45.4)
Sulfur monochloride	12771083		1000	1		C	1000 (454)
Sulfur phosphide	1314803	Phosphorus pentasulfide Phosphorus sulfide	100	1,4	U189	B	100 (45.4)
Sulfuric acid	7664939 8014957		1000	1		C	1000 (454)
Sulfuric acid, dithallium (1+) salt	7446186 10031591	Thallium (I) sulfate	1000	1,4	P115	B	100 (45.4)
Sulfuric acid, dimethyl ester	77781	Dimethyl sulfate	1*	3,4	U103	B	100(45.4)
2,4,5-T acid	93765	Acetic acid, (2,4,5-trichlorophenoxy) 2,4,5-T	100	1,4	U232	C	1000 (454)
2,4,5-T amines	2008460 1319728 3813147 6369966 6369977		100	1		D	5000 (2270)
2,4,5-T esters	93798 1928478 2545597 25168154 61792072		100	1		C	1000 (454)
2,4,5-T salts	13560991		100	1		C	1000 (454)
2,4,5-T	93765	Acetic acid, (2,4,5-trichlorophenoxy) 2,4,5-T acid	100	1,4	U232	C	1000 (454)

TCDD	1746016	2,3,7,8,-Tetrachlorodibenzo-p-dioxin	1*	2,3		X	1(0.454)
TDE	72548	Benzene, 1,1′-(2,2-dichloroethylidene)bis[4-chloro- DDD 4,4′ DDD.	1	1,2,4	U060	X	1 (0.454)
1,2,4,5-Tetrachlorobenzene	95943	Benzene, 1,2,4,5-tetrachloro-	1*	4	U207	D	5000 (2270)
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746016	TCDD	1*	2,3		X	1(0.454)
1,1,1,2-Tetrachloroethane	630206	Ethane, 1,1,1,2-tetrachloro-	1*	4	U208	B	100 (45.4)
1,1,2,2,-Tetrachloroethane	79345	Ethane, 1,1,2,2,-tetrachloro-	1*	2,3,4	U209	B	100(45.4)
Tetrachloroethene	127184	Ethene, tetrachloro- Perchloroethylene Tetrachloroethylene	1*	2,3,4	U210	B	100(45.4)
Tetrachloroethylene	127184	Ethene, tetrachloro Perchloroethylene Tetrachloroethene	1*	2,3,4	U210	B	100(45.4)
2,3,4,6-Tetrachlorophenol	58902	Phenol, 2,3,4,6-tetrachloro-	1*	4	U212	A	10 (4.54)
Tetraethyl lead	78002	Plumbane, tetraethyl-	100	1,4	P110	A	10 (4.54)
Tetraethyl pyrophosphate	107493	Diphosphoric acid, tetraethyl ester	100	1,4	P111	A	10 (4.54)
Tetraethyldithiopyrophosphate	3689245	Thiodiphosphoric acid, tetraethyl ester	1*	4	P109	B	100 (45.4)
Tetrahydrofuran	109999	Furan, tetrahydro-	1*	4	U213	C	1000 (454)
Tetranitromethane	509148	Methane, tetranitro-	1*	4	P112	A	10 (4.54)
Tetraphosphoric acid, hexaethyl ester	757584	Hexaethyl tetraphosphoate	1*	4	P062	B	100 (45.4)
Thallic oxide	1314325	Thallium oxide Tl_2O_3	1*	4	P113	B	100 (45.4)
Thallium ††	7440280		1*	2		C	1000 (454)
Thallium and compounds	N.A.		1*	2			**
Thallium (I) acetate	563688	Acetic acid, thallium(1+) salt	1*	4	U214	B	100 (45.4)
Thallium (I) carbonate	6533739	Carbonic acid, dithallium(1+) salt	1*	4	U215	B	100 (45.4)
Thallium (I) chloride	7791120	Thallium chloride TlCl	1*	4	U216	B	100 (45.4)
Thallium chloride TlCl	7791120	Thallium(I) chloride	1*	4	U216	B	100 (45.4)
Thallium (I) nitrate	10102451	Nitric acid, thallium (1+) salt	1*	4	U217	B	100 (45.4)
Thallium oxide Tl_2O_3	1314325	Thallic oxide	1*	4	P113	B	100 (45.4)
Thallium selenite	12039520	Selenious acid, dithallium(1+) salt	1*	4	P114	C	1000 (454)
Thallium (I) sulfate	7446186 10031591	Sulfuric acid, dithallium(1+) salt	1000	1,4	P115	B	100 (45.4)
Thioacetamide	62555	Ethanethioamide	1*	4	U218	A	10 (4.54)
Thiodiphosphoric acid, tetraethyl ester	3689245	Tetraethyldithiopyrophosphate	1*	4	P109	B	100 (45.4)
Thiofanox	39196184	2-Butanone, 3,3-dimethyl-1-(methylthio)-, O[(methylamino)carbonyl] oxime.	1*	4	P045	B	100 (45.4)
Thioimidodicarbonic diamide [$(H_2N)C(S)$] 2NH	541537	Dithiobiuret	1*	4	P049	B	100 (45.4)
Thiomethanol	74931	Methanethiol Methylmercaptan	100	1,4	U153	B	100 (45.4)
Thioperoxydicarbonic diamide [$(H_2N)C(S)$] $2S_2$, tetramethyl-	137268	Thiram	1*	4	U244	A	10 (4.54)
Thiophenol	108985	Benzenethiol	1*	4	P014	B	100 (45.4)
Thiosemicarbazide	79196	Hydrazinecarbothioamide	1*	4	P116	B	100 (45.4)
Thiourea	62566		1*	4	U219	A	10 (4.54)
Thiourea, (2-chlorophenyl)-	5344821	1-(o-Chlorophenyl)thiourea	1*	4	P026	B	100 (45.4)
Thiourea, 1-naphthalenyl-	86884	alpha-Naphthylthiourea	1*	4	P072	B	100 (45.4)
Thiourea, phenyl-	103855	Phenylthiourea	1*	4	P093	B	100 (45.4)
Thiram	137268	Thioperoxydicarbonic diamide [(H2N)C(S)] 2S2, tetramethyl-	1*	4	U244	A	10 (4.54)
Titanium tetrachloride	7550450		1*	3		C	1000 (454)
Toluene	108883	Benzene, methyl	1000	1,2,3,4	U220	C	1000(454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste Number	Cat- egory	Pounds (Kg)
Toluenediamine	95807 496720 823405 25376458	Benzenediamine, ar-methyl- 2,4-Toluene diamine	1*	3,4	U221	A	10(4.54)
2,4-Toluene diamine	95807 496720 823405 25376458	Benzenediamine, ar-methyl- Toluenediamine	1*	3,4	U221	A	10(4.54)
Toluene diisocyanate	91087 584849 26471625	Benzene, 1,3-diisocyanatomethyl- 2,4-Toluene diisocyanate-	1*	3,4	U223	B	100 (45.4)
2,4-Toluene diisocyanate	91087 584849 26471625	Benzene, 1,3-diisocya-natomethyl- Toluene diisocyanate	1*	3,4	U223	B	100 (45.4)
o-Toluidine	95534	Benzenamine, 2-methyl-	1*	3,4	U328	B	100(45.4)
p-Toluidine	106490	Benzenamine, 4-methyl-	1*	4	U353	B	100 (45.4)
o-Toluidine hydrochloride	636215	Benzenamine, 2-methyl-, hydrochloride	1*	4	U222	B	100 (45.4)
Toxaphene	8001352	Camphene, octachloro- Chlorinated camphene	1*	1,2,3,4	P123	X	1 (0.454)
2,4,5-TP acid	93721	Propionic acid, 2-(2,4,5-trichlorophenoxy)- Silvex (2,4,5-TP)	100	1,4	U233	B	100 (45.4)
2,4,5-TP esters	32534955		100	1		B	100 (45.4)
1H-1,2,4-Triazol-3-amine	61825	Amitrole	1*	4	U011	A	10 (4.54)
2,4,6-tribromophenol	118796		100	4	U408	B	100 (45.4)
Trichlorfon	52686		1000	1		B	100 (45.4)
1,2,4-Trichlorobenzene	120821		1*	2,3		B	100 (45.4)
1,1,1-Trichloroethane	71556	Ethane, 1,1,1-trichloro- Methyl chloroform	1*	2,3,4	U226	C	1000 (454)
1,1,2-Trichloroethane	79005	Ethane, 1,1,2-trichloro	1*	2,3,4	U227	B	100 (45.4)
Trichloroethene	79016	Ethene, trichloro- Trichloroethylene	1000	1,2,3,4	U228	B	100 (45.4)
Trichloroethylene	79016	Ethene, trichloro Trichloroethene	1000	1,2,3,4	U228	B	100 (45.4)
Trichloromethanesulfenyl chloride	594423	Methanesulfenyl chloride, trichloro-	1*	4	P118	B	100 (45.4)
Trichloromonofluoromethane	75694	Methane, trichlorofluoro-	1*	4	U121	D	5000 (2270)
Trichlorophenol	25167822		10	1		A	10 (4.54)
2,3,4-Trichlorophenol	15950660						
2,3,5-Trichlorophenol	933788						
2,3,6-Trichlorophenol	933755						
2,4,5-Trichlorophenol	95954	Phenol, 2,4,5-trichloro-	10	1,3,4	U230	A	10 (4.54)
2,4,6-Trichlorophenol	88062	Phenol, 2,4,6-trichloro-	10	1,2,3,4	U231	A	10 (4.54)

3,4,5-Trichlorophenol	609198						
2,4,5-Trichlorophenol	95954	Phenol, 2,4,5-trichloro-	10*	1,4	U230	A	10 (4.54)
2,4,6-Trichlorophenol	88062	Phenol, 2,4,6-trichloro-	10	1,2,4	U231	A	10 (4.54)
Triethanolamine dodecylbenzenesulfonate	27323417		1000	1		C	1000 (454)
Triethylamine	121448		5000	1,3		D	5000 (2270)
Trifluralin	1582098		1*	3		A	10 (4.54)
Trimethylamine	75503		1000	1		B	100 (45.4)
2,2,4-Trimethylpentane	540841		1*	3		C	1000 (454)
1,3,5-Trinitrobenzene	99354	Benzene, 1,3,5-trinitro-	1*	4	U234	A	10 (4.54)
1,3,5-Trioxane, 2,4,6-trimethyl-	123637	Paraldehyde	1*	4	U182	C	1000 (454)
Tris(2,3-dibromopropyl) phosphate	126727	1-Propanol, 2,3-dibromo-, phosphate [(3:1)	1*	4	U235	A	10 (4.54)
Trypan blue	72571	2,7-Naphthalenedisulfonic acid, 3,3′-3,3′-dimethyl-(1,1′-biphenyl)-4,4′-diyl)-bis(azo)]bis(5-amino-4-hydroxy)-tetrasodium salt.	1*	4	U236	A	10 (4.54)
Unlisted Hazardous Wastes Characteristic of Corrosivity	N.A.		1*	4	D002	B	100 (45.4)
Unlisted Hazardous Wastes Characteristics:	N.A.		1*	4			
Characteristic of Toxicity:							
Arsenic (D004)	N.A.		*1	4	D004	X	1 (0.454)
Barium (D005)	N.A.		*1	4	D005	C	1,000 (454)
Benzene (D018)	N.A.		1000	1, 2, 3, 4	D018	A	10 (4.54)
Cadmium (D006)	N.A.		*1	4	D006	A	10 (4.54)
Carbon tetrachloride (D019)	N.A.		5,000	1, 2, 4	D019	A	10 (4.54)
Chlordane (D020)	N.A.		1	1, 2, 4	D020	X	1 (0.454)
Chlorobenzene (D021)	N.A.		100	1, 2, 4	D021	B	100 (45.4)
Chloroform (D022)	N.A.		5,000	1, 2, 4	D022	A	10 (4.54)
Chromium (D007)	N.A.		*1	4	D007	A	10 (4.54)
o-Cresol (D023)	N.A.		1*	4	D023	B	100 (45.4)
m-Cresol (D024)	N.A.		1*	4	D024	B	100 (45.4)
p-Cresol (D025)	N.A.		1*	4	D025	B	100 (45.4)
Cresol (D026)	N.A.		1*	4	D026	B	100 (45.4)
2,4-D (D016)	N.A.		100	1, 4	D016	B	100 (45.4)
1,4-Dichlorobenzene (D027)	N.A.		100	1, 2, 4	D027	B	100 (45.4)
1,2-Dichloroethane (D028)	N.A.		5,000	1, 2, 4	D028	B	100 (45.4)
1,1-Dichloroethylene (D029)	N.A.		5,000	1, 2, 4	D029	B	100 (45.4)
2,4-Dinitrotoluene (D030)	N.A.		1,000	1, 2, 4	D030	A	10 (4.54)
Endrin (D012)	N.A.		1	1, 4	D012	X	1 (0.454)
Heptachlor (and epoxide) (D031)	N.A.		1	1, 2, 4	D031	X	1 (0.454)
Hexachlorobenzene (D032)	N.A.		*1	2, 4	D032	A	10 (4.54)
Hexachlorobutadiene (D033)	N.A.		*1	2, 4	D033	X	1 (0.454)
Hexachloroethane (D034)	N.A.		*1	2, 4	D034	B	100 (45.4)
Lead (D008)	N.A.		1*	4	D008	A	10 (4.54)
Lindane (D013)	N.A.		1	1, 4	D013	X	1 (0.454)
Mercury (D009)	N.A.		*1	4	D009	X	1 (0.454)
Methoxychlor (D014)	N.A.		1	1, 4	D014	X	1 (0.454)
Methyl ethyl ketone (D035)	N.A.		*1	4	D035	D	5,000 (2270)
Nitrobenzene (D036)	N.A.		1,000	1, 2, 4	D036	C	1,000 (454)
Pentachlorophenol (D037)	N.A.		10	1, 2, 4	D037	A	10 (4.54)
Pyridine (D038)	N.A.		*1	4	D038	C	1,000 (454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory RQ	Statutory Code†	Statutory RCRA waste Number	Final RQ Category	Final RQ Pounds (Kg)
Selenium (D010)	N.A.		*1	4	D010	A	10 (4.54)
Silver (D011)	N.A.		*1	4	D011	X	1 (0.454)
Tetrachloroethylene (D039)	N.A.		*1	2, 4	D039	B	100 (45.4)
Toxaphene (D015)	N.A.		1	1, 4	D015	X	1 (0.454)
Trichloroethylene (D040)	N.A.		1000	1, 2, 4	D040	B	100 (45.4)
2,4,5-Trichlorophenol (D041)	N.A.		10	1, 4	D041	A	10 (4.54)
2,4,6-Trichlorophenol (D042)	N.A.		10	1, 2, 4	D042	A	10 (4.54)
2,4,5-TP (D017)	N.A.		100	1, 4	D017	B	100 (45.4)
Vinyl chloride (D043)	N.A.		*1	2, 3, 4	D043	X	1 (0.454)
Unlisted Hazardous Wastes Characteristic of Ignitability	N.A.		1*	4	D001	B	100 (45.4)
Unlisted Hazardous Wastes Characteristic of Reactivity	N.A.		1*	4	D003	B	100 (45.4)
Uracil mustard	66751	2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]-.	1*	4	U237	A	10 (4.54)
Uranyl acetate	541093		5000	1		B	100 (45.4)
Uranyl nitrate	10102064 36478769		5000	1		B	100 (45.4)
Urea, N-ethyl-N-nitroso-	759739	N-Nitroso-N-ethylurea	1*	4	U176	X	1 (0.454)
Urea, N-methyl-N-nitroso	684935	N-Nitroso-N-methylurea	1*	3,4	U177	X	1 (0.454)
Urethane	51796	Carbamic acid, ethyl ester Ethyl carbamate	1*	3,4	U238	B	100 (45.4)
Vanadic acid, ammonium salt	7803556	Ammonium vanadate	1*	4	P119	C	1000 (454)
Vanadium oxide V_2O_5	1314621	Vanadium pentoxide	1000	1,4	P120	C	1000 (454)
Vanadium pentoxide	1314621	Vanadium oxide V_2O_5	1000	1,4	P120	C	1000 (454)
Vanadyl sulfate	27774136		1000	1		C	1000 (454)
Vinyl acetate	108054	Vinyl acetate monomer	1000	1,3		D	5000 (2270)
Vinyl acetate monomer	108054	Vinyl acetate	1000	1,3		D	5000 (2270)
Vinylamine, N-methyl-N-nitroso-	4549400	N-Nitrosomethylvinylamine	1*	4	P084	A	10 (4.54)
Vinyl bromide	593602		1*	3		B	100 (45.4)
Vinyl chloride	75014	Ethene, chloro-	1*	2,3,4	U043	X	1 (0.454)
Vinylidene chloride	75354	1,1-Dichloroethylene Ethene, 1,1-dichloro-	5000	1,2,3,4	U078	B	100 (45.4)
Warfarin, & salts, when present at concentrations greater than 0.3%	81812	2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenyl-butyl)-, & salts, when present at concentrations greater than 0.3%.	1*	4	P001	B	100 (45.4)
Xylene	1330207	Benzene, dimethyl- Xylene (mixed) Xylenes (isomers and mixture)	1000	1,3,4	U239	B	100 (45.4)
m-Xylene	108383	Benzene, m-dimethyl-	1*	3		C	1000 (454)
o-Xylene	95476	Benzene, o-dimethyl-	1*	3		C	1000 (454)
p-Xylene	106423	Benzene, p-dimethyl-	1*	3		B	100 (45.4)

Xylene (mixed)	1330207	Benzene, dimethyl- Xylene Xylenes (isomers and mixture)	1000	1,3,4	U239	B	100 (45.4)
Xylenes (isomers and mixture)	1330207	Benzene, dimethyl- Xylene Xylene (mixed)	1000	1,3,4	U239	B	100 (45.4)
Xylenol	1300716		1000	1		C	1000 (454)
Yohimban-16-carboxylic acid,11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyl)oxy]-, methyl ester (3beta,16beta,17alpha, 18beta, 20alpha)-	50555	Reserpine	1*	4	U200	D	5000 (2270)
Zinc††	7440666		1*	2		C	1000 (454)
ZINC AND COMPOUNDS	N.A.		1*	2			**
Zinc acetate	557346		1000	1		C	1000 (454)
Zinc ammonium chloride	52628258 14639975 14639986		5000	1		C	1000 (454)
Zinc, bis(dimethylcarbomodithioato-S,S′)-, (Ziram)	137304		1*	4	P205		##
Zinc borate	1332076		1000	1		C	1000 (454)
Zinc bromide	7699458		5000	1		C	1000 (454)
Zinc carbonate	3486359		1000	1		C	1000 (454)
Zinc chloride	7646857		5000	1		C	1000 (454)
Zinc cyanide	557211	Zinc cyanide Zn(CN)2	10	1,4	P121	A	10 (4.54)
Zinc cyanide Zn(CN)2	557211	Zinc cyanide	10	1,4	P121	A	10 (4.54)
Zinc fluoride	7783495		1000	1		C	1000 (454)
Zinc formate	557415		1000	1		C	1000 (454)
Zinc hydrosulfite	7779864		1000	1		C	1000 (454)
Zinc nitrate	7779886		5000	1		C	1000 (454)
Zinc phenosulfonate	127822		5000	1		D	5000 (2270)
Zinc phosphide	1314847	Zinc phosphide Zn_3 P_2, when present at concentrations greater than 10%.	1000	1,4	P122	B	100 (45.4)
Zinc phosphide Zn_3 P_2, when present at concentrations greater than 10%.	1314847	Zinc phosphide	1000	1,4	P122	B	100 (45.4)
Zinc silicofluoride	16871719		5000	1		D	5000 (2270)
Zinc sulfate	7733020		1000	1		C	1000 (454)
Zirconium nitrate	13746899		5000	1		D	5000 (2270)
Zirconium potassium fluoride	16923958		5000	1		C	1000 (454)
Zirconium sulfate	14644612		5000	1		D	5000 (2270)
Zirconium tetrachloride	10026116		5000	1		D	5000 (2270)
F001			1*	4	F001	A	10 (4.54)
The following spent halogenated solvents used in degreasing; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures							
(a) Tetrachloroethylene	127184		1*	2,4	U210	B	100 (45.4)
(b) Trichloroethylene	79016		1000	1,2,4	U228	B	100 (45.4)
(c) Methylene chloride	75092		1*	2,4	U080	C	1000 (454)
(d) 1,1,1-Trichloroethane	71556		1*	2,4	U226	C	1000 (454)
(e) Carbon tetrachloride	56235		5000	1,2,4	U211	A	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste Number	Category	Pounds (Kg)
(f) Chlorinated fluorocarbons	N.A.					D	5000 (2270)
F002			1*	4	F002	A	10 (4.54)
The following spent halogenated solvents; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures							
(a) Tetrachloroethylene	127184		1*	2,4	U210	B	100 (45.4)
(b) Methylene chloride	75092		1*	2,4	U080	C	1000 (454)
(c) Trichloroethylene	79016		1000	1,2,4	U228	B	100 (45.4)
(d) 1,1,1-Trichloroethane	71556		1*	2,4	U226	C	1000 (454)
(e) Chlorobenzene	108907		100	1,2,4	U037	B	100 (45.4)
(f) 1,1,2-Trichloro-1,2,2-trifluoroethane	76131					D	5000 (2270)
(g) o-Dischlorobenzene	95501		100	1,2,4	U070	B	100 (45.4)
(h) Trichlorofluoromethane	75694		1*	4	U121	D	5000 (2270)
(i) 1,1,2-Thrichloroethane	79005		1*	2,4	U227	B	100 (45.4)
F003			1*	4	F003	B	100 (45.4)
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:							
(a) Xylene	1330207					C	1000 (454)
(b) Acetone	67641					D	5000 (2270)
(c) Ethyl acetate	141786					D	5000 (2270)
(d) Ethylbenzene	100414					C	1000 (454)
(e) Ethyl ether	60297					B	100 (45.4)
(f) Methyl isobutyl ketone	108101					D	5000 (2270)
(g) n-Butyl alcohol	71363					D	5000 (2270)
(h) Cyclohexanone	108941					D	5000 (2270)
(i) Methanol	67561					D	5000 (2270)
F004			1*	4	F004	B	100 (45.4)
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:							
(a) Cresols/Cresylic acid	1319773		1000	1,3,4	U052	B	100(45.4)
(b) Nitrobenzene	98953		1000	1,2,4	U169	C	1000 (454)
F005			1*	4	F005	B	100 (45.4)
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:							
(a) Toluene	108883		1000	1,2,4	U220	C	1000 (454)
(b) Methyl ethyl ketone	78933		1*	4	U159	D	5000 (2270)
(c) Carbon disulfide	75150		5000	1,4	P022	B	100 (45.4)
(d) Isobutanol	78831		1*	4	U140	D	5000 (2270)
(e) Pyridine	110861		1*	4	U196	C	1000 (454)

F006 .... Wastewater treatment sludges from electroplating operations except from the following processes: (1) sulfuric acid anodizing of aluminum, (2) tin plating on carbon steel, (3) zinc plating (segregated basis) on carbon steel, (4) aluminum or zinc-aluminum plating on carbon steel, (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel, and (6) chemical etching and milling of aluminum.	....	....	1*	4	F006	A	10 (4.54)
F007 .... Spent cyanide plating bath solutions from electroplating operations.	....	....	1*	4	F007	A	10 (4.54)
F008 .... Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.	....	....	1*	4	F008	A	10 (4.54)
F009 .... Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.	....	....	1*	4	F009	A	10 (4.54)
F010 .... Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.	....	....	1*	4	F010	A	10 (4.54)
F011 .... Spent cyanide solution from salt bath pot cleaning from metal heat treating operations.	....	....	1*	4	F011	A	10 (4.54)
F012 .... Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process.	....	....	1*	4	F012	A	10 (4.54)
F019 .... Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusive conversion coating process.	....	....	1	4	F019	A	10 (4.54)
F020 .... Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or-tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5-trichlorophenol.).	....	....	1*	4	F020	X	1 (0.454)
F021 .... Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives.	....	....	1*	4	F021	X	1 (0.454)
F022 .... Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.	....	....	1*	4	F022	X	1 (0.454)
F023	....	....	1*	4	F023	X	1 (0.454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste Number	Cat-egory	Pounds (Kg)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of hexa-chlorophene from highly purified 2,4,5-tri-chlorophenol.).							
F024			1*	4	F024	X	1 (0.454)
Wastes, including but not limited to distillation residues, heavy ends, tars, and reactor cleanout wastes, from the production of chlorinated aliphatic hydrocarbons, having carbon content from one to five, utilizing free radical catalyzed processes. (This listing does not include light ends, spent filters and filter aids, spent dessicants(sic), wastewater, wastewater treatment sludges, spent catalysts, and wastes listed in § 261.32.).							
F025			1*	4	F025	X	1 (0.454)
Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution.							
F026			1*	4	F026	X	1 (0.454)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions.							
F027			1*	4	F027	X	1 (0.454)
Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5-tri-chlorophenol as the sole component.).							
F028			1*	4	F028	X	1 (0.454)
Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027.							
F032			1*	4	F032	X	1(0.454)

Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with §261.35 of this chapter or potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.							
F034			1*	4	F034	X	1(0.454)
Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use cresote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.							
F035			1*	4	F035	X	1(0.454)
Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.							
F037			1*	4	F037	X	1 (0.454)
Petroleum refinery primary oil/water/solids separation sludge—Any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewaters from petroleum refineries. Such sludges include, but are not limited to, those generated in: oil/water/solids separators; tanks and impoundments; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludge generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges generated in aggressive biological treatment units as defined in §261.31(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and K051 wastes are not included in this listing.							
F038			1*	4	F038	X	1 (0.454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code†	RCRA waste Number	Category	Pounds (Kg)
Petroleum refinery secondary (emulsified) oil/water/solids separation sludge—Any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewaters and oily cooling wastewaters from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from once-through non-contact cooling waters segregated for treatment from other process or oil cooling wastes, sludges and floats generated in aggressive biological treatment units as defined in § 261.31(b)(2) (including sludges and floats generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing.							
K001			1*	4	K001	X	1 (0.454)
Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol.							
K002			1*	4	K002	A	10 (4.54)
Wastewater treatment sludge from the production of chrome yellow and orange pigments.							
K003			1*	4	K003	A	10 (4.54)
Wastewater treatment sludge from the production of molybdate orange pigments.							
K004			1*	4	K004	A	10 (4.54)
Wastewater treatment sludge from the production of zinc yellow pigments.							
K005			1*	4	K005	A	10 (4.54)
Wastewater treatment sludge from the production of chrome green pigments.							
K006			1*	4	K006	A	10 (4.54)
Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous and hydrated).							
K007			1*	4	K007	A	10 (4.54)
Wastewater treatment sludge from the production of iron blue pigments.							
K008			1*	4	K008	A	10 (4.54)
Oven residue from the production of chrome oxide green pigments.							
K009			1*	4	K009	A	10 (4.54)

Distillation bottoms from the production of acetaldehyde from ethylene.							
K010			1*	4	K010	A	10 (4.54)
Distillation side cuts from the production of acetaldehyde from ethylene.							
K011			1*	4	K011	A	10 (4.54)
Bottom stream from the wastewater stripper in the production of acrylonitrile.							
K013			1*	4	K013	A	10 (4.54)
Bottom stream from the acetonitrile column in the production of acrylonitrile.							
K014			1*	4	K014	D	5000 (2270)
Bottoms from the acetonitrile purification column in the production of acrylonitrile.							
K015			1*	4	K015	A	10 (4.54)
Still bottoms from the distillation of benzyl chloride.							
K016			1*	4	K016	X	1 (0.454)
Heavy ends or distillation residues from the production of carbon tetrachloride.							
K017			1*	4	K017	A	10 (4.54)
Heavy ends (still bottoms) from the purification column in the production of epi-chlorohydrin.							
K018			1*	4	K018	X	1 (0.454)
Heavy ends from the fractionation column in ethyl chloride production.							
K019			1*	4	K019	X	1 (0.454)
Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production.							
K020			1*	4	K020	X	1 (0.454)
Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production.							
K021			1*	4	K021	A	10 (4.54)
Aqueous spent antimony catalyst waste from fluoromethanes production.							
K022			1*	4	K022	X	1 (0.454)
Distillation bottom tars from the production of phenol/acetone from cumene.							
K023			1*	4	K023	D	5000 (2270)
Distillation light ends from the production of phthalic anhydride from naphthalene.							
K024			1*	4	K024	D	5000 (2270)
Distillation bottoms from the production of phthalic anhydride from naphthalene.							
K025			1*	4	K025	A	10 (4.54)
Distillation bottoms from the production of nitrobenzene by the nitration of benzene.							
K026			1*	4	K026	C	1000 (454)
Stripping still tails from the production of methyl ethyl pyridines.							
K027			1*	4	K027	A	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste Number	Category	Pounds (Kg)
Centrifuge and distillation residues from toluene diisocyanate production.							
K028	....	....	1*	4	K028	X	1 (0.454)
Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane.							
K029	....	....	1*	4	K029	X	1 (0.454)
Waste from the product steam stripper in the production of 1,1,1-trichloroethane.							
K030	....	....	1*	4	K030	X	1 (0.454)
Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene.							
K031	....	....	1*	4	K031	X	1 (0.454)
By-product salts generated in the production of MSMA and cacodylic acid.							
K032	....	....	1*	4	K032	A	10 (4.54)
Wastewater treatment sludge from the production of chlordane.							
K033	....	....	1*	4	K033	A	10 (4.54)
Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane.							
K034	....	....	1*	4	K034	A	10 (4.54)
Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane.							
K035	....	....	1*	4	K035	X	1 (0.454)
Wastewater treatment sludges generated in the production of creosote.							
K036	....	....	1*	4	K036	X	1 (0.454)
Still bottoms from toluene reclamation distillation in the production of disulfoton.							
K037	....	....	1*	4	K037	X	1 (0.454)
Wastewater treatment sludges from the production of disulfoton.							
K038	....	....	1*	4	K038	A	10 (4.54)
Wastewater from the washing and stripping of phorate production.							
K039	....	....	1*	4	K039	A	10 (4.54)
Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate.							
K040	....	....	1*	4	K040	A	10 (4.54)
Wastewater treatment sludge from the production of phorate.							
K041	....	....	1*	4	K041	X	1 (0.454)
Wastewater treatment sludge from the production of toxaphene.							

K042 — Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T.	....	....	1*	4	K042	A	10 (4.54)
K043 — 2,6-Dichlorophenol waste from the production of 2,4-D.	....	....	1*	4	K043	A	10 (4.54)
K044 — Wastewater treatment sludges from the manufacturing and processing of explosives.	....	....	1*	4	K044	A	10 (4.54)
K045 — Spent carbon from the treatment of wastewater containing explosives.	....	....	1*	4	K045	A	10 (4.54)
K046 — Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds.	....	....	1*	4	K046	A	10 (4.54)
K047 — Pink/red water from TNT operations.	....	....	1*	4	K047	A	10 (4.54)
K048 — Dissolved air flotation (DAF) float from the petroleum refining industry.	....	....	1*	4	K048	A	10 (4.54)
K049 — Stop oil emulsion solids from the petroleum refining industry.	....	....	1*	4	K049	A	10 (4.54)
K050 — Heat exchanger bundle cleaning sludge from the petroleum refining industry.	....	....	1*	4	K050	A	10 (4.54)
K051 — API separator sludge from the petroleum refining industry.	....	....	1*	4	K051	A	10 (4.54)
K052 — Tank bottoms (leaded) from the petroleum refining industry.	....	....	1*	4	K052	A	10 (4.54)
K060 — Ammonia still lime sludge from coking operations.	....	....	1*	4	K060	X	1 (0.454)
K061 — Emission control dust/sludge from the primary production of steel in electric furnaces.	....	....	1*	4	K061	A	10 (4.54)
K062 — Spent pickle liquor generated by steel finishing operations of factilties within the iron and steel industry (SIC Codes 331 and 332).	....	....	1*	4	K062	A	10 (4.54)
K064 — Acid plant blowdown slurry/sludge resulting from thickening of blowdown slurry from primary copper production.	....	....	1*	4	K064	A	10 (4.54)
K065 — Surface impoundment solids contained in and dredged from surface impoundments at primary lead smelting facilities.	....	....	1*	4	K065	A	10 (4.54)
K066 — Sludge from treatment of process wastewater and/or acid plant blowdown from primary zinc production.	....	....	1*	4	K066	A	10 (4.54)
K069 — Emission control dust/sludge from secondary lead smelting.	....	....	1*	4	K069	A	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste Number	Category	Pounds (Kg)
K071 Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used.			1*	4	K071	X	1 (0.454)
K073 Chlorinated hydrocarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production.			1*	4	K073	A	10 (4.54)
K083 Distillation bottoms from aniline extraction.			1*	4	K083	B	100 (45.4)
K084 Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.			1*	4	K084	X	1 (0.454)
K085 Distillation or fractionation column bottoms from the production of chlorobenzenes.			1*	4	K085	A	10 (4.54)
K086 Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead.			1*	4	K086	A	10 (4.54)
K087 Decanter tank tar sludge from coking operations.			1*	4	K087	B	100 (45.4)
K088 Spent potliners from primary aluminum reduction.			1*	4	K088	A	10 (4.54)
K090 Emission control dust or sludge from ferrochromiumsilicon production.			1*	4	K090	A	10 (4.54)
K091 Emission control dust or sludge from ferrochromium production.			1	4	K091	A	10 (4.54)
K093 Distillation light ends from the production of phthalic anhydride from ortho-xylene.			1*	4	K093	D	5000 (2270)
K094 Distillation bottoms from the production of phthalic anhydride from ortho-xylene.			1*	4	K094	D	5000 (2270)
K095 Distillation bottoms from the production of 1,1,1-trichloroethane.			1*	4	K095	B	100 (45.4)
K096			1*	4	K096	B	100 (45.4)

Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane. K097	....	....	1*	4	K097	X	1 (0.454)
Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane. K098	....	....	1*	4	K098	X	1 (0.454)
Untreated process wastewater from the production of toxaphene. K099	....	....	1*	4	K099	A	10 (4.54)
Untreated wastewater from the production of 2,4-D. K100	....	....	1*	4	K100	A	10 (4.54)
Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting. K101	....	....	1*	4	K101	X	1 (0.454)
Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds. K102	....	....	1*	4	K102	X	1 (0.454)
Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds. K103	....	....	1*	4	K103	B	100 (45.4)
Process residues from aniline extraction from the production of aniline. K104	....	....	1*	4	K104	A	10 (4.54)
Combined wastewater streams generated from nitrobenzene/aniline production. K105	....	....	1*	4	K105	A	10 (4.54)
Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes. K106	....	....	1*	4	K106	X	1 (0.454)
Wastewater treatment sludge from the mercury cell process in chlorine production. K107	....	....	10	4	K107	X	10 (4.54)
Column bottoms from product separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazines. K108	....	....	10	4	K108	X	10 (4.54)
Condensed column overheads from product separation and condensed reactor vent gases from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides. K109	....	....	10	4	K109	X	10 (4.54)
Spent filter cartridges from product purification from the production of 1,1- dimethylhydrazine (UDMH) from carboxylic acid hydrazides. K110	....	....	10	4	K110	X	10 (4.54)
Condensed column overheads from intermediate separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides. K111	....	....	1*	4	K111	A	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste Number	Category	Pounds (Kg)
Product washwaters from the production of dinitrotoluene via nitration of toluene.							
K112			1*	4	K112	A	10 (4.54)
Reaction by-product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene.							
K113			1*	4	K113	A	10 (4.54)
Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.							
K114			1*	4	K114	A	10 (4.54)
Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.							
K115			1*	4	K115	A	10 (4.54)
Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.							
K116			1*	4	K116	A	10 (4.54)
Organic condensate from the solvent recovery column in the production of toluene diisocyanate via phosgenation of toluenediamine.							
K117			1*	4	K117	X	1 (0.454)
Wastewater from the reaction vent gas scrubber in the production of ethylene bromide via bromination of ethene.							
K118			1*	4	K118	X	1 (0.454)
Spent absorbent solids from purification of ethylene dibromide in the production of ethylene dibromide.							
K123			1*	4	K123	A	10 (4.54)
Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salts.							
K124			1*	4	K124	A	10 (4.54)
Reactor vent scrubber water from the production of ethylenebisdithiocarbamic acid and its salts.							
K125			1*	4	K125	A	10 (4.54)
Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts.							
K126			1*	4	K126	A	10 (4.54)
Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylenebisdithiocarbamic acid and its salts.							
K131			100	4	K131	X	100 (45.4)

Wastewater from the reactor and spent sulfuric acid from the acid dryer in the production of methyl bromide. K132			1000	4	K132	X	1000 (454)
Spent absorbent and wastewater solids from the production of methyl bromide. K136			1*	4	K136	X	1 (0.454)
Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene. K140			1*	4	K140	B	## 100 (45.4)
Floor sweepings, off-specification product and spent filter media from the production of 2,4,6-tribromophenol.. K141			1*	4	K141	X	1 (0.454)
Process related from the recovery of coal tar, including, but not limited to, tar collecting sump residues from the production of coke by-products produced from coal. This listing does not include K087 (decanter tank tar sludge from coking operations.). K142			1*	4	K142	X	1 (0.454)
Tar storage tank residues from the production of coke from coal or from the recovery of coke by-products produced from coal. K143			1*	4	K143	X	1 (0.454)
Process residues from the recovery of light oil, including, but not limited to, those generated in stills, decanters, and wash oil recovery units from the recovery of coke by-products produced from coal. K144			1*	4	K144	X	1 (0.454)
Wastewater sump residues from light oil refining, including, but not limited to, intercepting or contamination sump sludges from the recovery of coke by-products produced from coal. K145			1*	4	K145	X	1 (0.454)
Residues from naphthalene collection and recovery operations from the recovery of coke by-products produced from coal. K147			1*	4	K147	X	1 (0.454)
Tar storage tank residues from coal tar refining. K148			1*	4	K148	X	1 (0.454)
Residues from coal tar distillation, including, but not limited to, still bottoms. K149			1*	4	K149	A	10 (4.54)
Distillation bottoms from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups. [This waste does not include still bottoms from the distillation of benzyl chloride.]. K150			1*	4	K150	A	10 (4.54)
Organic residuals, excluding spent carbon adsorbent, from the spent chlorine gas and hydrochloric acid recovery processes associated with the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.							

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Regulatory synonyms	Statutory			Final RQ	
			RQ	Code †	RCRA waste Number	Category	Pounds (Kg)
K151 Wastewater treatment sludges, excluding neutralization and biological sludges, generated during the treatment of wastewaters from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.			1*	4	K151	A	10 (4.54)
K156 Organic waste (including heavy ends, still bottoms, light ends, spent solvents, filtrates, and decantates) from the production of carbamates and carbamoyl oximes. (This listing does not apply to wastes generated from the manufacture of 3-iodo-2-propynyl n-butylcarbamate.).			*1	4	K156		##
K157 Wastewaters (including scrubber waters, condenser waters, washwaters, and separation waters) from the production of carbamates and carbamoyl oximes. (This listing does not apply to wastes generated from the manufacture of 3-iodo-2-propynyl n-butylcarbamate.).			*1	4	K157		##
K158 Bag house dusts and filter/separation solids from the production of carbamates and carbamoyl oximes. (This listing does not apply to wastes generated from the manufacture of 3-iodo-2-propynyl n-butylcarbamate.).			*1	4	K158		##
K159 Organics from the treatment of thiocarbamate wastes.			1*	4	K159		##
K161 Purification solids (including filtration, evaporation, and centrifugation solids), bag house dust, and floor sweepings from the production of dithiocarbamate acids and their salts (This listing does not include K125 or K126.).			1*	4	K161		##
K169[f] Crude oil storage tank sediment from petroleum refining operations.			1*	4	K169	A	10(4.54)
K170[f] Clarified slurry oil tank sediment and/or in-line filter/separation solids from petroleum refining operations.			1*	4	K170	X	1 (0.454)
K171[f] Spent hydrotreating catalyst from petroleum refining operations. (This listing does not include inert support media.)			1*	4	K171	X	1 (0.454)
K172[f]			1*	4	K172	X	1 (0.454)

Spent hydrorefining catalyst from petroleum refining operations. (This listing does not include inert support media.)							

† Indicates the statutory source as defined by 1, 2, 3, and 4 below.

†† No reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is equal to or exceeds 100 micrometers (0.004 inches).

††† The RQ for asbestos is limited to friable forms only.

1—indicates that the statutory source for designation of this hazardous substance under CERCLA is CWA Section 311(b)(4).

2—indicates that the statutory source for designation of this hazardous substance under CERCLA is CWA Section 307(a).

3—indicates that the statutory source for designation of this hazardous substance under CERCLA is CAA Section 112.

4—Indicates that the statutory source for designation of this hazardous substance under CERCLA is RCRA Section 3001.

1*—indicates that the 1-pound RQ is a CERCLA statutory RQ.

# Indicates that the RQ is subject to change when the assessment of potential carcinogenicity is completed.

The Agency may adjust the statutory RQ for this hazardous substance in a future rulemaking; until then the statutory RQ applies.

§—The adjusted RQs for radionuclides may be found in appendix B to this table.

**—indicates that no RQ is being assigned to the generic or broad class.

[a] Benzene was already a CERCLA hazardous substance prior to the CAA Amendments of 1990 and received an adjusted 10-pound RQ based on potential carcinogenicity in an August 14, 1989, final rule (54 FR 33418). The CAA Amendments specify that ''benzene (including benzene from gasoline)'' is a hazardous air pollutant and, thus, a CERCLA hazardous substance.

[b] The CAA Amendments of 1990 list DDE (3547–04–4) as a CAA hazardous air pollutant. The CAS number, 3547–04–4, is for the chemical, p,p′-dichlorodiphenylethane. DDE or p,p′-dichlorodiphenyldichloroethylene, CAS number 72–55–9, is already listed in table 302.4 with a final RQ of 1 pound. The substance identified by the CAS number 3547–04–4 has been evaluated and listed as DDE to be consistent with the CAA section 112 listing, as amended.

[c] Includes mineral fiber emissions from facilities manufacturing or processing glass, rock, or slag fibers (or other mineral derived fibers) of average diameter 1 micrometer or less.

[d] Includes mono- and di-ethers of ethylene glycol, diethylene glycol, and triethylene glycol R-$(OCH2CH2)_n$-OR′ where

n=1, 2, or 3

R=alkyl or aryl groups

R′=R, H, or groups which, when removed, yield glycol ethers with the structure: R-$(OCH2CH2)_n$—OH. Polymers are excluded from the glycol category.

[e] Includes organic compounds with more than one benzene ring, and which have a boiling point greater than or equal to 100 °C.

[f] See 40 CFR 302.6(b)(1) for application of the mixture rule to this hazardous waste.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES

CASRN	Hazardous substance
50000	Formaldehyde.
50077	Azirino[2′,3′:3,4]pyrrolo[1,2-a]indole-4,7-dione,6-amino-8-[[(aminocarbonyl)oxy]methyl]-1,1a,2,8,8a, 8b-hexahydro-8a-methoxy-5-methyl-, [1aS-(1aalpha, 8beta,8aalpha,8balpha)]-
	Mitomycin C.
50180	Cyclophosphamide.
	2H-1,3,2-Oxazaphosphorin-2-amine, N,N-bis(2-chloroethyl)tetrahydro-, 2-oxide.
50293	Benzene, 1,1′-(2,2,2-trichloroethylidene)bis[4-chloro-.
	DDT′.
	4,4′DDT.
50328	Benzo[a]pyrene.
	3,4-Benzopyrene.
50555	Reserpine.
	Yohimban-16-carboxylic acid,11,17-dimethoxy-18-[(3 ,4,5-trimethoxybenzoyl)oxy]-, methyl ester (3beta, 16beta,17alpha,18beta,20alpha)-.
51285	Phenol, 2,4-dinitro-.
	2,4-Dinitrophenol.
51434	Epinephrine.
	1,2-Benzenediol,4-[1-hydroxy-2-(methylamino) ethyl]-.
51796	Carbamic acid, ethyl ester.
	Ethyl carbamate.
	Urethane.
52686	Trichlorfon.
52857	Famphur.
	Phosphorothioic acid, O,[4-[(dimethyl- amino) sulfonyl]phenyl]O,O-dimethyl ester.
53703	Dibenz[a,h]anthracene.
	Dibenzo[a,h]anthracene.
	1,2:5,6-Dibenzanthracene.
53963	Acetamide, N-9H-fluoren-2-yl-.
	2-Acetylaminofluorene.
54115	Nicotine, & salts.
	Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)-.
55185	Ethanamine, N-ethyl-N-nitroso-.
	N-Nitrosodiethylamine.
55630	Nitroglycerine.
	1,2,3-Propanetriol, trinitrate-.
55914	Diisopropylfluorophosphate.
	Phosphorofluoridic acid, bis(1-methyl- ethyl) ester.
56042	Methylthiouracil.
	4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-.
56235	Carbon tetrachloride.
	Methane, tetrachloro-.
56382	Parathion.
	Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester.
56495	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-.
	3-Methylcholanthrene.
56531	Diethylstilbestrol.
	Phenol, 4,4′-(1,2-diethyl-1,2-ethenediyl)bis-, (E).
56553	Benz[a]anthracene.
	Benzo[a]anthracene.
	1,2-Benzanthracene.
56724	Coumaphos.
57125	Cyanides (soluble salts and complexes) not otherwise specified.
57147	Hydrazine, 1,1-dimethyl-.
	1,1-Dimethylhydrazine.
57249	Strychnidin-10-one.
	Strychnine, & salts.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
57476	Pyrrolo[2,3-b]indol-5-ol, 1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethyl-, methylcarbamate (ester), (3aS-cis)- (Physostigmine).
57647	Benzoic acid, 2-hydroxy-, compd. with (3aS-cis)-1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethylpyrrolo[2,3-b]indol-5-yl methylcarbamate ester (1:1) (Physostigmine salicylate).
57749	Chlordane.
	Chlordane, alpha & gamma isomers.
	CHLORDANE (TECHNICAL MIXTURE AND METABOLITES).
	4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-.
57976	1,2-Benzanthracene, 7,12-dimethyl-.
	7,12-Dimethylbenz[a]anthracene.
58899	γ-BHC.
	Cyclohexane, 1,2,3,4,5,6-hexachloro ($1\alpha,2\alpha,3\beta,4\alpha,5\alpha,6\beta$)-.
	Hexachlorocyclohexane (gamma isomer).
	Lindane.
	Lindane (all isomers).
58902	Phenol, 2,3,4,6-tetrachloro-.
	2,3,4,6-Tetrachlorophenol.
59507	p-Chloro-m-cresol.
	Phenol, 4-chloro-3-methyl-.
	4-Chloro-m-cresol.
60004	Ethylenediamine-tetraacetic acid (EDTA).
60117	Benzenamine, N,N-dimethyl-4-(phenylazo-).
	Dimethyl aminoazobenzene.
	p-Dimethylaminoazobenzene.
60297	Ethane, 1,1′-oxybis-.
	Ethyl ether.
60344	Hydrazine, methyl-.
	Methyl hydrazine.
60515	Dimethoate.
	Phosphorodithioic acid, O,O-dimethyl S-[2(methylamino)-2-oxoethyl] ester.
60571	Dieldrin.
	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2, 2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2aalpha,3beta,6beta, 6aalpha,7beta, 7aalpha)-.
61825	Amitrole.
	1H-1,2,4-Triazol-3-amine.
62384	Mercury, (acetato-O)phenyl-.
	Phenylmercury acetate.
62442	Acetamide, N-(4-ethoxyphenyl)-.
	Phenacetin.
62500	Ethyl methanesulfonate.
	Methanesulfonic acid, ethyl ester.
62533	Aniline.
	Benzenamine.
62555	Ethanethioamide.
	Thioacetamide.
62566	Thiourea.
62737	Dichlorvos.
62748	Acetic acid, fluoro-, sodium salt.
	Fluoroacetic acid, sodium salt.
62759	Methanamine, N-methyl-N-nitroso-.
	N-Nitrosodimethylamine.
63252	Carbaryl.
64006	Phenol, 3-(1-methylethyl)-, methyl carbamate (m-Cumenyl methylcarbamate).
64186	Formic acid.
64197	Acetic acid.
65850	Benzoic acid.
66751	Uracil mustard.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
	2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl) amino]-.
67561	Methanol.
	Methyl alcohol.
67641	Acetone.
	2-Propanone.
67663	Chloroform.
	Methane, trichloro-.
67721	Ethane, hexachloro-.
	Hexachloroethane.
70257	Guanidine, N-methyl-N′-nitro-N-nitroso-.
	MNNG.
70304	Hexachlorophene.
	Phenol, 2,2′-methylenebis[3,4,6-tri- chloro-.
71363	n-Butyl alcohol.
	1-Butanol.
71432	Benzene.
71556	Ethane, 1,1,1-trichloro-.
	Methyl chloroform.
	1,1,1-Trichloroethane.
72208	Endrin.
	Endrin, & metabolites.
	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octa-hydro-, (1aalpha,2beta,2abeta,3alpha,6alpha, 6abeta,7beta,7aalpha)-.
72435	Benzene, 1,1′-(2,2,2-trichloroethylidene)bis[4-methoxy-.
	Methoxychlor.
72548	Benzene, 1,1′-(2,2-dichloroethylidene)bis[4-chloro-.
	DDD.
	TDE.
	4,4′ DDD.
72559	DDE
	4,4'-DDE.
72571	Trypan blue.
	2,7-Naphthalenedisulfonic acid, 3,3′-[(3,3′-dimethyl-(l,1′-biphenyl)-4,4′-diyl)-bis(azo)]bis(5-amino-4-hydroxy)-tetrasodium salt.
74839	Bromomethane.
	Methane, bromo-.
	Methyl bromide.
74873	Chloromethane.
	Methane, chloro-.
	Methyl chloride.
74884	Iodomethane
	Methane, iodo-.
	Methyl iodide.
74895	Monomethylamine.
74908	Hydrocyanic acid.
	Hydrogen cyanide.
74931	Methanethiol.
	Methylmercaptan.
	Thiomethanol.
74953	Methane, dibromo-.
	Methylene bromide.
75003	Chloroethane.
	Ethyl chloride.
75014	Ethene, chloro-.
	Vinyl chloride.
75047	Monoethylamine.
75058	Acetonitrile.
75070	Acetaldehyde.
	Ethanal.
75092	Dichloromethane.
	Methane, dichloro-.
	Methylene chloride.
75150	Carbon disulfide.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
75207	Calcium carbide.
75218	Ethylene oxide.
	Oxirane.
75252	Bromoform.
	Methane, tribromo-.
75274	Dichlorobromomethane.
75343	Ethane, 1,1-dichloro-.
	Ethylidene dichloride.
	1,1-Dichloroethane.
75354	Ethene, 1,1-dichloro-.
	Vinylidene chloride.
	1,1-Dichloroethylene.
75365	Acetyl chloride.
75445	Carbonic dichloride.
	Phosgene.
75503	Trimethylamine.
75558	Aziridine, 2-methyl-.
	2-Methyl aziridine.
	1,2-Propylenimine.
75569	Propylene oxide.
75605	Arsinic acid, dimethyl-.
	Cacodylic acid.
75649	tert-Butylamine.
75694	Methane, trichlorofluoro-.
	Trichloromonofluoromethane.
75718	Dichlorodifluoromethane.
	Methane, dichlorodifluoro-.
75865	Acetone cyanohydrin.
	Propanenitrile, 2-hydroxy-2-methyl-.
	2-Methyllactonitrile.
75876	Acetaldehyde, trichloro-.
	Chloral.
75990	2,2-Dichloropropionic acid.
76017	Ethane, pentachloro-.
	Pentachloroethane.
76448	Heptachlor.
	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-.
77474	Hexachlorocyclopentadiene.
	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexa- chloro-.
77781	Dimethyl sulfate.
	Sulfuric acid, dimethyl ester.
78002	Plumbane, tetraethyl-.
	Tetraethyl lead.
78591	Isophorone.
78795	Isoprene.
78819	iso-Butylamine.
78831	Isobutyl alcohol.
	1-Propanol, 2-methyl-.
78875	Propane, 1,2-dichloro-.
	Propylene dichloride.
	1,2-Dichloropropane.
78886	2,3-Dichloropropene.
78933	2-Butanone.
	MEK.
	Methyl ethyl ketone.
78999	1,1-Dichloropropane.
79005	Ethane, 1,1,2-trichloro-.
	1,1,2-Trichloroethane.
79016	Ethene, trichloro-.
	Trichloroethene.
	Trichloroethylene-.
79061	Acrylamide.
	2-Propenamide.
79094	Propionic acid.
79107	Acrylic acid.
	2-Propenoic acid.
79196	Hydrazinecarbothioamide.
	Thiosemicarbazide.
79221	Carbonochloridic acid, methyl ester.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
	Methyl chlorocarbonate.
	Methyl chloroformate.
79312	iso-Butyric acid.
79345	Ethane, 1,1,2,2-tetrachloro-.
	1,1,2,2-Tetrachloroethane.
79447	Carbamic chloride, dimethyl-.
	Dimethylcarbamoyl chloride.
79469	Propane, 2-nitro-.
	2-Nitropropane.
80159	alpha,alpha-Dimethylbenzylhydroperoxide.
	Hydroperoxide, 1-methyl-1-phenylethyl-.
80626	Methyl methacrylate.
	2-Propenoic acid, 2-methyl-, methyl ester.
81072	Saccharin and salts.
	1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide.
81812	Warfarin, & salts, when present at concentrations greater than 0.3%.
	2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenyl -butyl)-, & salts, when present at concentrations greater than 0.3%.
82688	Benzene, pentachloronitro-.
	PCNB.
	Pentachloronitrobenzene.
	Quintobenzene.
83329	Acenaphthene.
84662	Diethyl phthalate.
	1,2-Benzenedicarboxylic acid, diethyl ester.
84742	Di-n-butyl phthalate.
	Dibutyl phthalate.
	n-Butyl phthalate.
	1,2-Benzenedicarboxylic acid, dibutyl ester.
85007	Diquat.
85018	Phenanthrene.
85449	Phthalic anhydride.
	1,3-Isobenzofurandione.
85687	Butyl benzyl phthalate.
86306	N-Nitrosodiphenylamine.
86500	Guthion.
86737	Fluorene.
86884	alpha-Naphthylthiourea.
	Thiourea, 1-naphthalenyl-.
87650	Phenol, 2,6-dichloro-.
	2,6-Dichlorophenol.
87683	Hexachlorobutadiene.
	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-.
87865	Pentachlorophenol.
	Phenol, pentachloro-.
88062	Phenol, 2,4,6-trichloro-.
	2,4,6-Trichlorophenol.
88722	o-Nitrotoluene.
88755	o-Nitrophenol.
	2-Nitrophenol.
88857	Dinoseb.
	Phenol, 2-(1-methylpropyl)-4,6-dinitro.
91087	Benzene, 1,3-diisocyanatomethyl-.
	Toluene diisocyanate.
	2,4-Toluene diisocyanate.
91203	Naphthalene.
91225	Quinoline.
91587	beta-Chloronaphthalene.
	Naphthalene, 2-chloro-.
	2-Chloronaphthalene.
91598	beta-Naphthylamine.
	2-Naphthalenamine.
91805	Methapyrilene.
	1,2-Ethanediamine, N,N-dimethyl-N′-2-pyridinyl-N′- (2-thienylmethyl)-.
91941	[1,1′-Biphenyl]-4,4′diamine,3,3′dichloro-.
	3,3′-Dichlorobenzidine.
92875	Benzidine.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
	[1,1'-Biphenyl]-4,4'diamine.
93721	Propionic acid, 2-(2,4,5-trichlorophenoxy)-.
	Silvex (2,4,5-TP).
	2,4,5-TP acid.
93765	Acetic acid, (2,4,5-trichlorophenoxy).
	2,4,5-T.
	2,4,5-T acid.
93798	2,4,5-T esters.
94111	2,4-D Ester.
94586	Dihydrosafrole.
	1,3-Benzodioxole, 5-propyl-.
94597	Safrole.
	1,3-Benzodioxole, 5-(2-propenyl)-.
94757	Acetic acid (2,4-dichlorophenoxy)-, salts & esters.
	2,4-D Acid.
	2,4-D, salts and esters.
94791	2,4-D Ester.
94804	2,4-D Ester.
95476	o-Benzene, dimethyl.
	o-Xylene.
95487	o-Cresol.
	o-Cresylic acid.
95501	Benzene, 1,2-dichloro-.
	o-Dichlorobenzene.
	1,2-Dichlorobenzene.
95534	Benzenamine, 2-methyl-.
	o-Toluidine.
95578	o-Chlorophenol.
	Phenol, 2-chloro-.
	2-Chlorophenol.
95807	Benzenediamine, ar-methyl-.
	Toluenediamine.
	2,4-Toluene diamine.
95943	Benzene, 1,2,4,5-tetrachloro-.
	1,2,4,5-Tetrachlorobenzene.
95954	Phenol, 2,4,5-trichloro-.
	2,4,5-Trichlorophenol.
96128	Propane, 1,2-dibromo-3-chloro-.
	1,2-Dibromo-3-chloropropane.
96184	1,2,3-Trichloropropane.
96457	Ethylenethiourea.
	2-Imidazolidinethione.
97632	Ethyl methacrylate.
	2-Propenoic acid, 2-methyl-, ethyl ester.
98011	Furfural.
	2-Furancarboxaldehyde.
98077	Benzene, (trichloromethyl)-.
	Benzotrichloride.
98099	Benzenesulfonic acid chloride.
	Benzenesulfonyl chloride.
98828	Benzene, (1-methylethyl)-.
	Cumene.
98862	Acetophenone.
	Ethanone, 1-phenyl-.
98873	Benzal chloride.
	Benzene, dichloromethyl-.
98884	Benzoyl chloride.
98953	Benzene, nitro-.
	Nitrobenzene.
99081	m-Nitrotoluene.
99354	Benzene, 1,3,5-trinitro-.
	1,3,5-Trinitrobenzene.
99558	Benzenamine, 2-methyl-5-nitro-.
	5-Nitro-o-toluidine.
99650	m-Dinitrobenzene.
99990	p-Nitrotoluene.
100016	Benzenamine, 4-nitro-.
	p-Nitroaniline.
100027	p-Nitrophenol.

APPENDIX A TO §302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
	Phenol, 4-nitro-.
	4-Nitrophenol.
100254	p-Dinitrobenzene.
100414	Ethylbenzene.
100425	Styrene.
100447	Benzene, chloromethyl-.
	Benzyl chloride.
100470	Benzonitrile.
100754	N-Nitrosopiperidine.
	Piperidine, 1-nitroso-.
101144	Benzenamine, 4,4′-methylenebis(2-chloro-.
	4,4′-Methylenebis(2-chloroaniline).
101279	Carbamic acid, (3-chlorophenyl)-, 4-chloro-2-butynyl ester (Barban).
101553	Benzene, 1-bromo-4-phenoxy-.
	4-Bromophenyl phenyl ether.
103855	Phenylthiourea.
	Thiourea, phenyl-.
105464	sec-Butyl acetate.
105679	Phenol, 2,4-dimethyl-.
	2,4-Dimethylphenol.
106423	p-Benzene, dimethyl.
	p-Xylene.
106445	p-Cresol.
	p-Cresylic acid.
106467	Benzene, 1,4-dichloro-.
	p-Dichlorobenzene.
	1,4-Dichlorobenzene.
106478	Benzenamine, 4-chloro-.
	p-Chloroaniline.
106490	Benzenamine, 4-methyl-.
	p-Toluidine.
106503	Phenylenediamine (para-isomer).
106514	p-Benzoquinone.
	2,5-Cyclohexadiene-1,4-dione.
	Quinone.
106898	1-Chloro-2,3-epoxypropane.
	Epichlorohydrin.
	Oxirane, (chloromethyl)-.
106934	Dibromoethane.
	Ethane, 1,2-dibromo-.
	Ethylene, dibromide.
107028	Acrolein.
	2-Propenal.
107051	Allyl chloride.
107062	Ethane, 1,2-dichloro-.
	Ethylene dichloride.
	1,2-Dichloroethane.
107108	n-Propylamine.
	1-Propanamine.
107120	Ethyl cyanide.
	Propanenitrile.
107131	Acrylonitrile.
	2-Propenenitrile.
107153	Ethylenediamine.
107186	Allyl alcohol.
	2-Propen-1-ol.
107197	Propargyl alcohol.
	2-Propyn-1-ol.
107200	Acetaldehyde, chloro-.
	Chloroacetaldehyde.
107302	Chloromethyl methyl ether.
	Methane, chloromethoxy-.
107493	Diphosphoric acid, tetraethyl ester.
	Tetraethyl pyrophosphate.
107926	Butyric acid.
108054	Vinyl acetate.
	Vinyl acetate monomer.
108101	Methyl isobutyl ketone.
	4-Methyl-2-pentanone.
108247	Acetic anhydride.
108316	Maleic anhydride.
	2,5-Furandione.
108383	m-Benzene, dimethyl.
	m-Xylene.
108394	m-Cresol.
	m-Cresylic acid.
108463	Resorcinol.
	1,3-Benzenediol.
108601	Dichloroisopropyl ether.
	Propane, 2,2″-oxybis[2-chloro-.
108883	Benzene, methyl-.
	Toluene.
108907	Benzene, chloro-.
	Chlorobenzene.
108941	Cyclohexanone.
108952	Benzene, hydroxy-.
	Phenol.
108985	Benzenethiol.
	Thiophenol.
109068	Pyridine, 2-methyl-.
	2-Picoline.
109739	Butylamine.
109773	Malononitrile.
	Propanedinitrile.
109897	Diethylamine.
109999	Furan, tetrahydro-.
	Tetrahydrofuran.
110009	Furan.
	Furfuran.
110167	Maleic acid.
110178	Fumaric acid.
110190	iso-Butyl acetate.
110758	Ethene, 2-chloroethoxy-.
	2-Chloroethyl vinyl ether.
110805	Ethanol, 2-ethoxy-.
	Ethylene glycol monoethyl ether.
110827	Benzene, hexahydro-.
	Cyclohexane.
110861	Pyridine.
111444	Bis (2-chloroethyl) ether.
	Dichloroethyl ether.
	Ethane, 1,1′-oxybis[2-chloro-.
111546	Carbamodithioic acid, 1,2-ethanediylbis, salts & esters.
	Ethylenebisdithiocarbamic acid, salts & esters.
111911	Bis(2-chloroethoxy) methane.
	Dichloromethoxy ethane.
	Ethane, 1,1′-[methylenebis(oxy)]bis(2-chloro-.
115026	Azaserine.
	L-Serine, diazoacetate (ester).
115297	Endosulfan.
	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide.
115322	Dicofol.
116063	Aldicarb.
	Propanal, 2-methyl-2-(methylthio)-, 0-[(methylamino)carbonyl]oxime.
117806	Dichlone.
117817	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester.
	Bis(2-ethylhexyl)phthalate.
	DEHP.
	Diethylhexyl phthalate.
117840	Di-n-octyl phthalate.
	1,2-Benzenedicarboxylic acid, dioctyl ester.
118741	Benzene, hexachloro-.
	Hexachlorobenzene.
118796	2,4,6-Tribromophenol

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
119380	Carbamic acid, dimethyl-, 3-methyl-1-(1-methylethyl)-1H-pyrazol-5-yl ester (Isolan).
119904	[1,1′-Biphenyl]-4,4′diamine,3,3′dimethoxy-.
	3,3′-Dimethoxybenzidine.
119937	[1,1′Biphenyl]-4,4′-diamine,3,3′-dimethyl-.
	3,3′-Dimethylbenzidine.
120127	Anthracene.
120581	Isosafrole.
	1,3-Benzodioxole, 5-)1-propenyl)-.
120821	1,2,4-Trichlorobenzene.
120832	Phenol, 2,4-dichloro-.
	2,4-Dichlorophenol.
121142	Benzene, 1-methyl-2,4-dinitro-.
	2,4-Dinitrotoluene.
121211	Pyrethrins.
121299	Pyrethrins.
121448	Triethylamine.
121755	Malathion.
122098	alpha,alpha-Dimethylphenethylamine.
	Benzeneethanamine, alpha,alpha-dimethyl-.
122394	Diphenylamine.
122429	Carbamic acid, phenyl-, 1-methylethyl ester (Propham).
122667	Hydrazine, 1,2-diphenyl-.
	1,2-Diphenylhydrazine.
123331	Maleic hydrazide.
	3,6-Pyridazinedione, 1,2-dihydro-.
123626	Propionic anhydride.
123637	Paraldehyde.
	1,3,5-Trioxane, 2,4,6-trimethyl-.
123739	Crotonaldehyde.
	2-Butenal.
123864	Butyl acetate.
123911	1,4-Diethyleneoxide.
	1,4-Diethylenedioxide.
	1,4-Dioxane.
123922	iso-Amyl acetate.
124049	Adipic acid.
124403	Dimethylamine.
	Methanamine, N-methyl-.
124414	Sodium methylate.
124481	Chlorodibromomethane.
126727	Tris(2,3-dibromopropyl) phosphate.
	1-Propanol, 2,3-dibromo-, phosphate (3:1).
126987	Methacrylonitrile.
	2-Propenenitrile, 2-methyl-.
126998	2-Chloro-1,3-butadiene.
127184	Ethene, tetrachloro-.
	Perchloroethylene.
	Tetrachloroethene.
	Tetrachloroethylene.
127822	Zinc phenolsulfonate.
129000	Pyrene.
130154	1,4-Naphthalenedione.
	1,4-Naphthoquinone.
131113	Dimethyl phthalate.
	1,2-Benzenedicarboxylic acid, dimethyl ester.
131748	Ammonium picrate.
	Phenol, 2,4,6-trinitro-, ammonium salt.
131895	Phenol, 2-cyclohexyl-4,6-dinitro-.
	2-Cyclohexyl-4,6-dinitrophenol.
133062	Captan.
134327	alpha-Naphthylamine.
	1-Naphthalenamine.
137268	Thioperoxydicarbonic diamide ([H2N)C(S)]2S2, tetramethyl-.
	Thiram.
137304	Zinc, bis(dimethylcarbamodithioato-S,S′)-, (Ziram).
140885	Ethyl acrylate.
	2-Propenoic acid, ethyl ester.
141786	Acetic acid, ethyl ester.
	Ethyl acetate.
142289	1,3-Dichloropropane.
142712	Cupric acetate.
142847	Dipropylamine.
	1-Propanamine, N-propyl-.
143339	Sodium cyanide.
	Sodium cyanide Na(CN).
143500	Kepone.
	1,3,4-Metheno-2H-cyclobutal[cd]pentalen-2-one, 1,1a,3,3a,4,5,5,5a,5b,6-decachloroctahydro-.
145733	Endothall.
	7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid.
148823	L-Phenylalanine, 4-[bis(2-chloroethyl) aminol].
	Melphalan.
151508	Potassium cyanide.
	Potassium cyanide K(CN).
151564	Aziridine.
	Ethyleneimine.
152169	Diphosphoramide, octamethyl-.
	Octamethylpyrophosphoramide.
156605	Ethene, 1,2-dichloro- (E).
	1,2-Dichloroethylene.
189559	Benzo [rst]pentaphene.
	Dibenz[a,i]pyrene.
191242	Benzo[ghi]perylene.
193395	Indeno(1,2,3-cd)pyrene.
	1,10-(1,2-Phenylene)pyrene.
205992	Benzo[b]fluoranthene.
206440	Benzo[j,k]fluorene.
	Fluoranthene.
207089	Benzo(k)fluoranthene.
208968	Acenaphthylene.
218019	Chrysene.
	1,2-Benzphenanthrene.
225514	Benz[c]acridine.
297972	O,O-Diethyl O-pyrazinyl phosphorothioate.
	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester.
298000	Methyl parathion.
	Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester.
298022	Phorate.
	Phosphorodithioic acid, O,O-diethyl S-(ethylthio), methyl ester.
298044	Disulfoton.
	Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl]ester.
300765	Naled.
301042	Acetic acid, lead(2+) salt.
	Lead acetate.
302012	Hydrazine.
303344	Lasiocarpine.
	2-Butenoic acid, 2-methyl-, 7[[2,3-dihydroxy-2-(1-methoxyethyl)-3- methyl-1-oxobutoxy]methyl]-2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl ester, [1S-[1alpha(Z),7(2S*,3R*),7aalpha]]-.
305033	Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]-.
	Chlorambucil.
309002	Aldrin.
	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-10-hexachloro-1, 4,4a,5,8,8a-hexahydro-(1alpha,4 alpha,4abeta,5alpha,8alpha,8abeta)-.
311455	Diethyl-p-nitrophenyl phosphate.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
	Phosphoric acid, diethyl 4-nitrophenyl ester.
315184	Mexacarbate.
319846	alpha—BHC.
319857	beta—BHC.
319868	delta—BHC.
329715	2,5-Dinitrophenol.
330541	Diuron.
333415	Diazinon.
353504	Carbon oxyfluoride.
	Carbonic difluoride.
357573	Brucine.
	Strychnidin-10-one, 2,3-dimethoxy-.
460195	Cyanogen.
	Ethanedinitrile.
465736	Isodrin.
	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro (1alpha, 4alpha,4abeta,5beta,8beta,8abeta)-.
492808	Auramine.
	Benzenamine, 4,4′-carbonimidoylbis (N,N-dimethyl(N,N-D,methyl-)-.
494031	Chlornaphazine.
	Naphthalenamine, N,N′-bis(2-chloroethyl)-.
496720	Benzenediamine, ar-methyl-.
	Toluenediamine.
	2,4-Toluene diamine.
504245	4-Aminopyridine.
	4-Pyridinamine.
504609	1-Methylbutadiene.
	1,3-Pentadiene.
506616	Argentate(1-), bis(cyano-C)- ,potassium.
	Potassium silver cyanide.
506649	Silver cyanide.
	Silver cyanide Ag(CN).
506683	Cyanogen bromide.
	Cyanogen bromide (CN)Br.
506774	Cyanogen chloride.
	Cyanogen chloride (CN)Cl.
506876	Ammonium carbonate.
506967	Acetyl bromide.
509148	Methane, tetranitro-.
	Tetranitromethane.
510156	Benzeneacetic acid, 4-chloro-α- (4-chlorophenyl)-α-hydroxy-, ethyl ester.
	Chlorobenzilate.
513495	sec-Butylamine.
528290	o-Dinitrobenzene.
534521	4,6-Dinitro-o-cresol, and salts.
	Phenol, 2-methyl-4,6-dinitro-, & salts.
540738	Hydrazine, 1,2-dimethyl-.
	1,2-Dimethylhydrazine.
540885	tert-Butyl acetate.
541093	Uranyl acetate.
541537	Dithiobiuret.
	Thioimidodicarbonic diamide [(H2N)C(S)]2NH.
541731	Benzene, 1,3-dichloro-.
	m-Dichlorobenzene.
	1,3-Dichlorobenzene.
542621	Barium cyanide.
542756	1-Propene, 1,3-dichloro-.
	1,3-Dichloropropene.
542767	Propanenitrile, 3-chloro-.
	3-Chloropropionitrile.
542881	Bis(chloromethyl)ether.
	Dichloromethyl ether.
	Methane, oxybis(chloro)-.
543908	Cadmium acetate.
544183	Cobaltous formate.
544923	Copper cyanide CuCN.
	Copper cyanide.
554847	m-Nitrophenol.
557197	Nickel cyanide.
	Nickel cyanide Ni(CN)2.
557211	Zinc cyanide.
	Zinc cyanide Zn(CN)2.
557346	Zinc acetate.
557415	Zinc formate.
563122	Ethion.
563688	Acetic acid, thallium(1+) salt.
	Thallium(I) acetate.
573568	2,6-Dinitrophenol.
584849	Benzene, 1,3-diisocyanatomethyl-.
	Toluene diisocyanate.
	2,4-Toluene diisocyanate.
591082	Acetamide, N-(aminothioxomethyl)-.
	1-Acetyl-2-thiourea.
592018	Calcium cyanide.
	Calcium cyanide Ca(CN)2.
592041	Mercuric cyanide.
592858	Mercuric thiocyanate.
592870	Lead thiocyanate.
594423	Methanesulfenyl chloride, trichloro-.
	Trichloromethanesulfenyl chloride.
598312	Bromoacetone.
	2-Propanone, 1-bromo-.
606202	Benzene, 1-methyl-1,3-dinitro-.
	2,6-Dinitrotoluene.
608731	HEXACHLOROCYCLOHEXANE (all isomers).
608935	Benzene, pentachloro-.
	Pentachlorobenzene.
609198	3,4,5-Trichlorophenol.
610399	3,4-Dinitrotoluene.
615532	Carbamic acid, methylnitroso-, ethyl ester.
	N-Nitroso-N-methylurethane.
616239	n-,2,3 Dichloropropanol.
621647	Di-n-propylnitrosamine.
	1-Propanamine, N-nitroso-N-propyl-.
624839	Methane, isocyanato-.
	Methyl isocyanate.
625161	tert-Amyl acetate.
626380	sec-Amyl acetate.
628637	Amyl acetate.
628864	Fulminic acid, mercury(2+)salt.
	Mercury fulminate.
630104	Selenourea.
630206	Ethane, 1,1,1,2-tetrachloro-.
	1,1,1,2-Tetrachloroethane.
631618	Ammonium acetate.
636215	Benzenamine, 2-methyl-, hydrochloride.
	o-Toluidine hydrochloride.
640197	Acetamide, 2-fluoro-.
	Fluoroacetamide.
644644	Carbamic acid, dimethyl-,1-[(dimethylamino)carbonyl]-5-methyl-1H-pyrazol-3-yl ester (Dimetilan).
684935	N-Nitroso-N-methylurea.
	Urea, N-methyl-N-nitroso-.
692422	Arsine, diethyl-.
	Diethylarsine.
696286	Arsonous dichloride, phenyl-.
	Dichlorophenylarsine.
757584	Hexaethyl tetraphosphate.
	Tetraphosphoric acid, hexaethyl ester.
759739	N-Nitroso-N-ethylurea.
	Urea, N-ethyl-N-nitroso-.
764410	1,4-Dichloro-2-butene.
	2-Butene, 1,4-dichloro-.
765344	Glycidylaldehyde.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
	Oxiranecarboxyaldehyde.
815827	Cupric tartrate.
823405	Benzenediamine, ar-methyl-.
	Toluenediamine.
	2,4-Toluene diamine.
924163	N-Nitrosodi-n-butylamine.
	1-Butanamine, N-butyl-N-nitroso-.
930552	N-Nitrosopyrrolidine.
	Pyrrolidine, 1-nitroso-.
933755	2,3,6-Trichlorophenol.
933788	2,3,5-Trichlorophenol.
959988	alpha-Endosulfan.
1024573	Heptachlor epoxide.
1031078	Endosulfan sulfate.
1066304	Chromic acetate.
1066337	Ammonium bicarbonate.
1072351	Lead stearate.
1111780	Ammonium carbamate.
1116547	Ethanol, 2,2′-(nitrosoimino)bis-.
	N-Nitrosodiethanolamine.
1120714	1,2-Oxathiolane, 2,2-dioxide.
	1,3-Propane sultone.
1129415	Carbamic acid, methyl-, 3-methylphenyl ester (Metolcarb).
1185575	Ferric ammonium citrate.
1194656	Dichlobenil.
1300716	Xylenol.
1303282	Arsenic oxide As2O5.
	Arsenic pentoxide.
1303328	Arsenic disulfide.
1303339	Arsenic trisulfide.
1309644	Antimony trioxide.
1310583	Potassium hydroxide.
1310732	Sodium hydroxide.
1314325	Thallic oxide.
	Thallium oxide Tl2O3.
1314621	Vanadium oxide V2O5.
	Vanadium pentoxide.
1314803	Phosphorus pentasulfide.
	Phosphorus sulfide.
	Sulfur phosphide.
1314847	Zinc phosphide.
	Zinc phosphide Zn3P2, when present at concentrations greater than 10%.
1314870	Lead sulfide.
1319728	2,4,5-T amines.
1319773	Cresol(s).
	Cresylic acid.
	Phenol, methyl-.
1320189	2,4-D Ester.
1321126	Nitrotoluene.
1327522	Arsenic acid.
	Arsenic acid H3AsO4.
1327533	Arsenic oxide As2O3.
	Arsenic trioxide.
1330207	Benzene, dimethyl.
	Xylene (mixed).
1332076	Zinc borate.
1332214	Asbestos.
1333831	Sodium bifluoride.
1335326	Lead subacetate.
	Lead, bis(acetato-O)tetrahydroxytri.
1336216	Ammonium hydroxide.
1336363	Aroclors.
	PCBs.
	POLYCHLORINATED BIPHENYLS.
1338234	Methyl ethyl ketone peroxide.
	2-Butanone peroxide.
1338245	Naphthenic acid.
1341497	Ammonium bifluoride.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
1464535	1,2:3,4-Diepoxybutane.
	2,2′-Bioxirane.
1563388	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl- (Carbofuran phenol).
1563662	Carbofuran.
1615801	Hydrazine, 1,2-diethyl-.
	N,N′-Diethylhydrazine.
1646884	Propanal, 2-methyl-2-(methylsulfonyl)-, O-[(methylamino)carbonyl] oxime (Aldicarb sulfone).
1746016	TCDD.
	2,3,7,8-Tetrachlorodibenzo-p-dioxin.
1762954	Ammonium thiocyanate.
1863634	Ammonium benzoate.
1888717	Hexachloropropene.
	1-Propene, 1,1,2,3,3,3-hexachloro-.
1918009	Dicamba.
1928387	2,4-D Ester.
1928478	2,4,5-T esters.
1928616	2,4-D Ester.
1929733	2,4-D Ester.
2008460	2,4,5-T amines.
2032657	Mercaptodimethur.
2303164	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester.
	Diallate.
2303175	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3,3-trichloro-2-propenyl) ester (Triallate).
2312358	Propargite.
2545597	2,4,5-T esters.
2631370	Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate (Promecarb).
2763964	Muscimol.
	3(2H)-Isoxazolone, 5-(aminomethyl)-.
	5-(Aminomethyl)-3-isoxazolol.
2764729	Diquat
2921882	Chlorpyrifos.
2944674	Ferric ammonium oxalate.
2971382	2,4-D Ester.
3012655	Ammonium citrate, dibasic.
3164292	Ammonium tartrate.
3165933	Benzenamine, 4-chloro-2-methyl-, hydrochloride.
	4-Chloro-o-toluidine, hydrochloride.
3251238	Cupric nitrate.
3288582	O,O-Diethyl S-methyl dithiophosphate.
	Phosphorodithioic acid, O,O-diethyl S-methyl ester.
3486359	Zinc carbonate.
3689245	Tetraethyldithiopyrophosphate.
	Thiodiphosphoric acid, tetraethyl ester.
3813147	2,4,5-T amines.
4170303	Crotonaldehyde.
	2-Butenal.
4549400	N-Nitrosomethylvinylamine.
	Vinylamine, N-methyl-N-nitroso-.
5344821	Thiourea, (2-chlorophenyl)-.
	1-(o-Chlorophenyl)thiourea.
5893663	Cupric oxalate.
5952261	Ethanol, 2,2'-oxybis-, dicarbamate (Diethylene glycol, dicarbamate).
5972736	Ammonium oxalate.
6009707	Ammonium oxalate.
6369966	2,4,5-T amines.
6369977	2,4,5-T amines.
6533739	Carbonic acid, dithallium(1+) salt.
	Thallium(I) carbonate.
7005723	4-Chlorophenyl phenyl ether.
7421934	Endrin aldehyde.
7428480	Lead stearate.

APPENDIX A TO §302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
7439921	Lead.
7439976	Mercury.
7440020	Nickel.
7440224	Silver.
7440235	Sodium.
7440280	Thallium.
7440360	Antimony.
7440382	Arsenic.
7440417	Beryllium powder.
7440439	Cadmium.
7440473	Chromium.
7440508	Copper.
7440666	Zinc.
7446084	Selenium dioxide.
	Selenium oxide.
7446142	Lead sulfate.
7446186	Sulfuric acid, dithallium(1+) salt.
	Thallium(I) sulfate.
7446277	Lead phosphate.
	Phosphoric acid, lead(2+) salt (2:3).
7447394	Cupric chloride.
7488564	Selenium sulfide.
	Selenium sulfide SeS2.
7558794	Sodium phosphate, dibasic.
7601549	Sodium phosphate, tribasic.
7631892	Sodium arsenate.
7631905	Sodium bisulfite.
7632000	Sodium nitrite.
7645252	Lead arsenate.
7646857	Zinc chloride.
7647010	Hydrochloric acid.
	Hydrogen chloride.
7647189	Antimony pentachloride.
7664382	Phosphoric acid.
7664393	Hydrofluoric acid.
	Hydrogen fluoride.
7664417	Ammonia.
7664939	Sulfuric acid.
7681494	Sodium fluoride.
7681529	Sodium hypochlorite.
7697372	Nitric acid.
7699458	Zinc bromide.
7705080	Ferric chloride.
7718549	Nickel chloride.
7719122	Phosphorus trichloride.
7720787	Ferrous sulfate.
7722647	Potassium permanganate.
7723140	Phosphorus.
7733020	Zinc sulfate.
7738945	Chromic acid.
7758294	Sodium phosphate, tribasic.
7758943	Ferrous chloride.
7758954	Lead chloride.
7758987	Cupric sulfate.
7761888	Silver nitrate.
7773060	Ammonium sulfamate.
7775113	Sodium chromate.
7778394	Arsenic acid.
	Arsenic acid H3As04.
7778441	Calcium arsenate.
7778509	Potassium bichromate.
7778543	Calcium hypochlorite.
7779864	Zinc hydrosulfite.
7779886	Zinc nitrate.
7782414	Fluorine.
7782492	Selenium.
7782505	Chlorine.
7782630	Ferrous sulfate.
7782823	Sodium selenite.
7782867	Mercurous nitrate.
7783008	Selenious acid.
7783064	Hydrogen sulfide.
	Hydrogen sulfide H2S.
7783359	Mercuric sulfate.
7783462	Lead fluoride.
7783495	Zinc fluoride.
7783508	Ferric fluoride.
7783564	Antimony trifluoride.
7784341	Arsenic trichloride.
7784409	Lead arsenate.
7784410	Potassium arsenate.
7784465	Sodium arsenite.
7785844	Sodium phosphate, tribasic.
7786347	Mevinphos.
7786814	Nickel sulfate.
7787475	Beryllium chloride.
7787497	Beryllium fluoride.
7787555	Beryllium nitrate.
7788989	Ammonium chromate.
7789006	Potassium chromate.
7789062	Strontium chromate.
7789095	Ammonium bichromate.
7789426	Cadmium bromide.
7789437	Cobaltous bromide.
7789619	Antimony tribromide.
7790945	Chlorosulfonic acid.
7791120	Thallium chloride TlCl.
	Thallium(I) chloride.
7803512	Hydrogen phosphide.
	Phosphine.
7803556	Ammonium vanadate.
	Vanadic acid, ammonium salt.
8001352	Camphene, octachloro-.
	Chlorinated camphene.
	Toxaphene.
8001589	Creosote.
8003198	Dichloropropane—Dichloropropene (mixture).
8003347	Pyrethrins.
8014957	Sulfuric acid.
10022705	Sodium hypochlorite.
10025873	Phosphorus oxychloride.
10025919	Antimony trichloride.
10026116	Zirconium tetrachloride.
10028225	Ferric sulfate.
10031591	Sulfuric acid, dithallium(1+) salt.
	Thallium(I) sulfate.
10039324	Sodium phosphate, dibasic.
10043013	Aluminum sulfate.
10045893	Ferrous ammonium sulfate.
10045940	Mercuric nitrate.
10049055	Chromous chloride.
10099748	Lead nitrate.
10101538	Chromic sulfate.
10101630	Lead iodide.
10101890	Sodium phosphate, tribasic.
10102064	Uranyl nitrate.
10102188	Sodium selenite.
10102439	Nitric oxide.
	Nitrogen oxide NO.
10102440	Nitrogen dioxide.
	Nitrogen oxide NO2.
10102451	Nitric acid, thallium(1+) salt.
	Thallium(I) nitrate.
10102484	Lead arsenate.
10108642	Cadmium chloride.
10124502	Potassium arsenite.
10124568	Sodium phosphate, tribasic.
10140655	Sodium phosphate, dibasic.
10192300	Ammonium bisulfite.
10196040	Ammonium sulfite.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
10361894	Sodium phosphate, tribasic.
10380297	Cupric sulfate, ammoniated.
10415755	Mercurous nitrate.
10421484	Ferric nitrate.
10544726	Nitrogen dioxide.
	Nitrogen oxide NO2.
10588019	Sodium bichromate.
10605217	Carbamic acid, 1H-benzimidazol-2-yl, methyl ester (Carbendazim).
11096825	Aroclor 1260.
	Aroclors.
	PCBs.
	POLYCHLORINATED BIPHENYLS.
11097691	Aroclor 1254.
	Aroclors.
	PCBs
	POLYCHLORINATED BIPHENYLS.
11104282	Aroclor 1221.
	Aroclors.
	PCBs.
	POLYCHLORINATED BIPHENYLS.
11115745	Chromic acid.
11141165	Aroclor 1232.
	Aroclors.
	PCBs.
	POLYCHLORINATED BIPHENYLS.
12002038	Cupric acetoarsenite.
12039520	Selenious acid, dithallium(1+) salt.
	Thallium selenite.
12054487	Nickel hydroxide.
12125018	Ammonium fluoride.
12125029	Ammonium chloride.
12135761	Ammonium sulfide.
12672296	Aroclor 1248.
	Aroclors.
	PCBs.
	POLYCHLORINATED BIPHENYLS.
12674112	Aroclor 1016.
	Aroclors.
	PCBs.
	POLYCHLORINATED BIPHENYLS.
12771083	Sulfur monochloride.
13463393	Nickel carbonyl.
	Nickel carbonyl Ni(CO)4, (T-4)-.
13560991	2,4,5-T salts.
13597994	Beryllium nitrate.
13746899	Zirconium nitrate.
13765190	Calcium chromate.
	Chromic acid H2CrO4, calcium salt.
13814965	Lead fluoborate.
13826830	Ammonium fluoborate.
13952846	sec-Butylamine.
14017415	Cobaltous sulfamate.
14216752	Nickel nitrate.
14258492	Ammonium oxalate.
14307358	Lithium chromate.
14307438	Ammonium tartrate.
14639975	Zinc ammonium chloride.
14639986	Zinc ammonium chloride.
14644612	Zirconium sulfate.
15339363	Manganese, bis(dimethylcarbamodithioato-S,S')- (Manganese dimethyldithiocarbamate).
15699180	Nickel ammonium sulfate.
15739807	Lead sulfate.
15950660	2,3,4-Trichlorophenol.
16721805	Sodium hydrosulfide.
16752775	Ethanimidothioic acid, N-[[(methyl-amino)carbonyl] oxy]-, methyl ester.
	Methomyl.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
16871719	Zinc silicofluoride.
16919190	Ammonium silicofluoride.
16923958	Zirconium potassium fluoride.
17702577	Methanimidamide, N,N-dimethyl-N'-[2-methyl-4-[[(methylamino)carbonyl]oxy]phenyl]- (Formparanate).
17804352	Carbamic acid, [1-[(butylamino)carbonyl]-1H-benzimidazol-2-yl, methyl ester (Benomyl).
18883664	D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl]amino]-.
	Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-.
	Streptozotocin.
20816120	Osmium oxide OsO4 (T-4)-.
	Osmium tetroxide.
20830813	Daunomycin.
	5,12-Naphthacenedione, 8-acetyl-10-[3-amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-,(8S-cis)-.
20859738	Aluminum phosphide.
22781233	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate (Bendiocarb).
22961826	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, (Bendiocarb phenol).
23135220	Ethanimidothioc acid, 2-(dimethylamino)-N-[[(methylamino)carbonyl]oxy]-2-oxo-, methyl ester (Oxamyl).
23422539	Methanimidamide, N,N-dimethyl-N'-[3-[[(methylamino)carbonyl]oxy]phenyl]-, monohydrochloride (Formetanate hydrochloride).
23564058	Carbamic acid, [1,2-phenylenebis(iminocarbonothioyl)]bis-, dimethyl ester (Thiophanate-methyl).
23950585	Benzamide, 3,5-dichloro-N-(1,1- dimethyl-2-propynyl)-.
	Pronamide.
25154545	Dinitrobenzene (mixed).
25154556	Nitrophenol (mixed).
25155300	Sodium dodecylbenzenesulfonate.
25167822	Trichlorophenol.
25168154	2,4,5-T esters.
25168267	2,4-D Ester.
25321146	Dinitrotoluene.
25321226	Dichlorobenzene.
25376458	Benzenediamine, ar-methyl-.
	Toluenediamine.
	2,4-Toluene diamine.
25550587	Dinitrophenol.
26264062	Calcium dodecylbenzenesulfonate.
26419738	1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-, O-[(methylamino)carbonyl]oxime (Tirpate).
26471625	Benzene, 1,3-diisocyanatomethyl-.
	Toluene diisocyanate.
	2,4-Toluene diisocyanate.
26628228	Sodium azide.
26638197	Dichloropropane.
26952238	Dichloropropene.
27176870	Dodecylbenzenesulfonic acid.
27323417	Triethanolamine dodecylbenzene sulfonate.
27774136	Vanadyl sulfate.
28300745	Antimony potassium tartrate.
30525894	Paraformaldehyde.
30558431	Ethanimidothioic acid, 2-(dimethylamino)-N-hydroxy-2-oxo-, methyl ester (A2213).
32534955	2,4,5-TP esters.
33213659	beta - Endosulfan.
36478769	Uranyl nitrate.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
37211055	Nickel chloride.
39196184	Thiofanox 2-Butanone, 3,3-dimethyl-1-(methylthio)-, O[(methylamino)carbonyl] oxime.
42504461	Isopropanolamine dodecylbenzenesulfonate.
52628258	Zinc ammonium chloride.
52652592	Lead stearate.
52740166	Calcium arsenite.
52888809	Carbamothioic acid, dipropyl-, S-(phenylmethyl) ester (Prosulfocarb).
53467111	2,4-D Ester.
53469219	Aroclor 1242 Aroclors. PCBs. POLYCHLORINATED BIPHENYLS.
55285148	Carbamic acid, [(dibutylamino)thio]methyl-, 2,3-dihydro-2,2-dimethyl-7-benzofuranyl ester (Carbosulfan).
55488874	Ferric ammonium oxalate.
56189094	Lead stearate.
59669260	Ethanimidothioic acid, N,N'-[thiobis[(methylimino)carbonyloxy]]bis-, dimethyl ester (Thiodicarb).
61792072	2,4,5-T esters.

APPENDIX B TO § 302.4—RADIONUCLIDES

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Radionuclides@	....	1& (3.7E 10)
Actinium-224	89	100 (3.7E 12)
Actinium-225	89	1 (3.7E 10)
Actinium-226	89	10 (3.7E 11)
Actinium-227	89	0.001 (3.7E 7)
Actinium-228	89	10 (3.7E 11)
Aluminum-26	13	10 (3.7E 11)
Americium-237	95	1000 (3.7E 13)
Americium-238	95	100 (3.7E 12)
Americium-239	95	100 (3.7E 12)
Americium-240	95	10 (3.7E 11)
Americium-241	95	0.01 (3.7E 8)
Americium-242m	95	0.01 (3.7E 8)
Americium-242	95	100 (3.7E 12)
Americium-243	95	0.01 (3.7E 8)
Americium-244m	95	1000 (3.7E 13)
Americium-244	95	10 (3.7E 11)
Americium-245	95	1000 (3.7E 13)
Americium-246m	95	1000 (3.7E 13)
Americium-246	95	1000 (3.7E 13)
Antimony-115	51	1000 (3.7E 13)
Antimony-116m	51	100 (3.7E 12)
Antimony-116	51	1000 (3.7E 13)
Antimony-117	51	1000 (3.7E 13)
Antimony-118m	51	10 (3.7E 11)
Antimony-119	51	1000 (3.7E 13)
Antimony-120 (16 min)	51	1000 (3.7E 13)
Antimony-120 (5.76 day)	51	10 (3.7E 11)
Antimony-122	51	10 (3.7E 11)
Antimony-124m	51	1000 (3.7E 13)
Antimony-124	51	10 (3.7E 11)
Antimony-125	51	10 (3.7E 11)
Antimony-126m	51	1000 (3.7E 13)
Antimony-126	51	10 (3.7E 11)
Antimony-127	51	10 (3.7E 11)
Antimony-128 (10.4 min)	51	1000 (3.7E 13)
Antimony-128 (9.01 hr)	51	10 (3.7E 11)
Antimony-129	51	100 (3.7E 12)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Antimony-130	51	100 (3.7E 12)
Antimony-131	51	1000 (3.7E 13)
Argon-39	18	1000 (3.7E 13)
Argon-41	18	10 (3.7E 11)
Arsenic-69	33	1000 (3.7E 13)
Arsenic-70	33	100 (3.7E 12)
Arsenic-71	33	100 (3.7E 12)
Arsenic-72	33	10 (3.7E 11)
Arsenic-73	33	100 (3.7E 12)
Arsenic-74	33	10 (3.7E 11)
Arsenic-76	33	100 (3.7E 12)
Arsenic-77	33	1000 (3.7E 13)
Arsenic-78	33	100 (3.7E 12)
Astatine-207	85	100 (3.7E 12)
Astatine-211	85	100 (3.7E 12)
Barium-126	56	1000 (3.7E 13)
Barium-128	56	10 (3.7E 11)
Barium-131m	56	1000 (3.7E 13)
Barium-131	56	10 (3.7E 11)
Barium-133m	56	100 (3.7E 12)
Barium-133	56	10 (3.7E 11)
Barium-135m	56	1000 (3.7E 13)
Barium-139	56	1000 (3.7E 13)
Barium-140	56	10 (3.7E 11)
Barium-141	56	1000 (3.7E 13)
Barium-142	56	1000 (3.7E 13)
Berkelium-245	97	100 (3.7E 12)
Berkelium-246	97	10 (3.7E 11)
Berkelium-247	97	0.01 (3.7E 8)
Berkelium-249	97	1 (3.7E 10)
Berkelium-250	97	100 (3.7E 12)
Beryllium-7	4	100 (3.7E 12)
Beryllium-10	4	1 (3.7E 10)
Bismuth-200	83	100 (3.7E 12)
Bismuth-201	83	100 (3.7E 12)
Bismuth-202	83	1000 (3.7E 13)
Bismuth-203	83	10 (3.7E 11)
Bismuth-205	83	10 (3.7E 11)
Bismuth-206	83	10 (3.7E 11)
Bismuth-207	83	10 (3.7E 11)
Bismuth-210m	83	0.1 (3.7E 9)
Bismuth-210	83	10 (3.7E 11)
Bismuth-212	83	100 (3.7E 12)
Bismuth-213	83	100 (3.7E 12)
Bismuth-214	83	100 (3.7E 12)
Bromine-74m	35	100 (3.7E 12)
Bromine-74	35	100 (3.7E 12)
Bromine-75	35	100 (3.7E 12)
Bromine-76	35	10 (3.7E 11)
Bromine-77	35	100 (3.7E 12)
Bromine-80m	35	1000 (3.7E 13)
Bromine-80	35	1000 (3.7E 13)
Bromine-82	35	10 (3.7E 11)
Bromine-83	35	1000 (3.7E 13)
Bromine-84	35	100 (3.7E 12)
Cadmium-104	48	1000 (3.7E 13)
Cadmium-107	48	1000 (3.7E 13)
Cadmium-109	48	1 (3.7E 10)
Cadmium-113m	48	0.1 (3.7E 9)
Cadmium-113	48	0.1 (3.7E 9)
Cadmium-115m	48	10 (3.7E 11)
Cadmium-115	48	100 (3.7E 12)
Cadmium-117m	48	10 (3.7E 11)
Cadmium-117	48	100 (3.7E 12)
Calcium-41	20	10 (3.7E 11)
Calcium-45	20	10 (3.7E 11)
Calcium-47	20	10 (3.7E 11)
Californium-244	98	1000 (3.7E 13)
Californium-246	98	10 (3.7E 11)
Californium-248	98	0.1 (3.7E 9)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Californium-249	98	0.01 (3.7E 8)
Californium-250	98	0.01 (3.7E 8)
Californium-251	98	0.01 (3.7E 8)
Californium-252	98	0.1 (3.7E 9)
Californium-253	98	10 (3.7E 11)
Californium-254	98	0.1 (3.7E 9)
Carbon-11	6	1000 (3.7E 13)
Carbon-14	6	10 (3.7E 11)
Cerium-134	58	10 (3.7E 11)
Cerium-135	58	10 (3.7E 11)
Cerium-137m	58	100 (3.7E 12)
Cerium-137	58	1000 (3.7E 13)
Cerium-139	58	100 (3.7E 12)
Cerium-141	58	10 (3.7E 11)
Cerium-143	58	100 (3.7E 12)
Cerium-144	58	1 (3.7E 10)
Cesium-125	55	1000 (3.7E 13)
Cesium-127	55	100 (3.7E 12)
Cesium-129	55	100 (3.7E 12)
Cesium-130	55	1000 (3.7E 13)
Cesium-131	55	1000 (3.7E 13)
Cesium-132	55	10 (3.7E 11)
Cesium-134m	55	1000 (3.7E 13)
Cesium-134	55	1 (3.7E 10)
Cesium-135m	55	100 (3.7E 12)
Cesium-135	55	10 (3.7E 11)
Cesium-136	55	10 (3.7E 11)
Cesium-137	55	1 (3.7E 10)
Cesium-138	55	100 (3.7E 12)
Chlorine-36	17	10 (3.7E 11)
Chlorine-38	17	100 (3.7E 12)
Chlorine-39	17	100 (3.7E 12)
Chromium-48	24	100 (3.7E 12)
Chromium-49	24	1000 (3.7E 13)
Chromium-51	24	1000 (3.7E 13)
Cobalt-55	27	10 (3.7E 11)
Cobalt-56	27	10 (3.7E 11)
Cobalt-57	27	100 (3.7E 12)
Cobalt-58m	27	1000 (3.7E 13)
Cobalt-58	27	10 (3.7E 11)
Cobalt-60m	27	1000 (3.7E 13)
Cobalt-60	27	10 (3.7E 11)
Cobalt-61	27	1000 (3.7E 13)
Cobalt-62m	27	1000 (3.7E 13)
Copper-60	29	100 (3.7E 12)
Copper-61	29	100 (3.7E 12)
Copper-64	29	1000 (3.7E 13)
Copper-67	29	100 (3.7E 12)
Curium-238	96	1000 (3.7E 13)
Curium-240	96	1 (3.7E 10)
Curium-241	96	10 (3.7E 11)
Curium-242	96	1 (3.7E 10)
Curium-243	96	0.01 (3.7E 8)
Curium-244	96	0.01 (3.7E 8)
Curium-245	96	0.01 (3.7E 8)
Curium-246	96	0.01 (3.7E 8)
Curium-247	96	0.01 (3.7E 8)
Curium-248	96	0.001 (3.7E 7)
Curium-249	96	1000 (3.7E 13)
Dysprosium-155	66	100 (3.7E 12)
Dysprosium-157	66	100 (3.7E 12)
Dysprosium-159	66	100 (3.7E 12)
Dysprosium-165	66	1000 (3.7E 13)
Dysprosium-166	66	10 (3.7E 11)
Einsteinium-250	99	10 (3.7E 11)
Einsteinium-251	99	1000 (3.7E 13)
Einsteinium-253	99	10 (3.7E 11)
Einsteinium-254m	99	1 (3.7E 10)
Einsteinium-254	99	0.1 (3.7E 9)
Erbium-161	68	100 (3.7E 12)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Erbium-165	68	1000 (3.7E 13)
Erbium-169	68	100 (3.7E 12)
Erbium-171	68	100 (3.7E 12)
Erbium-172	68	10 (3.7E 11)
Europium-145	63	10 (3.7E 11)
Europium-146	63	10 (3.7E 11)
Europium-147	63	10 (3.7E 11)
Europium-148	63	10 (3.7E 11)
Europium-149	63	100 (3.7E 12)
Europium-150 (12.6 hr)	63	1000 (3.7E 13)
Europium-150 (34.2 yr)	63	10 (3.7E 11)
Europium-152m	63	100 (3.7E 12)
Europium-152	63	10 (3.7E 11)
Europium-154	63	10 (3.7E 11)
Europium-155	63	10 (3.7E 11)
Europium-156	63	10 (3.7E 11)
Europium-157	63	10 (3.7E 11)
Europium-158	63	1000 (3.7E 13)
Fermium-252	100	10 (3.7E 11)
Fermium-253	100	10 (3.7E 11)
Fermium-254	100	100 (3.7E 12)
Fermium-255	100	100 (3.7E 12)
Fermium-257	100	1 (3.7E 10)
Fluorine-18	9	1000 (3.7E 13)
Francium-222	87	100 (3.7E 12)
Francium-223	87	100 (3.7E 12)
Gadolinium-145	64	100 (3.7E 12)
Gadolinium-146	64	10 (3.7E 11)
Gadolinium-147	64	10 (3.7E 11)
Gadolinium-148	64	0.001 (3.7E7)
Gadolinium-149	64	100 (3.7E 12)
Gadolinium-151	64	100 (3.7E 12)
Gadolinium-152	64	0.001 (3.7E 7)
Gadolinium-153	64	10 (3.7E 11)
Gadolinium-159	64	1000 (3.7E 13)
Gallium-65	31	1000 (3.7E 13)
Gallium-66	31	10 (3.7E 11)
Gallium-67	31	100 (3.7E 12)
Gallium-68	31	1000 (3.7E 13)
Gallium-70	31	1000 (3.7E 13)
Gallium-72	31	10 (3.7E 11)
Gallium-73	31	100 (3.7E 12)
Germanium-66	32	100 (3.7E 12)
Germanium-67	32	1000 (3.7E 13)
Germanium-68	32	10 (3.7E 11)
Germanium-69	32	10 (3.7E 11)
Germanium-71	32	1000 (3.7E 13)
Germanium-75	32	1000 (3.7E 13)
Germanium-77	32	10 (3.7E 11)
Germanium-78	32	1000 (3.7E 13)
Gold-193	79	100 (3.7E 12)
Gold-194	79	10 (3.7E 11)
Gold-195	79	100 (3.7E 12)
Gold-198m	79	10 (3.7E 11)
Gold-198	79	100 (3.7E 12)
Gold-199	79	100 (3.7E 12)
Gold-200m	79	10 (3.7E 11)
Gold-200	79	1000 (3.7E 13)
Gold-201	79	1000 (3.7E 13)
Hafnium-170	72	100 (3.7E 12)
Hafnium-172	72	1 (3.7E 10)
Hafnium-173	72	100 (3.7E 12)
Hafnium-175	72	100 (3.7E 12)
Hafnium-177m	72	1000 (3.7E 13)
Hafnium-178m	72	0.1 (3.7E 9)
Hafnium-179m	72	100 (3.7E 12)
Hafnium-180m	72	100 (3.7E 12)
Hafnium-181	72	10 (3.7E 11)
Hafnium-182m	72	100 (3.7E 12)
Hafnium-182	72	0.1 (3.7E 9)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Hafnium-183	72	100 (3.7E 12)
Hafnium-184	72	100 (3.7E 12)
Holmium-155	67	1000 (3.7E 13)
Holmium-157	67	1000 (3.7E 13)
Holmium-159	67	1000 (3.7E 13)
Holmium-161	67	1000 (3.7E 13)
Holmium-162m	67	1000 (3.7E 13)
Holmium-162	67	1000 (3.7E 13)
Holmium-164m	67	1000 (3.7E 13)
Holmium-164	67	1000 (3.7E 13)
Holmium-166m	67	1 (3.7E 10)
Holmium-166	67	100 (3.7E 12)
Holmium-167	67	100 (3.7E 12)
Hydrogen-3	1	100 (3.7E 12)
Indium-109	49	100 (3.7E 12)
Indium-110 (69.1 min)	49	100 (3.7E 12)
Indium-110 (4.9 hr)	49	10 (3.7E 11)
Indium-111	49	100 (3.7E 12)
Indium-112	49	1000 (3.7E 13)
Indium-113m	49	1000 (3.7E 13)
Indium-114m	49	10 (3.7E 11)
Indium-115m	49	100 (3.7E 12)
Indium-115	49	0.1 (3.7E 9)
Indium-116m	49	100 (3.7E 12)
Indium-117m	49	100 (3.7E 12)
Indium-117	49	1000 (3.7E 13)
Indium-119m	49	1000 (3.7E 13)
Iodine-120m	53	100 (3.7E 12)
Iodine-120	53	10 (3.7E 11)
Iodine-121	53	100 (3.7E 12)
Iodine-123	53	10 (3.7E 11)
Iodine-124	53	0.1 (3.7E 9)
Iodine-125	53	0.01 (3.7E 8)
Iodine-126	53	0.01 (3.7E 8)
Iodine-128	53	1000 (3.7E 13)
Iodine-129	53	0.001 (3.7E 7)
Iodine-130	53	1 (3.7E 10)
Iodine-131	53	0.01 (3.7E 8)
Iodine-132m	53	10 (3.7E 11)
Iodine-132	53	10 (3.7E 11)
Iodine-133	53	0.1 (3.7E 9)
Iodine-134	53	100 (3.7E 12)
Iodine-135	53	10 (3.7E 11)
Iridium-182	77	1000 (3.7E 13)
Iridium-184	77	100 (3.7E 12)
Iridium-185	77	100 (3.7E 12)
Iridium-186	77	10 (3.7E 11)
Iridium-187	77	100 (3.7E 12)
Iridium-188	77	10 (3.7E 11)
Iridium-189	77	100 (3.7E 12)
Iridium-190m	77	1000 (3.7E 13)
Iridium-190	77	10 (3.7E 11)
Iridium-192m	77	100 (3.7E 12)
Iridium-192	77	10 (3.7E 11)
Iridium-194m	77	10 (3.7E 11)
Iridium-194	77	100 (3.7E 12)
Iridium-195m	77	100 (3.7E 12)
Iridium-195	77	1000 (3.7E 13)
Iron-52	26	100 (3.7E 12)
Iron-55	26	100 (3.7E 12)
Iron-59	26	10 (3.7E 11)
Iron-60	26	0.1 (3.7E 9)
Krypton-74	36	10 (3.7E 11)
Krypton-76	36	10 (3.7E 11)
Krypton-77	36	10 (3.7E 11)
Krypton-79	36	100 (3.7E 12)
Krypton-81	36	1000 (3.7E 13)
Krypton-83m	36	1000 (3.7E 13)
Krypton-85m	36	100 (3.7E 12)
Krypton-85	36	1000 (3.7E 13)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Krypton-87	36	10 (3.7E 11)
Krypton-88	36	10 (3.7E 11)
Lanthanum-131	57	1000 (3.7E 13)
Lanthanum-132	57	100 (3.7E 12)
Lanthanum-135	57	1000 (3.7E 13)
Lanthanum-137	57	10 (3.7E 11)
Lanthanum-138	57	1 (3.7E 10)
Lanthanum-140	57	10 (3.7E 11)
Lanthanum-141	57	1000 (3.7E 13)
Lanthanum-142	57	100 (3.7E 12)
Lanthanum-143	57	1000 (3.7E 13)
Lead-195m	82	1000 (3.7E 13)
Lead-198	82	100 (3.7E 12)
Lead-199	82	100 (3.7E 12)
Lead-200	82	100 (3.7E 12)
Lead-201	82	100 (3.7E 12)
Lead-202m	82	10 (3.7E 11)
Lead-202	82	1 (3.7E 10)
Lead-203	82	100 (3.7E 12)
Lead-205	82	100 (3.7E 12)
Lead-209	82	1000 (3.7E 13)
Lead-210	82	0.01 (3.7E 8)
Lead-211	82	100 (3.7E 12)
Lead-212	82	10 (3.7E 11)
Lead-214	82	100 (3.7E 12)
Lutetium-169	71	10 (3.7E 11)
Lutetium-170	71	10 (3.7E 11)
Lutetium-171	71	10 (3.7E 11)
Lutetium-172	71	10 (3.7E 11)
Lutetium-173	71	100 (3.7E 12)
Lutetium-174m	71	10 (3.7E 11)
Lutetium-174	71	10 (3.7E 11)
Lutetium-176m	71	1000 (3.7E 13)
Lutetium-176	71	1 (3.7E 10)
Lutetium-177m	71	10 (3.7E 11)
Lutetium-177	71	100 (3.7E 12)
Lutetium-178m	71	1000 (3.7E 13)
Lutetium-178	71	1000 (3.7E 13)
Lutetium-179	71	1000 (3.7E 13)
Magnesium-28	12	10 (3.7E 11)
Manganese-51	25	1000 (3.7E 13)
Manganese-52m	25	1000 (3.7E 13)
Manganese-52	25	10 (3.7E 11)
Manganese-53	25	1000 (3.7E 13)
Manganese-54	25	10 (3.7E 11)
Manganese-56	25	100 (3.7E 12)
Mendelevium-257	101	100 (3.7E 12)
Mendelevium-258	101	1 (3.7E 10)
Mercury-193m	80	10 (3.7E 11)
Mercury-193	80	100 (3.7E 12)
Mercury-194	80	0.1 (3.7E 9)
Mercury-195m	80	100 (3.7E 12)
Mercury-195	80	100 (3.7E 12)
Mercury-197m	80	1000 (3.7E 13)
Mercury-197	80	1000 (3.7E 13)
Mercury-199m	80	1000 (3.7E 13)
Mercury-203	80	10 (3.7E 11)
Molybdenum-90	42	100 (3.7E 12)
Molybdenum-93m	42	10 (3.7E 11)
Molybdenum-93	42	100 (3.7E 12)
Molybdenum-99	42	100 (3.7E 12)
Molybdenum-101	42	1000 (3.7E 13)
Neodymium-136	60	1000 (3.7E 13)
Neodymium-138	60	1000 (3.7E 13)
Neodymium-139m	60	100 (3.7E 12)
Neodymium-139	60	1000 (3.7E 13)
Neodymium-141	60	1000 (3.7E 13)
Neodymium-147	60	10 (3.7E 11)
Neodymium-149	60	100 (3.7E 12)
Neodymium-151	60	1000 (3.7E 13)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Neptunium-232	93	1000 (3.7E 13)
Neptunium-233	93	1000 (3.7E 13)
Neptunium-234	93	10 (3.7E 11)
Neptunium-235	93	1000 (3.7E 13)
Neptunium-236 (1.2 E 5 yr)	93	0.1 (3.7E 9)
Neptunium-236 (22.5 hr)	93	100 (3.7E 12)
Neptunium-237	93	0.01 (3.7E 8)
Neptunium-238	93	10 (3.7E 11)
Neptunium-239	93	100 (3.7E 12)
Neptunium-240	93	100 (3.7E 12)
Nickel-56	28	10 (3.7E 11)
Nickel-57	28	10 (3.7E 11)
Nickel-59	28	100 (3.7E 12)
Nickel-63	28	100 (3.7E 12)
Nickel-65	28	100 (3.7E 12)
Nickel-66	28	10 (3.7E 11)
Niobium-88	41	100 (3.7E 12)
Niobium-89 (66 min)	41	100 (3.7E 12)
Niobium-89 (122 min)	41	100 (3.7E 12)
Niobium-90	41	10 (3.7E 11)
Niobium-93m	41	100 (3.7E 12)
Niobium-94	41	10 (3.7E 11)
Niobium-95m	41	100 (3.7E 12)
Niobium-95	41	10 (3.7E 11)
Niobium-96	41	10 (3.7E 11)
Niobium-97	41	100 (3.7E 12)
Niobium-98	41	1000 (3.7E 13)
Osmium-180	76	1000 (3.7E 13)
Osmium-181	76	100 (3.7E 12)
Osmium-182	76	100 (3.7E 12)
Osmium-185	76	10 (3.7E 11)
Osmium-189m	76	1000 (3.7E 13)
Osmium-191m	76	1000 (3.7E 13)
Osmium-191	76	100 (3.7E 12)
Osmium-193	76	100 (3.7E 12)
Osmium-194	76	1 (3.7E 10)
Palladium-100	46	100 (3.7E 12)
Palladium-101	46	100 (3.7E 12)
Palladium-103	46	100 (3.7E 12)
Palladium-107	46	100 (3.7E 12)
Palladium-109	46	1000 (3.7E 13)
Phosphorus-32	15	0.1 (3.7E 9)
Phosphorus-33	15	1 (3.7E 10)
Platinum-186	78	100 (3.7E 12)
Platinum-188	78	100 (3.7E 12)
Platinum-189	78	100 (3.7E 12)
Platinum-191	78	100 (3.7E 12)
Platinum-193m	78	100 (3.7E 12)
Platinum-193	78	1000 (3.7E 13)
Platinum-195m	78	100 (3.7E 12)
Platinum-197m	78	1000 (3.7E 13)
Platinum-197	78	1000 (3.7E 13)
Platinum-199	78	1000 (3.7E 13)
Platinum-200	78	100 (3.7E 12)
Plutonium-234	94	1000 (3.7E 13)
Plutonium-235	94	1000 (3.7E 13)
Plutonium-236	94	0.1 (3.7E 9)
Plutonium-237	94	1000 (3.7E 13)
Plutonium-238	94	0.01 (3.7E 8)
Plutonium-239	94	0.01 (3.7E 8)
Plutonium-240	94	0.01 (3.7E 8)
Plutonium-241	94	1 (3.7E 10)
Plutonium-242	94	0.01 (3.7E 8)
Plutonium-243	94	1000 (3.7E 13)
Plutonium-244	94	0.01 (3.7E 8)
Plutonium-245	94	100 (3.7E 12)
Polonium-203	84	100 (3.7E 12)
Polonium-205	84	100 (3.7E 12)
Polonium-207	84	10 (3.7E 11)
Polonium-210	84	0.01 (3.7E 8)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Potassium-40	19	1 (3.7E 10)
Potassium-42	19	100 (3.7E 12)
Potassium-43	19	10 (3.7E 11)
Potassium-44	19	100 (3.7E 12)
Potassium-45	19	1000 (3.7E 13)
Praseodymium-136	59	1000 (3.7E 13)
Praseodymium-137	59	1000 (3.7E 13)
Praseodymium-138m	59	100 (3.7E 12)
Praseodymium-139	59	1000 (3.7E 13)
Praseodymium-142m	59	1000 (3.7E 13)
Praseodymium-142	59	100 (3.7E 12)
Praseodymium-143	59	10 (3.7E 11)
Praseodymium-144	59	1000 (3.7E 13)
Praseodymium-145	59	1000 (3.7E 13)
Praseodymium-147	59	1000 (3.7E 13)
Promethium-141	61	1000 (3.7E 13)
Promethium-143	61	100 (3.7E 12)
Promethium-144	61	10 (3.7E 11)
Promethium-145	61	100 (3.7E 12)
Promethium-146	61	10 (3.7E 11)
Promethium-147	61	10 (3.7E 11)
Promethium-148m	61	10 (3.7E 11)
Promethium-148	61	10 (3.7E 11)
Promethium-149	61	100 (3.7E 12)
Promethium-150	61	100 (3.7E 12)
Promethium-151	61	100 (3.7E 12)
Protactinium-227	91	100 (3.7E 12)
Protactinium-228	91	10 (3.7E 11)
Protactinium-230	91	10 (3.7E 11)
Protactinium-231	91	0.01 (3.7E 8)
Protactinium-232	91	10 (3.7E 11)
Protactinium-233	91	100 (3.7E 12)
Protactinium-234	91	10 (3.7E 11)
Radium-223	88	1 (3.7E 10)
Radium-224	88	10 (3.7E 11)
Radium-225	88	1 (3.7E 10)
Radium-226Φ	88	0.1 (3.7E 9)
Radium-227	88	1000 (3.7E 13)
Radium-228	88	0.1 (3.7E 9)
Radon-220	86	0.1 (3.7E 9)
Radon-222	86	0.1 (3.7E 9)
Rhenium-177	75	1000 (3.7E 13)
Rhenium-178	75	1000 (3.7E 13)
Rhenium-181	75	100 (3.7E 12)
Rhenium-182 (12.7 hr)	75	10 (3.7E 11)
Rhenium-182 (64.0 hr)	75	10 (3.7E 11)
Rhenium-184m	75	10 (3.7E 11)
Rhenium-184	75	10 (3.7E 11)
Rhenium-186m	75	10 (3.7E 11)
Rhenium-186	75	100 (3.7E 12)
Rhenium-187	75	1000 (3.7E 13)
Rhenium-188m	75	1000 (3.7E 13)
Rhenium-188	75	1000 (3.7E 13)
Rhenium-189	75	1000 (3.7E 13)
Rhodium-99m	45	100 (3.7E 12)
Rhodium-99	45	10 (3.7E 11)
Rhodium-100	45	10 (3.7E 11)
Rhodium-101m	45	100 (3.7E 12)
Rhodium-101	45	10 (3.7E 11)
Rhodium-102m	45	10 (3.7E 11)
Rhodium-102	45	10 (3.7E 11)
Rhodium-103m	45	1000 (3.7E 13)
Rhodium-105	45	100 (3.7E 12)
Rhodium-106m	45	10 (3.7E 11)
Rhodium-107	45	1000 (3.7E 13)
Rubidium-79	37	1000 (3.7E 13)
Rubidium-81m	37	1000 (3.7E 13)
Rubidium-81	37	100 (3.7E 12)
Rubidium-82m	37	10 (3.7E 11)
Rubidium-83	37	10 (3.7E 11)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Rubidium-84	37	10 (3.7E 11)
Rubidium-86	37	10 (3.7E 11)
Rubidium-88	37	1000 (3.7E 13)
Rubidium-89	37	1000 (3.7E 13)
Rubidium-87	37	10 (3.7E 11)
Ruthenium-94	44	1000 (3.7E 13)
Ruthenium-97	44	100 (3.7E 12)
Ruthenium-103	44	10 (3.7E 11)
Ruthenium-105	44	100 (3.7E 12)
Ruthenium-106	44	1 (3.7E 10)
Samarium-141m	62	1000 (3.7E 13)
Samarium-141	62	1000 (3.7E 13)
Samarium-142	62	1000 (3.7E 13)
Samarium-145	62	100 (3.7E 12)
Samarium-146	62	0.01 (3.7E 8)
Samarium-147	62	0.01 (3.7E 8)
Samarium-151	62	10 (3.7E 11)
Samarium-153	62	100 (3.7E 12)
Samarium-155	62	1000 (3.7E 13)
Samarium-156	62	100 (3.7E 12)
Scandium-43	21	1000 (3.7E 13)
Scandium-44m	21	10 (3.7E 11)
Scandium-44	21	100 (3.7E 12)
Scandium-46	21	10 (3.7E 11)
Scandium-47	21	100 (3.7E 12)
Scandium-48	21	10 (3.7E 11)
Scandium-49	21	1000 (3.7E 13)
Selenium-70	34	1000 (3.7E 13)
Selenium-73m	34	100 (3.7E 12)
Selenium-73	34	10 (3.7E 11)
Selenium-75	34	10 (3.7E 11)
Selenium-79	34	10 (3.7E 11)
Selenium-81m	34	1000 (3.7E 13)
Selenium-81	34	1000 (3.7E 13)
Selenium-83	34	1000 (3.7E 13)
Silicon-31	14	1000 (3.7E 13)
Silicon-32	14	1 (3.7E 10)
Silver-102	47	100 (3.7E 12)
Silver-103	47	1000 (3.7E 13)
Silver-104m	47	1000 (3.7E 13)
Silver-104	47	1000 (3.7E 13)
Silver-105	47	10 (3.7E 11)
Silver-106m	47	10 (3.7E 11)
Silver-106	47	1000 (3.7E 13)
Silver-108m	47	10 (3.7E 11)
Silver-110m	47	10 (3.7E 11)
Silver-111	47	10 (3.7E 11)
Silver-112	47	100 (3.7E 12)
Silver-115	47	1000 (3.7E 13)
Sodium-22	11	10 (3.7E 11)
Sodium-24	11	10 (3.7E 11)
Strontium-80	38	100 (3.7E 12)
Strontium-81	38	1000 (3.7E 13)
Strontium-83	38	100 (3.7E 12)
Strontium-85m	38	1000 (3.7E 13)
Strontium-85	38	10 (3.7E 11)
Strontium-87m	38	100 (3.7E 12)
Strontium-89	38	10 (3.7E 11)
Strontium-90	38	0.1 (3.7E 9)
Strontium-91	38	10 (3.7E 11)
Strontium-92	38	100 (3.7E 12)
Sulfur-35	16	1 (3.7E 10)
Tantalum-172	73	100 (3.7E 12)
Tantalum-173	73	100 (3.7E 12)
Tantalum-174	73	100 (3.7E 12)
Tantalum-175	73	100 (3.7E 12)
Tantalum-176	73	10 (3.7E 11)
Tantalum-177	73	1000 (3.7E 13)
Tantalum-178	73	1000 (3.7E 13)
Tantalum-179	73	1000 (3.7E 13)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Tantalum-180m	73	1000 (3.7E 13)
Tantalum-180	73	100 (3.7E 12)
Tantalum-182m	73	1000 (3.7E 13)
Tantalum-182	73	10 (3.7E 11)
Tantalum-183	73	100 (3.7E 12)
Tantalum-184	73	10 (3.7E 11)
Tantalum-185	73	1000 (3.7E 13)
Tantalum-186	73	1000 (3.7E 13)
Technetium-93m	43	1000 (3.7E 13)
Technetium-93	43	100 (3.7E 12)
Technetium-94m	43	100 (3.7E 12)
Technetium-94	43	10 (3.7E 11)
Technetium-96m	43	1000 (3.7E 13)
Technetium-96	43	10 (3.7E 11)
Technetium-97m	43	100 (3.7E 12)
Technetium-97	43	100 (3.7E 12)
Technetium-98	43	10 (3.7E 11)
Technetium-99m	43	100 (3.7E 12)
Technetium-99	43	10 (3.7E 11)
Technetium-101	43	1000 (3.7E 13)
Technetium-104	43	1000 (3.7E 13)
Tellurium-116	52	1000 (3.7E 13)
Tellurium-121m	52	10 (3.7E 11)
Tellurium-121	52	10 (3.7E 11)
Tellurium-123m	52	10 (3.7E 11)
Tellurium-123	52	10 (3.7E 11)
Tellurium-125m	52	10 (3.7E 11)
Tellurium-127m	52	10 (3.7E 11)
Tellurium-127	52	1000 (3.7E 13)
Tellurium-129m	52	10 (3.7E 11)
Tellurium-129	52	1000 (3.7E 13)
Tellurium-131m	52	10 (3.7E 11)
Tellurium-131	52	1000 (3.7E 13)
Tellurium-132	52	10 (3.7E 11)
Tellurium-133m	52	1000 (3.7E 13)
Tellurium-133	52	1000 (3.7E 13)
Tellurium-134	52	1000 (3.7E 13)
Terbium-147	65	100 (3.7E 12)
Terbium-149	65	100 (3.7E 12)
Terbium-150	65	100 (3.7E 12)
Terbium-151	65	10 (3.7E 11)
Terbium-153	65	100 (3.7E 12)
Terbium-154	65	10 (3.7E 11)
Terbium-155	65	100 (3.7E 12)
Terbium-156m (5.0 hr)	65	1000 (3.7E 13)
Terbium-156m (24.4 hr)	65	1000 (3.7E 13)
Terbium-156	65	10 (3.7E 11)
Terbium-157	65	100 (3.7E 12)
Terbium-158	65	10 (3.7E 11)
Terbium-160	65	10 (3.7E 11)
Terbium-161	65	100 (3.7E 12)
Thallium-194m	81	100 (3.7E 12)
Thallium-194	81	1000 (3.7E 13)
Thallium-195	81	100 (3.7E 12)
Thallium-197	81	100 (3.7E 12)
Thallium-198m	81	100 (3.7E 12)
Thallium-198	81	10 (3.7E 11)
Thallium-199	81	100 (3.7E 12)
Thallium-200	81	10 (3.7E 11)
Thallium-201	81	1000 (3.7E 13)
Thallium-202	81	10 (3.7E 11)
Thallium-204	81	10 (3.7E 11)
Thorium-226	90	100 (3.7E 12)
Thorium-227	90	1 (3.7E 10)
Thorium-228	90	0.01 (3.7E 8)
Thorium-229	90	0.001 (3.7E 7)
Thorium-230	90	0.01 (3.7E 8)
Thorium-231	90	100 (3.7E 12)
Thorium-232Φ	90	0.001 (3.7E 7)
Thorium-234	90	100 (3.7E 12)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Thulium-162	69	1000 (3.7E 13)
Thulium-166	69	10 (3.7E 11)
Thulium-167	69	100 (3.7E 12)
Thulium-170	69	10 (3.7E 11)
Thulium-171	69	100 (3.7E 12)
Thulium-172	69	100 (3.7E 12)
Thulium-173	69	100 (3.7E 12)
Thulium-175	69	1000 (3.7E 13)
Tin-110	50	100 (3.7E 12)
Tin-111	50	1000 (3.7E 13)
Tin-113	50	10 (3.7E 11)
Tin-117m	50	100 (3.7E 12)
Tin-119m	50	10 (3.7E 11)
Tin-121m	50	10 (3.7E 11)
Tin-121	50	1000 (3.7E 13)
Tin-123m	50	1000 (3.7E 13)
Tin-123	50	10 (3.7E 11)
Tin-125	50	10 (3.7E 11)
Tin-126	50	1 (3.7E 10)
Tin-127	50	100 (3.7E 12)
Tin-128	50	1000 (3.7E 13)
Titanium-44	22	1 (3.7E 10)
Titanium-45	22	1000 (3.7E 13)
Tungsten-176	74	1000 (3.7E 13)
Tungsten-177	74	100 (3.7E 12)
Tungsten-178	74	100 (3.7E 12)
Tungsten-179	74	1000 (3.7E 13)
Tungsten-181	74	100 (3.7E 12)
Tungsten-185	74	10 (3.7E 11)
Tungsten-187	74	100 (3.7E 12)
Tungsten-188	74	10 (3.7E 11)
Uranium-230	92	1 (3.7E 10)
Uranium-231	92	1000 (3.7E 13)
Uranium-232	92	0.01 (3.7E 8)
Uranium-233	92	0.1 (3.7E 9)
Uranium-234ϕ	92	0.1 (3.7E 9)
Uranium-235ϕ	92	0.1 (3.7E 9)
Uranium-236	92	0.1 (3.7E 9)
Uranium-237	92	100 (3.7E 12)
Uranium-238ϕ	92	0.1& (3.7E 9)
Uranium-239	92	1000 (3.7E 13)
Uranium-240	92	1000 (3.7E 13)
Vanadium-47	23	1000 (3.7E 13)
Vanadium-48	23	10 (3.7E 11)
Vanadium-49	23	1000 (3.7E 13)
Xenon-120	54	100 (3.7E 12)
Xenon-121	54	10 (3.7E 11)
Xenon-122	54	100 (3.7E 12)
Xenon-123	54	10 (3.7E 11)
Xenon-125	54	100 (3.7E 12)
Xenon-127	54	100 (3.7E 12)
Xenon-129m	54	1000 (3.7E 13)
Xenon-131m	54	1000 (3.7E 13)
Xenon-133m	54	1000 (3.7E 13)
Xenon-133	54	1000 (3.7E 13)
Xenon-135m	54	10 (3.7E 11)
Xenon-135	54	100 (3.7E 12)
Xenon-138	54	10 (3.7E 11)
Ytterbium-162	70	1000 (3.7E 13)
Ytterbium-166	70	10 (3.7E 11)
Ytterbium-167	70	1000 (3.7E 13)
Ytterbium-169	70	10 (3.7E 11)
Ytterbium-175	70	100 (3.7E 12)
Ytterbium-177	70	1000 (3.7E 13)
Ytterbium-178	70	1000 (3.7E 13)
Yttrium-86m	39	1000 (3.7E 13)
Yttrium-86	39	10 (3.7E 11)
Yttrium-87	39	10 (3.7E 11)
Yttrium-88	39	10 (3.7E 11)
Yttrium-90m	39	100 (3.7E 12)
Yttrium-90	39	10 (3.7E 11)
Yttrium-91m	39	1000 (3.7E 13)
Yttrium-91	39	10 (3.7E 11)
Yttrium-92	39	100 (3.7E 12)
Yttrium-93	39	100 (3.7E 12)
Yttrium-94	39	1000 (3.7E 13)
Yttrium-95	39	1000 (3.7E 13)
Zinc-62	30	100 (3.7E 12)
Zinc-63	30	1000 (3.7E 13)
Zinc-65	30	10 (3.7E 11)
Zinc-69m	30	100 (3.7E 12)
Zinc-69	30	1000 (3.7E 13)
Zinc-71m	30	100 (3.7E 12)
Zinc-72	30	100 (3.7E 12)
Zirconium-86	40	100 (3.7E 12)
Zirconium-88	40	10 (3.7E 11)
Zirconium-89	40	100 (3.7E 12)
Zirconium-93	40	1 (3.7E 10)
Zirconium-95	40	10 (3.7E 11)
Zirconium-97	40	10 (3.7E 11)

Ci—Curie. The curie represents a rate of radioactive decay. One curie is the quantity of any radioactive nuclide which undergoes 3.7E 10 disintegrations per second.

Bq—Becquerel. The becquerel represents a rate of radioactive decay. One becquerel is the quantity of any radioactive nuclide which undergoes one disintegration per second. One curie is equal to 3.7E 10 becquerel.

@—Final RQs for all radionuclides apply to chemical compounds containing the radionuclides and elemental forms regardless of the diameter of pieces of solid material.

&—The adjusted RQ of one curie applies to all radionuclides not otherwise listed. Whenever the RQs in table 302.4 and this appendix to the table are in conflict, the lowest RQ shall apply. For example, uranyl acetate and uranyl nitrate have adjusted RQs shown in table 302.4 of 100 pounds, equivalent to about one-tenth the RQ level for uranium-238 listed in this appendix.

E—Exponent to the base 10. For example, 1.3E 2 is equal to 130 while 1.3E 3 is equal to 1300.

m—Signifies a nuclear isomer which is a radionuclide in a higher energy metastable state relative to the parent isotope.

ϕ—Notification requirements for releases of mixtures or solutions of radionuclides can be found in § 302.6(b) of this rule. Final RQs for the following four common radionuclide mixtures are provided: radium-226 in secular equilibrium with its daughters (0.053 curie); natural uranium (0.1 curie); natural uranium in secular equilibrium with its daughters (0.052 curie); and natural thorium in secular equilibrium with its daughters (0.011 curie).

[54 FR 33449, Aug. 14, 1989]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 302.4, see the List of CFR Sections Affected in the Finding Aids section of this volume.

§ 302.5 Determination of reportable quantities.

(a) *Listed hazardous substances.* The quantity listed in the column ''Final RQ'' for each substance in table 302.4, or in appendix B to table 302.4, is the reportable quantity (RQ) for that substance. The RQs in table 302.4 are in units of pounds based on chemical toxicity, while the RQs in appendix B to table 302.4 are in units of curies based on radiation hazard. Whenever the RQs in table 302.4 and appendix B to the table are in conflict, the lowest RQ shall apply.

(b) *Unlisted hazardous substances.* Unlisted hazardous substances designated by 40 CFR 302.4(b) have the reportable quantity of 100 pounds, except for those unlisted hazardous wastes which exhibit extraction procedure (EP) toxicity identified in 40 CFR 261.24. Unlisted hazardous wastes which exhibit EP toxicity have the reportable quantities listed in table 302.4 for the contaminant on which the characteristic of EP toxicity is based. The reportable quantity applies to the waste itself, not merely to the toxic contaminant. If an unlisted hazardous waste exhibits EP toxicity on the basis of more than one contaminant, the reportable quantity for that waste shall be the lowest of the reportable quantities listed in table 302.4 for those contaminants. If an unlisted hazardous waste exhibits the characteristic of EP toxicity and one or more of the other characteristics referenced in 40 CFR 302.4(b), the reportable quantity for that waste shall be the lowest of the applicable reportable quantities.

[51 FR 34547, Sept. 29, 1987, as amended at 54 FR 22538, May 24, 1989]

§ 302.6 Notification requirements.

(a) Any person in charge of a vessel or an offshore or an onshore facility shall, as soon as he has knowledge of any release (other than a federally permitted release or application of a pesticide) of a hazardous substance from such vessel or facility in a quantity equal to or exceeding the reportable quantity determined by this part in any 24-hour period, immediately notify the National Response Center ((800) 424–8802; in Washington, DC (202) 426–2675).

(b) Releases of mixtures or solutions (including hazardous waste streams) of

(1) Hazardous substances, except for radionuclides, are subject to the following notification requirements:

(i) If the quantity of all of the hazardous constituent(s) of the mixture or solution is known, notification is required where an RQ or more of any hazardous constituent is released;

(ii) If the quantity of one or more of the hazardous constituent(s) of the mixture or solution is unknown, notification is required where the total amount of the mixture or solution released equals or exceeds the RQ for the hazardous constituent with the lowest RQ; or

(iii) For waste streams K169, K170, K171, and K172, knowledge of the quantity of all of the hazardous constituent(s) may be assumed, based on the following maximum observed constituent concentrations identified by EPA:

Waste	Constituent	Max ppm
K169	Benzene	220.0
K170	Benzene	1.2
	Benzo (a) pyrene	230.0
	Dibenz (a,h) anthracene	49.0
	Benzo (a) anthracene	390.0
	Benzo (b) fluoranthene	110.0
	Benzo (k) fluoranthene	110.0
	3-Methylcholanthrene	27.0
	7,12-Dimethylbenz (a) anthracene	1,200.0
K171	Benzene	500.0
	Arsenic	1,600.0
K172	Benzene	100.0
	Arsenic	730.0

(2) Radionuclides are subject to this section's notification requirements only in the following circumstances:

(i) If the identity and quantity (in curies) of each radionuclide in a released mixture or solution is known, the ratio between the quantity released (in curies) and the RQ for the radionuclide must be determined for each radionuclide. The only such releases subject to this section's notification requirements are those in which the sum of the ratios for the radionuclides in the mixture or solution released is equal to or greater than one.

(ii) If the identity of each radionuclide in a released mixture or solution is known but the quantity released (in curies) of one or more of the radionuclides is unknown, the only such releases subject to this section's notification requirements are those in which the total quantity (in curies) of the mixture or solution released is equal to or greater than the lowest RQ of any individual radionuclide in the mixture or solution.

(iii) If the identity of one or more radionuclides in a released mixture or solution is unknown (or if the identity of a radionuclide released by itself is unknown), the only such releases subject to this section's notification requirements are those in which the total quantity (in curies) released is equal to or greater than either one curie or the lowest RQ of any known individual radionuclide in the mixture or solution, whichever is lower.

(c) The following categories of releases are exempt from the notification requirements of this section:

(1) Releases of those radionuclides that occur naturally in the soil from land holdings such as parks, golf courses, or other large tracts of land.

(2) Releases of naturally occurring radionuclides from land disturbance activities, including farming, construction, and land disturbance incidental to extraction during mining activities, except that which occurs at uranium, phosphate, tin, zircon, hafnium, vanadium, monazite, and rare earth mines. Land disturbance incidental to extraction includes: land clearing; overburden removal and stockpiling; excavating, handling, transporting, and storing ores and other raw (not beneficiated or processed) materials; and replacing in mined-out areas coal ash, earthen materials from farming or construction, or overburden or other raw materials generated from the exempted mining activities.

(3) Releases of radionuclides from the dumping and transportation of coal and coal ash (including fly ash, bottom ash, and boiler slags), including the dumping and land spreading operations that occur during coal ash uses.

(4) Releases of radionuclides from piles of coal and coal ash, including fly ash, bottom ash, and boiler slags.

(d) Except for releases of radionuclides, notification of the release of an RQ of solid particles of antimony, arsenic, beryllium, cadmium, chromium, copper, lead, nickel, selenium, silver, thallium, or zinc is not required if the mean diameter of the particles released is larger than 100 micrometers (0.004 inches).

[50 FR 13474, Apr. 4, 1985, as amended at 54 FR 22538, May 24, 1989; 54 FR 33481, Aug. 14, 1989; 63 FR 13475, Mar. 19, 1998; 63 FR 42189, Aug. 6, 1998; 64 FR 13114, Mar. 17, 1999]

§ 302.7 Penalties.

(a) Any person—

(1) In charge of a vessel from which a hazardous substance is released, other than a federally permitted release, into or upon the navigable waters of the United States, adjoining shorelines, or into or upon the waters of the contiguous zone,

(2) In charge of a vessel from which a hazardous substance is released, other than a federally permitted release, which may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the United States (including resources under the Fishery Conservation and Management Act of 1976), and who is otherwise subject to the jurisdiction of the United States at the time of the release, or

(3) In charge of a facility from which a hazardous substance is released, other than a federally permitted release, in a quantity equal to or greater than that reportable quantity determined under this part who fails to notify immediately the National Response Center as soon as he has knowledge of such release shall be subject to all of the sanctions, including criminal penalties, set forth in section 103 of the Act with respect to such failure to notify.

(b) Notification received pursuant to this section or information obtained by the exploitation of such notification shall not be used against any such person in any criminal case, except a prosecution for perjury or for giving a false statement.

(c) This section shall not apply to the application of a pesticide product registered under the Federal Insecticide, Fungicide, and Rodenticide Act or to the handling and storage of such a pesticide product by an agricultural producer.

§ 302.8 Continuous releases.

(a) Except as provided in paragraph (c) of this section, no notification is required for any release of a hazardous substance that is, pursuant to the definitions in paragraph (b) of this section, continuous and stable in quantity and rate.

(b) *Definitions.* The following definitions apply to notification of continuous releases:

Continuous. A continuous release is a release that occurs without interruption or abatement or that is routine, anticipated, and intermittent and incidental to normal operations or treatment processes.

Normal range. The normal range of a release is all releases (in pounds or kilograms) of a hazardous substance reported or occurring over any 24-hour period under normal operating conditions during the preceding year. Only releases that are both continuous and stable in quantity and rate may be included in the normal range.

Routine. A routine release is a release that occurs during normal operating procedures or processes.

Stable in quantity and rate. A release that is stable in quantity and rate is a release that is predictable and regular in amount and rate of emission.

Statistically significant increase. A statistically significant increase in a release is an increase in the quantity of the hazardous substance released above the upper bound of the reported normal range of the release.

(c) *Notification.* The following notifications shall be given for any release qualifying for reduced reporting under this section:

(1) Initial telephone notification;

(2) Initial written notification within 30 days of the initial telephone notification;

(3) Follow-up notification within 30 days of the first anniversary date of the initial written notification;

(4) Notification of a change in the composition or source(s) of the release or in the other information submitted in the initial written notification of the release under paragraph (c)(2) of this section or the follow-up notification under paragraph (c)(3) of this section; and

(5) Notification at such times as an increase in the quantity of the hazardous substance being released during any 24-hour period represents a statistically significant increase as defined in paragraph (b) of this section.

(d) *Initial telephone notification.* Prior to making an initial telephone notification of a continuous release, the person in charge of a facility or vessel must establish a sound basis for qualifying the release for reporting under CERCLA section 103(f)(2) by:

(1) Using release data, engineering estimates, knowledge of operating procedures, or best professional judgment to establish the continuity and stability of the release;

(2) Reporting the release to the National Response Center for a period sufficient to establish the continuity and stability of the release; or

(3) When a person in charge of the facility or vessel believes that a basis has been established to qualify the release for reduced reporting under this section, initial notification to the National Response Center shall be made by telephone. The person in charge must identify the notification as an initial continuous release notification report and provide the following information:

(i) The name and location of the facility or vessel; and

(ii) The name(s) and identity(ies) of the hazardous substance(s) being released.

(e) *Initial written notification.* Initial written notification of a continuous release shall be made to the appropriate EPA Regional Office for the geographical area where the releasing facility or vessel is located. (Note: In addition to the requirements of this part, releases of CERCLA hazardous substances are also subject to the provisions of SARA title III section 304, and EPA's implementing regulations codified at 40 CFR part 355, which require initial telephone and written notifications of continuous releases to be submitted to the appropriate State emergency response commission and local emergency planning committee.)

(1) Initial written notification to the appropriate EPA Regional Office shall occur within 30 days of the initial telephone notification to the National Response Center, and shall include, for each release for which reduced reporting as a continuous release is claimed, the following information:

(i) The name of the facility or vessel; the location, including the latitude and longitude; the case number assigned by the National Response Center or the Environmental Protection Agency; the

Dun and Bradstreet number of the facility, if available; the port of registration of the vessel; the name and telephone number of the person in charge of the facility or vessel.

(ii) The population density within a one-mile radius of the facility or vessel, described in terms of the following ranges: 0–50 persons, 51–100 persons, 101–500 persons, 501–1,000 persons, more than 1,000 persons.

(iii) The identity and location of sensitive populations and ecosystems within a one-mile radius of the facility or vessel (e.g., elementary schools, hospitals, retirement communities, or wetlands).

(iv) For each hazardous substance release claimed to qualify for reporting under CERCLA section 103(f)(2), the following information must be supplied:

(A) The name/identity of the hazardous substance; the Chemical Abstracts Service Registry Number for the substance (if available); and if the substance being released is a mixture, the components of the mixture and their approximate concentrations and quantities, by weight.

(B) The upper and lower bounds of the normal range of the release (in pounds or kilograms) over the previous year.

(C) The source(s) of the release (e.g., valves, pump seals, storage tank vents, stacks). If the release is from a stack, the stack height (in feet or meters).

(D) The frequency of the release and the fraction of the release from each release source and the specific period over which it occurs.

(E) A brief statement describing the basis for stating that the release is continuous and stable in quantity and rate.

(F) An estimate of the total annual amount that was released in the previous year (in pounds or kilograms).

(G) The environmental medium(a) affected by the release:

(*1*) If surface water, the name of the surface water body;

(*2*) If a stream, the stream order or average flowrate (in cubic feet/second) and designated use;

(*3*) If a lake, the surface area (in acres) and average depth (in feet or meters);

(*4*) If on or under ground, the location of public water supply wells within two miles.

(H) A signed statement that the hazardous substance release(s) described is(are) continuous and stable in quantity and rate under the definitions in paragraph (a) of this section and that all reported information is accurate and current to the best knowledge of the person in charge.

(f) *Follow-up notification.* Within 30 days of the first anniversary date of the initial written notification, the person in charge of the facility or vessel shall evaluate each hazardous substance release reported to verify and update the information submitted in the initial written notification. The follow-up notification shall include the following information:

(1) The name of the facility or vessel; the location, including the latitude and longitude; the case number assigned by the National Response Center or the Environmental Protection Agency; the Dun and Bradstreet number of the facility, if available; the port of registration of the vessel; the name and telephone number of the person in charge of the facility or vessel.

(2) The population density within a one-mile radius of the facility or vessel, described in terms of the following ranges: 0–50 persons, 51–100 persons, 101–500 persons, 501–1,000 persons, more than 1,000 persons.

(3) The identity and location of sensitive populations and ecosystems within a one-mile radius of the facility or vessel (e.g., elementary schools, hospitals, retirement communities, or wetlands).

(4) For each hazardous substance release claimed to qualify for reporting under CERCLA section 103(f)(2), the following information shall be supplied:

(i) The name/identity of the hazardous substance; the Chemical Abstracts Service Registry Number for the substance (if available); and if the substance being released is a mixture, the components of the mixture and their approximate concentrations and quantities, by weight.

(ii) The upper and lower bounds of the normal range of the release (in pounds or kilograms) over the previous year.

(iii) The source(s) of the release (e.g., valves, pump seals, storage tank vents, stacks). If the release is from a stack, the stack height (in feet or meters).

(iv) The frequency of the release and the fraction of the release from each release source and the specific period over which it occurs.

(v) A brief statement describing the basis for stating that the release is continuous and stable in quantity and rate.

(vi) An estimate of the total annual amount that was released in the previous year (in pounds or kilograms).

(vii) The environmental medium(a) affected by the release:

(A) If surface water, the name of the surface water body;

(B) If a stream, the stream order or average flowrate (in cubic feet/second) and designated use;

(C) If a lake, the surface area (in acres) and average depth (in feet or meters);

(D) If on or under ground, the location of public water supply wells within two miles.

(viii) A signed statement that the hazardous substance release(s) is(are) continuous and stable in quantity and rate under the definitions in paragraph (a) of this section and that all reported information is accurate and current to the best knowledge of the person in charge.

(g) *Notification of changes in the release.* If there is a change in the release, notification of the change, not otherwise reported, shall be provided in the following manner:

(1) *Change in source or composition.* If there is any change in the composition or source(s) of the release, the release is a new release and must be qualified for reporting under this section by the submission of initial telephone notification and initial written notification in accordance with paragraphs (c) (1) and (2) of this section as soon as there is a sufficient basis for asserting that the release is continuous and stable in quantity and rate;

(2) *Change in the normal range.* If there is a change in the release such that the quantity of the release exceeds the upper bound of the reported normal range, the release must be reported as a statistically significant increase in the release. If a change will result in a number of releases that exceed the upper bound of the normal range, the person in charge of a facility or vessel may modify the normal range by:

(i) Reporting at least one statistically significant increase report as required under paragraph (c)(7) of this section and, at the same time, informing the National Response Center of the change in the normal range; and

(ii) Submitting, within 30 days of the telephone notification, written notification to the appropriate EPA Regional Office describing the new normal range, the reason for the change, and the basis for stating that the release in the increased amount is continuous and stable in quantity and rate under the definitions in paragraph (b) of this section.

(3) *Changes in other reported information.* If there is a change in any information submitted in the initial written notification or the followup notification other than a change in the source, composition, or quantity of the release, the person in charge of the facility or vessel shall provide written notification of the change to the EPA Region for the geographical area where the facility or vessel is located, within 30 days of determining that the information submitted previously is no longer valid. Notification shall include the reason for the change, and the basis for stating that the release is continuous and stable under the changed conditions.

(4) Notification of changes shall include the case number assigned by the National Response Center or the Environmental Protection Agency and also the signed certification statement required at (c)(2)(xi) of this section.

(h) *Notification of a statistically significant increase in a release.* Notification of a statistically significant increase in a release shall be made to the National Response Center as soon as the person in charge of the facility or vessel has knowledge of the increase. The release must be identified as a statistically significant increase in a continuous release. A determination of whether an increase is a ''statistically significant increase'' shall be made based upon calculations or estimation procedures that will identify releases that exceed the upper bound of the reported normal range.

(i) *Annual evaluation of releases.* Each hazardous substance release shall be evaluated annually to determine if changes have occurred in the information submitted in the initial written notification, the followup notification, and/or in a previous change notification.

(j) *Use of the SARA Title III section 313 form.* In lieu of an initial written report or a followup report, owners or operators of facilities subject to the requirements of SARA title III section 313 may submit to the appropriate EPA Regional Office for the geographical area where the facility is located, a copy of the Toxic Release Inventory form submitted under SARA Title III section 313 the previous July 1, provided that the following information is added:

(1) The population density within a one-mile radius of the facility or vessel, described in terms of the following ranges: 0–50 persons, 51–100 persons, 101–500 persons, 501–1,000 persons, more than 1,000 persons.

(2) The identity and location of sensitive populations and ecosystems within a one-mile radius of the facility or vessel (e.g., elementary schools, hospitals, retirement communities, or wetlands).

(3) For each hazardous substance release claimed to qualify for reporting under CERCLA section 103(f)(2), the following information must be supplied:

(i) The upper and lower bounds of the normal range of the release (in pounds or kilograms) over the previous year.

(ii) The frequency of the release and the fraction of the release from each release source and the specific period over which it occurs.

(iii) A brief statement describing the basis for stating that the release is continuous and stable in quantity and rate.

(iv) A signed statement that the hazardous substance release(s) is(are) continuous and stable in quantity and rate under the definitions in paragraph (b) of this section and that all reported information is accurate and current to the best knowledge of the person in charge.

(k) *Documentation supporting notification.* Where necessary to satisfy the requirements of this section, the person in charge may rely on recent release data, engineering estimates, the operating history of the facility or vessel, or other relevant information to support notification. All supporting documents, materials, and other information shall be kept on file at the facility, or in the case of a vessel, at an office within the United States in either a port of call, a place of regular berthing, or the headquarters of the business operating the vessel. Supporting materials shall be kept on file for a period of one year and shall substantiate the reported normal range of releases, the basis for stating that the release is continuous and stable in quantity and rate, and the other information in the initial written report, the followup report, and the annual evaluations required under paragraphs (e), (f), and (i), respectively. Such information shall be made available to EPA upon request as necessary to enforce the requirements of this section.

(l) *Multiple concurrent releases.* Multiple concurrent releases of the same substance occurring at various locations with respect to contiguous plants or installations upon contiguous grounds that are under common ownership or control may be considsred separately or added together in determining whether such releases constitute a continuous release or a statistically significant increase under the definitions in paragraph (b) of this section; whichever approach is elected for purposes of determining whether a release is continuous also must be used to determine a statistically significant increase in the release.

(m) *Penalties for failure to comply.* The reduced reporting requirements provided for under this section shall apply only so long as the person in charge complies fully with all requirements of paragraph (c) of this section. Failure to comply with respect to any release from the facility or vessel shall subject the person in charge to all of the reporting requirements of § 302.6 for each such release, to the penalties under § 302.7, and to any other applicable penalties provided for by law.

[55 FR 30185, July 24, 1990]

Chapter NR 706

HAZARDOUS SUBSTANCE DISCHARGE NOTIFICATION AND SOURCE CONFIRMATION REQUIREMENTS

Subchapter I — General Provisions
NR 706.01 Purpose.
NR 706.02 Applicability.
NR 706.03 Definitions.

Subchapter II — General Discharge Notification Requirements
NR 706.05 Discharger responsibilities.
NR 706.07 Exemptions.

Subchapter III — Discharge Notification and Source Confirmation Requirements For Underground Storage Tank Systems
NR 706.11 Discharger responsibilities.
NR 706.13 Indication of a discharge from an UST discharge monitoring system.
NR 706.15 UST discharge source confirmation.
NR 706.17 Underground storage tank response action status report.

Note: Corrections made under s. 13.93 (2m) (b) 7., Stats., Register, February, 1997, No. 494.

Subchapter I — General Provisions

NR 706.01 Purpose. The purpose of this chapter is to adopt by administrative rule notification requirements for discharges of hazardous substances. In order to retain authorization to implement the federal underground storage tank program in Wisconsin, subch. III contains requirements that are mandated by U.S. EPA, that are only applicable to discharges from underground storage tanks. This chapter is adopted pursuant to ss. 227.11 (2) and 292.11, Stats.

Note: The following portions of 40 CFR part 280 have been included in the text of this chapter: s. 280.34(a)(2); portions of s. 280.34(a)(3); s. 280.34(b)(5); s. 280.50(a) to (c)(1); s. 280.51; s. 280.52; s. 280.53; s. 280.61(1); s. 280.62(a)(5); portions of s. 280.63(a)(1) to (3); portions of s. 280.63(b); portions of s. 280.72(a); s. 280.72(b); and s. 280.73. Additional portions of s. 280.34(a)(3) are included in chs. NR 708, 716, 722 and 724. Additional portions of s. 280.63(a)(1) to (3) and (b) are included in chs. NR 708 and 716. Additional portions of s. 280.72(a) are included in ch. Comm 10.

History: Cr. Register, February, 1997, No. 494, eff. 3−1−97.

NR 706.02 Applicability. **(1)** This chapter applies to hazardous substance discharges that are subject to the requirements of s. 292.11, Stats.

(2) Subchapter II applies to all persons who have responsibility under s. 292.11, Stats., for any hazardous substance discharge that may occur. Subchapter III contains additional requirements that only apply to the owners and operators of underground storage tank systems that are subject to regulation under 42 USC s. 6991 *et seq.* and 40 CFR part 280, or ch. Comm 10, for hazardous substance discharges that are related to the underground storage tank system.

Note: The definition of "underground storage tank" in s. NR 700.03, which applies to this chapter, is based on the definition of "underground storage tank" in ch. Comm 10, which includes certain farm and residential motor fuel storage tanks and heating oil tanks that are excluded from the federal UST program definition in 42 USC s. 6991.

(3) Persons and facilities subject to the release notification requirements in CERCLA section 103(a), 42 USC 9603(a), or the emergency notification and notification requirements in s. 323.60, Stats., and 42 USC 11004, 11021, 11022 and 11023, are required to comply with those requirements in addition to complying with the notification requirements of this chapter, except that notification of a hazardous substance discharge which is given to the department in compliance with the requirements of this chapter constitutes notification of the state emergency response board as required by s. 323.60, Stats., if the notification contains all of the information specified in 42 USC 11004(b)(2).

History: Cr. Register, February, 1997, No. 494, eff. 3−1−97; correction in (2) made under s. 13.93 (2m) (b) 7., Stats., Register, March, 2001, No. 543; **corrections in (3) made under s. 13.92 (4) (b) 7., Stats.**

NR 706.03 Definitions. In this chapter:

(1) "Discharge" has the meaning specified in s. 292.01 (3), Stats.

Note: Section 292.01 (3), Stats., provides that: "'discharge' means, but is not limited to, spilling, leaking, pumping, pouring, emitting, emptying or dumping". However, it should be noted that under s. NR 706.05 the department has interpreted the hazardous substance discharge notification requirements in s. 292.11 (2), Stats., to apply only when a hazardous substance is spilled in such a way that it is discharged to the environment. A hazardous substance that is "discharged" into a secondary containment structure, that is completely contained and can be recovered with no discharge to the environment, is not subject to the discharge notification requirements in s. 292.11 (2), Stats.

(2) "Fertilizer" has the meaning specified in s. 94.64 (1) (e), Stats., except that it does not include nitrates or other forms of nitrogen found in the environment that cannot be attributed to a discharge.

Note: Section 94.64 (1) (e), Stats., defines "fertilizer" to mean "any substance, containing one or more plant nutrients, which is used for its plant nutrient content and which is designed for use or claimed to have value in promoting plant growth, except unmanipulated animal or vegetable manures, marl, liming material, sewage sludge other than finished sewage sludge products, and wood ashes. 'Fertilizer' includes fertilizer materials, mixed fertilizers, custom mixed fertilizers, nonagricultural fertilizers and all other fertilizers or mixtures of fertilizers, regardless of type or form."

(3) "Hazardous substance" has the meaning specified in s. 299.01 (6), Stats.

Note: "Hazardous substance" is defined in s. 299.01 (6), Stats., to mean: "any substance or combination of substances including any waste of a solid, semisolid, liquid, or gaseous form which may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness or which may pose a substantial present or potential hazard to human health or the environment because of its quantity, concentration or physical, chemical or infectious characteristics. This term includes, but is not limited to, substances which are toxic, corrosive, flammable, irritants, strong sensitizers or explosives as determined by the department."

(4) "Impervious" means incapable of being penetrated by a discharged substance.

Note: Asphalt and concrete, if intact and undamaged, are considered impervious surfaces. However, if hazardous substances are capable of penetrating asphalt or concrete due to cracks or holes, or repeated discharges, the surface would not be considered impervious.

(5) "Nonhousehold pesticide" has the meaning specified in s. 94.681 (1) (c), Stats., except that it does not include pentachlorophenol, inorganic arsenical wood preservatives and coal tar creosote.

Note: Section 94.681 (1) (c), Stats., defines "nonhousehold pesticide" as "a pesticide that is not a household pesticide." "Household pesticide" is defined in s. 94.681 (1) (a), Stats.

(6) "Pesticide" has the meaning specified in s. 94.67 (25), Stats.

Note: Section 94.67 (25), Stats., defines "pesticide" to mean "any substance or mixture of substances labeled or designed or intended for use in preventing, destroying, repelling or mitigating any pest, or as a plant regulator, defoliant or desiccant."

(7) "Petroleum products" mean gasoline products, diesel−like products and light crude oils, medium grade crude oils and intermediate products, and heavy crude oils and residual products.

Note: This definition in intended to include gasoline, diesel fuel, kerosene, jet fuel, hydraulic oils, lubricating oils, and machine oils.

History: Cr. Register, February, 1997, No. 494, eff. 3−1−97; correction in (5) made under s. 13.93 (2m) (b) 7., Stats., Register, March, 2001, No. 543.

Subchapter II — General Discharge Notification Requirements

NR 706.05 Discharger responsibilities. (1) DISCHARGE NOTIFICATION. (a) Unless the discharge is specifically exempted under s. NR 706.07, persons who cause the discharge to the environment of a hazardous substance or who possess or control a hazardous substance which is discharged to the environment shall immediately notify the department of the discharge. For the purpose of determining if a substance is hazardous and whether its discharge is required to be reported, responsible parties shall consider the quantity, concentration and physical, chemical and infectious characteristics of the substance and the location where the discharge occurred, and whether the substance has been discharged to the environment. A hazardous substance that is "discharged" into a secondary containment structure, that is completely contained and can be recovered with no discharge to the environment, is not subject to the discharge notification requirements in s. 292.11 (2), Stats.

Note: The department believes that the dictionary definition of "immediate", i.e. "occurring at once; next in line," does not lend itself to quantification. An across−the−board time−period can't be specified. In uncomplicated spill situations, responsible parties are expected to provide notice to the department within a matter of a few minutes after they learned of the spill. In other situations, especially where emergency action of some kind is being taken by the responsible party or where the responsible party does not have access to a telephone, notification may not be possible for several hours, but would still be considered "immediate" if promptly given.

(b) Hazardous substance discharges shall be reported to the department by telephoning, telefaxing or visiting a department office during normal business hours or by telephoning a department−designated 24−hour hotline telephone number after normal business hours.

Note: The 24−hour hotline operated by the division of emergency management in cooperation with the department can be reached at 1−800−943−0003. Directories for the telephone numbers of the department's offices can be found in local telephone books and in various department guidance documents.

(c) The notification required by this subsection shall contain the following information to the extent practicable:

1. Name, address and telephone number of the person reporting the discharge.

2. Name, address and telephone number of the discharger, or owner and operator of the UST system and any other potentially responsible persons.

3. Date, time, duration and location of the discharge including street address, if appropriate, county, town, city or village, 1/4, 1/4 section, township, range, and legal description of lot, if located in a platted area.

4. Identity, physical state and quantity of the material discharged.

5. Physical, chemical, hazardous and toxicological characteristics of the substance.

6. Cause of the discharge.

7. Immediate actions being taken and the name of the contractor or other person performing the action.

8. Source, speed of movement and destination or probable destination of the discharged hazardous substance.

9. Actual or potential impacts to human health or the environment, including actual or potential impacts to drinking water supplies.

10. Weather conditions existing at the scene, including presence of precipitation and wind direction and velocity.

11. Other agencies on−scene during the spill incident.

(2) CONTAINMENT, CLEANUP, DISPOSAL AND RESTORATION. Responsible parties shall comply with the requirements of chs. NR 700 to 726 for response actions to discharges of hazardous substances.

History: Cr. Register, February, 1997, No. 494, eff. 3−1−97.

NR 706.07 Exemptions. (1) STATUTORY EXEMPTIONS. The following persons are not required to notify the department of a hazardous substance discharge that falls within any of the following categories:

(a) Any person holding a valid permit under ch. 283, Stats., is exempt with respect to substances discharged within the limits authorized by the permit.

(b) Law enforcement officers or members of fire departments using hazardous substances in carrying out their responsibility to protect public health, safety or welfare are exempt.

Note: These persons are encouraged to voluntarily report to the department any discharges of a hazardous substance occurring within the performance of their duties.

(c) Any person discharging in conformity with a permit or program approved under chs. 280 to 299, Stats., is exempt with respect to substances discharged within the limits authorized by the permit or program.

(d) Any person applying a registered pesticide according to the label instructions, or applying a fertilizer at or below normal and beneficial agromonic rates, is exempt with respect to that pesticide or fertilizer application.

(2) DE MINIMIS EXEMPTIONS. (a) Except when reporting is required under par. (b), the following discharges do not require notification to the department:

1. A discharge of gasoline or another petroleum product that is completely contained on an impervious surface.

2. A discharge of gasoline if less than one gallon is discharged onto a surface that is not impervious or runs off an impervious surface.

3. A discharge of a petroleum product other than gasoline if less than 5 gallons is discharged onto a surface that is not impervious or runs off an impervious surface.

4. A discharge of a dry fertilizer if the amount is less than 250 pounds.

5. A discharge of a liquid fertilizer if the amount is less than 25 gallons, unless the reportable quantities listed for chemicals in 40 CFR part 117 or 302 are more restrictive, in which case the values in 40 CFR part 117 or 302 apply.

6. A discharge of pesticides registered for use in Wisconsin if the amount discharged when diluted as indicated on the pesticide label would cover less than one acre of land if applied according to label instructions, unless the reportable quantities listed for chemicals in 40 CFR part 117 or 302 are more restrictive, in which case the values in 40 CFR part 117 or 302 apply.

7. A discharge of substances specifically listed in 40 CFR part 117 or 302 if the amount discharged in any 24 hour period is less than the amount listed in 40 CFR part 117 or 302. If responsible parties are uncertain about how to interpret or apply 40 CFR part 117 or 302, they may report any discharge to the department.

Note: Notification requirements under this rule may not meet the obligations for responsible parties to report hazardous substance releases to the federal government. Questions on federal requirements should be directed to the US EPA Superfund hotline at 1−800−535−0202.

(b) Whenever, in light of site−specific conditions, any of the following criteria apply, hazardous substance discharges which would otherwise be exempt from notification under par. (a) shall be reported as required in s. NR 706.05:

1. The discharged substance has not evaporated or has not been cleaned up in compliance with the requirements of chs. NR 700 to 726.

2. The discharged substance has adversely impacted or threatens to adversely impact the air, lands or waters of the state either as a single discharge or when accumulated with previous

discharges, even though the degree of the impact or threatened impact may not have been thoroughly evaluated.

Note: Where there is a sheen on surface water or the discharged substance has entered or is on the verge of entering the waters of the state, typically via a storm sewer, or drainage ditch, the department would consider the discharged substance to adversely impact or threaten to adversely impact the waters of the state.

3. The discharged substance has caused or threatens to cause acute or chronic human health impacts if immediate action, such as evacuation or in−place sheltering, is not taken. If the responsible party is unsure about potential human health effects, the responsible party shall consult with local or state health officials, and the responsible party shall make a notification decision based on that consultation.

4. The discharged substance presents or threatens to present a fire or explosion hazard or other safety hazards, such as slippery conditions on a roadway.

Note: In determining whether a threat exists under subd. 1., 2., 3., or 4., the standard of conduct to which the responsible party must conform is that of a reasonable person under the site−specific circumstances.

History: Cr. Register, February, 1997, No. 494, eff. 3−1−97.

Subchapter III — Discharge Notification and Source Confirmation Requirements For Underground Storage Tank Systems

NR 706.11 Discharger responsibilities. (1) DISCHARGE NOTIFICATION. (a) Owners or operators of UST systems shall immediately notify the department of a spill, overfill or other discharge or suspected discharge of a hazardous substance to the environment that is related to the UST system, except as provided in s. NR 706.15 (2) and (4).

Note: The term “UST” which is an acronym for “underground storage tank” is defined in s. NR 700.03.

(b) Evidence which indicates that a discharge of a hazardous substance to the environment has occurred or may have occurred includes, but is not limited to: visible soil contamination; the presence of free product or vapors in soils, basements, sewers or utility lines, or on surface water or groundwater in the surrounding area; and the receipt of reports, environmental assessments or routinely gathered monitoring data which indicates that a discharge of a hazardous substance has occurred or may have occurred.

(2) ADDITIONAL INFORMATION. The owner or operator of an UST system shall document and submit to the department, within 72 hours of the original notification, any additional information that the owner or operator obtains concerning the discharge which was not included at the time of the original notification, unless otherwise directed by the department.

(3) CLOSURE ASSESSMENT REPORTS. The owner or operator of an UST system shall submit to the department any tank closure assessment report that is generated to document compliance with the requirements of s. Comm 10.734 or 10.805, regardless of whether a discharge of a hazardous substance was detected during the site assessment.

Note: Sections Comm 10.734 and 10.805 no longer exist since the repeal and recreation of Chapter Comm 10, effective 12−1−08.

(4) CONTAINMENT, CLEANUP, DISPOSAL AND RESTORATION. The owner or operator of an UST system shall comply with the requirements of chs. NR 700 to 726 for response actions to discharges of hazardous substances.

History: Cr. Register, February, 1997, No. 494, eff. 3−1−97; correction in (3) made under s. 13.93 (2m) (b) 7., Stats., Register, March, 2001, No. 543.

NR 706.13 Indication of a discharge from an UST discharge monitoring system. (1) When the discharge monitoring system of an UST system indicates that a discharge of a hazardous substance to the environment may have occurred, the owner or operator of the UST system shall determine immediately whether the indication was due to a malfunction of the discharge monitoring equipment.

(2) If the discharge monitoring equipment is found to be malfunctioning, and there is no other reason to suspect that a discharge of a hazardous substance to the environment has occurred, the owner or operator of the UST system shall repair, recalibrate or replace the equipment in accordance with all applicable statutes and rules. Notification of the department is not necessary if there is no reason to suspect a discharge.

(3) If the discharge monitoring equipment is found to be working correctly, the owner or operator of the UST system shall immediately report the suspected or confirmed discharge to the department in accordance with the requirements of s. NR 706.05.

(4) If testing or inspection of discharge monitoring equipment is inconclusive, the owner or operator of the UST system shall conduct another test, expand the scope of the inspection, conduct tank system tightness tests, or excavate the area where a discharge is suspected, as necessary, to determine whether or not a discharge of a hazardous substance has occurred.

(5) If investigation of unusual operating conditions, such as the erratic behavior of product dispensing equipment, the sudden loss of product from the system, or an unexplained presence of water in the tank, indicates that a release may have occurred, the owner or operator of the UST system shall immediately report the suspected or confirmed discharge to the department in accordance with the requirements of s. NR 706.05.

Note: Chapter Comm 10 contains requirements governing methods of release detection for underground storage tanks.

History: Cr. Register, February, 1997, No. 494, eff. 3−1−97.

NR 706.15 UST discharge source confirmation. (1) EVIDENCE OF A DISCHARGE. (a) If there is evidence of the discharge of a hazardous substance to the environment which may be from an UST system, the owner or operator of the UST system shall, within 10 days of discovery of the evidence, undertake all steps necessary to determine whether the UST system is the source of the discharge.

(b) Evidence of a discharge which may be from an UST system includes, but is not limited to, visible soil contamination and the presence of free product or vapors in soils, basements, sewers or utility lines, or on surface water or groundwater in the surrounding area.

(2) SYSTEM INTEGRITY TESTS. (a) When a discharge monitoring system indicates a hazardous substance discharge may have occurred or there is other evidence of a hazardous substance discharge to the environment, the owner or operator of the UST system shall conduct the appropriate tests for tightness specified in ch. Comm 10 to determine whether a leak exists in the tank or the attached piping, or both.

(b) Further investigation is not required if the test results for the system, tank and piping do not indicate that a leak exists and if there is no other indication of a discharge of a hazardous substance from the UST system.

(c) If the tests do not indicate that a leak exists, but there is other evidence of a hazardous substance discharge to the environment which may be associated with the UST system, the department may require the owner or operator of an UST system to undertake other measures to determine whether contamination is associated with the UST system, including the identification and investigation of potential migration pathways from the UST system to the location where contamination is discovered.

(3) SITE CHECK. (a) If there is evidence of the discharge of a hazardous substance to the environment which may be from an UST system, but system integrity tests conducted under sub. (2) do not indicate that a leak exists, the owner or operator shall collect samples for laboratory analysis from areas where contamination is most likely to be present at the UST site, unless the presence and source of the discharge have been confirmed in a site check conducted to comply with s. Comm 10.734.

Note: Section Comm 10.734 no longer exists since the repeal and recreation of Chapter Comm 10, effective 12−1−08.

(b) In selecting sample types, sample locations and measurement methods, the owner or operator shall consider the nature of the stored substance, the type of backfill, depth to groundwater and other factors as appropriate for identifying the presence and source of the release.

(4) NOTIFICATION OF A CONFIRMED DISCHARGE. When UST system integrity test results or sampling results indicate that a discharge of a hazardous substance has occurred, the owner or operator of the UST system shall report the confirmed discharge immediately in accordance with the requirements of s. NR 706.05 and exemptions and exceptions in s. NR 706.07.

History: Cr. Register, February, 1997, No. 494, eff. 3−1−97; corrections in (2) (a) and (3) (a) made under s. 13.93 (2m) (b) 7., Stats., Register, March, 2001, No. 543.

NR 706.17 Underground storage tank response action status report. The owner or operator of every UST system for which a response action has been taken to respond to the discharge of a hazardous substance that is related to the UST system shall annually report to the department on the status of all response activities undertaken to restore the environment to the extent practicable and to minimize the harmful effects to the environment of the discharge from the UST system. This annual report shall be on a form supplied by the department, and shall be submitted by June 30th of each year, until the case has been closed by the department in accordance with ch. NR 726.

Note: Copies of the annual status report form required by this section are available from the Underground Storage Tank program in the Wisconsin Department of Natural Resources, P.O. Box 7921, Madison, Wisconsin 53707.

History: Cr. Register, February, 1997, No. 494, eff. 3−1−97.

Wisconsin Spill Reporting Exemptions

Statutory Exemptions

The following exemptions to spill reporting are included in s. 292.11, Wis. Stats.:

- discharges within the limits authorized by a valid permit or program approved under Chs. 281, 285, or 289 - 299 (e.g. WPDES discharge permit);
- law enforcement agencies/fire departments using hazardous substances in protecting human health, safety, or welfare;
- applications of a registered pesticide according to label instructions, or application of a fertilizer at or below normal and beneficial agronomic rates

De Minimis Exemptions:

Besides the statutory exemptions identified above, Ch. NR 706, Wis. Adm. Code establishes exemptions for small quantity spills of agricultural and petroleum related compounds, as well as substances that have a federal reportable quantity established. These quantities are termed "de minimis" in that below these levels, under the following conditions, state notification of a discharge is not required. While reporting requirements may be exempted, cleanup requirements remain.

De Minimis Exemptions do not apply if the spill:

✔ has not evaporated or been cleaned up in accordance with NR 700 - 726;
✔ adversely impacts or threatens to adversely impact the air, lands, waters of the state as a single discharge, or when accumulated with past discharges;
✔ causes or threatens to cause chronic/acute human health impacts; or
✔ presents or threatens to present a fire or explosion or other safety hazard (including evacuations).

If you have a discharge that meets one of the following de-minimis exemptions, but has not been cleaned up, adversely impacts or threatens to adversely impact the environment, causes or threatens to cause human health impacts, or presents or threatens to present a fire or explosion hazard (including all evacuations), you still need to report your spill!

De Minimis Exemptions are as follows:

Discharges of Petroleum compounds if you spill:

- gasoline or another petroleum product is completely contained on an impervious surface.
- less than one gallon of gasoline on a pervious surface or runs off an impervious surface.
- less than five gallons of other petroleum products on a pervious surface or runs off an impervious surface.

Discharges of Agrichemical compounds if:

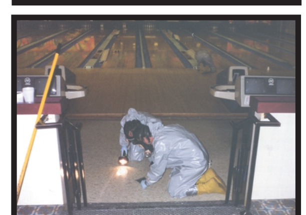
- the amount is less than 250 pounds of a dry fertilizer.
- the amount is less than 25 gallons of a liquid fertilizer.
- the amount discharged when diluted as indicated on the pesticide label would cover less than one acre of land if applied according to label instructions for pesticides registered for use in Wisconsin.

Federal reportable quantities:

- if the amount discharged is less than the federal reportable quantity.

For More Information

To order this and any other publications, or to find out more information about the Remediation and Redevelopment Program, please call our Information Line at 800-367-6076 (long distance in-state) or 608-264-6020 (local or out-of-state); or check out our web site at http://www.dnr.state.wi.us/org/aw/rr.



Chapter 292.11 – Wisconsin Spill Law

The spill law, Chapter 292.11, Wis. Stats., requires that a person who possesses or controls a hazardous substance or who causes the discharge of a hazardous substance shall notify the department immediately of any discharge not exempted by the statute. The Department has a 24-hour toll free number for reporting spills: 1-800-943-0003.

In order to determine whether you have a hazardous substance spill that requires immediate notification, you must ask yourself the following three questions: 1) Is the substance spilled a hazardous substance; 2) Has it been released to the environment; and 3) Are there statutory or rule exemptions that apply to this situation. The following text should help you answer those questions, and provides you with insights into unusual spills that did require notification.

WISCONSIN DEPT. OF NATURAL RESOURCES

PUB-RR-558 MARCH, 2003

Hazardous Substance Spills Reporting Requirements

Wisconsin Department of Natural Resources • PO Box 7921 • Madison, WO 53707

Hazardous Substance Definition

Chapter 292.01(5), Wis. Stats., defines a hazardous substance as "any substance or combination of substances including any waste of a solid, semisolid, liquid or gaseous form which may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illnesses or which may pose a substantial present or potential hazard to human health or the environment because of its quantity, concentration or physical, chemical or infectious characteristics. This term includes, but is not limited to, substances which are toxic, corrosive, flammable, irritants, strong sensitizers or explosives as determined by the department."

This definition suggests that a hazardous substance can be anything, depending on the nature of the release. The question you really need to ask yourself is how much was released and into what environment. The rule of thumb used by many is if you have to think about whether it needs to be reported, it probably does. Remember, reporting spills never gets you into trouble, only failure to report does. Whether the spilled hazardous substance is heating oil or gasoline, or something unusual like corn, butter and/or manure that flows towards a stream, pickle juice spilled on the ground, or even mercury spilled in a classroom, DNR staff will tell you if your specific incident does not meet the criteria of a reportable spill at the time that you report it. To help clarify what spills are reportable, statutory exemptions as well as "de-minimis" exemptions have been established and are explained on the back page of this brochure.

**The 24-hour Toll Free Hotline for Reporting Spills is:
1-800-943-0003**

Environment Remediation and Redevelopment Program Cleanup Partnership Redevelopment

Knee High by the Fourth of July!

We don't think of corn as hazardous – fields of corn dominate the landscape in the summer. Sweet corn stands at the farmers' market and ground corn for cattle or hogs are the images that come to mind. However, a stream filled with dried shell corn from a derailed train is quite a different picture. As organic materials decompose in water, they increase the biological oxygen demand, or BOD, of the water. Their degradation reduces the amount of oxygen available to the organisms living in that water body, including fish. If the BOD gets too high, the water will not contain sufficient oxygen for organisms to survive – in this case, the corn created an anaerobic environment. The substance can be corn, milk, manure, or any other organic material. The quantity and size of the spill, the biological oxygen demand of the spilled material, and the size of the water body will determine whether the environment is at risk. The company associated with this spill did not report it to the department, and was subject to enforcement action.

If there's corn, there must be butter…

In May of 1991, a fire broke out in a refrigerated warehouse that stored 50 million pounds of food products, including butter, lard and cheese. This warehouse was in close proximity to a creek that flowed into Lake Monona, a large urban lake. The heat from the fire caused the food products to melt, which in turn, contributed to the intensity and duration of the fire. It took 8 days for the fire department to put out the fire. The warehouse buildings were destroyed, and the water from the fire suppression activities mixed with the melted food products and flowed toward the creek and nearby storm sewers – all leading to the lake. The fire department realized quickly that this was a reportable spill, and a potential environmental disaster and reported the release to the DNR. The department acted to prevent the mixture from reaching the waterbodies, and the total environmental cleanup costs to the warehouse company were over $1 million.

What's that smell?

Driving through the beautiful Wisconsin countryside with the windows open – fresh air filling your car – until you pass an area that has recently been spread with animal manure. Yes, you explain to your children, waste from animals can be used to fertilize the land, making it a recyclable product benefiting the environment. Until, however, that manure is applied too heavily or washed into a stream where the organic material removes the oxygen from the stream resulting in a major fish kill stretching for miles downstream. Again, manure is not often thought of as a hazardous substance – it's a natural by-product of animal husbandry – but it needs to be properly managed or hazardous conditions may result. For more information on agricultural spills, see DNR publication # RR-687 "Agricultural Spills and How to Handle Them".

In a pickle!

This truck driver was in quite a pickle after his truck carrying pickle juice was in a major collision. Pickle juice leaked from the truck bed, along with diesel fuel from the truck itself. This caused soil contamination due to the hazardous characteristics of the diesel fuel along with the high pH of the pickle juice. The trucking company hired a clean up company to excavate the contaminated soil and properly dispose of it. If left in place, this contamination could have migrated to the groundwater, causing impacts to nearby private drinking water wells.

"F" in Science Class…

Recently, a high school science teacher was using elemental mercury in his science class while talking about elements and compounds. Despite warnings about the hazards of mercury, it was simply too tempting for one student, who stole the small bottle containing approximately 4 ounces of mercury after class.

The student and friends began playing with the mercury, spreading it to various classrooms, stairwells, steps and sidewalks. Later in the morning, the student went bowling at a nearby bowling alley. On the bus to the bowling alley, the container of mercury was passed around, spilling on more students and the bus. At the bowling alley, students continued to play with the mercury, putting it in the finger holes of bowling balls and rolling them down the lanes. During lunch, the student took the mercury to a friend's house, transferring it to zip lock bags to be sold for $1 per bag. Before classes ended that day, the student was called out of her classroom, the mercury was confiscated and police, fire departments, and the DNR were notified.

After sampling, the high school, several students, one home, a school bus, the bowling alley, and a sidewalk tested positive for mercury contamination. A contractor was called into assist with the mercury cleanup. In order to gain control of the scene and begin to control the spread of the mercury students were locked in the building and put into separate rooms, depending on whether they were contaminated or not. Students that were exposed to the mercury were required to go to the school locker rooms, remove their clothes, shower, and dress in new clothes. Several students were taken to a local hospital for additional mercury testing. Total costs for the entire cleanup were more than $250,000.

When in doubt, call the number!

If you're not sure whether you have a spill that needs to be reported, call the 24-hour toll free hotline, 1-800-943-0003, and you will be provided with guidance on reporting. In many situations, spill report forms are not completed if the incident is not considered a hazardous substance spill to the environment. You will need to provide information such as

- ✔ your name, address, location of the discharge;
- ✔ physical state, quantity, chemical characteristics of the discharged substance;
- ✔ cause of the discharge;
- ✔ destination of the discharged substance;
- ✔ actions taken to stop the release/minimize the impact to the environment
- ✔ actual or potential impacts to human health or the environment

DNR Regional Spill Coordinators:

Northeast: Roxanne Chronert (920) 492-5592

Northern: Norm Dunbar (715) 365-8963

Southeast: Scott Ferguson (414) 263-8685

South Central: Ted Amman (608) 275-3332

West Central: John Grump (715) 839-3775

See the back page for further explanation of reporting exemptions.

Remember, reporting a spill is always in your best interest – it can minimize potential legal consequences, protect you from future false accusations, and establish a record on your follow-up activities cleaning up the spill. Not reporting spills is where problems start. If you have general questions about spill reporting, call your regional DNR office and ask for the spill coordinator. They can assist you in your spill-related questions.

Are these hazardous Spills?

Publication # RR-559 **January, 2002**

DNR Staff Provide Spill Response and Support

No one plans a spill; they are typically caused by accidents of some sort, but when they do occur, there are statutory requirements people must comply with. The Wisconsin Statutes mandate that spills of hazardous substances be immediately reported and cleaned up to protect Wisconsin's citizens and resources. If and when a spill occurs, the DNR has staff in each of the Regional offices to help in a variety of ways.

Activating a DNR Response

When calls are made to the hotline during the day, the information comes directly to the DNR office in Madison, and is forwarded to the nearest available warden for follow-up. During the evening hours, the phone calls are directed to the State Patrol, who will forward the information to a DNR Duty Officer. That Duty Officer will make sure the local warden is alerted to the situation. Depending on the nature of the spill, local officials may also be activated to assist at the scene. These officials can be fire department staff, hazmat specialists, or local police or sheriff department staff.

The DNR encourages the public to report hazardous substance spills using the ***24-hour toll-free hotline: 1-800-943-0003***

DNR Field Response

DNR Wardens

The first responders to a hazardous substance spill for the DNR typically are the DNR wardens. Wardens are local - each county has at least one warden working within the county. They have training in response activities and can assist local law enforcement officials, help set up protective barriers for small spills, or assist the responsible party in managing the spill. Wardens also know the local resources, including other response agencies like the fire departments, as well as the natural resources for which they are stewards.

When a warden gets a call about a spill, their follow up may include additional phone calls to get more information about the nature of the spill, going to the site, requesting other DNR assistance (i.e. fish managers, water resources staff, spill coordinators), or when an emergency situation occurs and the responsible party is not available or willing to take action, calling in the DNR Zone Contractor to respond to the spill.

The DNR has contracted with emergency response companies to provide statewide emergency response services to discharges of hazadous substances when responsible parties are unable or unwilling to take necessary actions to respond to an emergency situation. These companies can provide a response within 2 hours of notification, and specialize in emergency response, spill containment and removal. They are able to assess a situation, take actions to prevent spilled materials from harming the public or the environment, sample substances to determine how to manage them, containerize the spilled materials in suitable containers, and remove those substances from the spill site to a secure facility until analyses are completed to determine their final placement. At the conclusion of the response, the department seeks cost recovery for the response costs from the responsible party.

Regional Spill Coordinators

Spill Coordinators are available in each of the Regional DNR offices who specialize in technical spill response issues. These staff are available before, during, and after spills occur.

Before spills occur...

The spill coordinators are part of local planning and response networks. They work with local emergency planning agencies, talk to the local fire departments about spill response issues, and work with the wardens to ensure a consistent DNR approach to spill response. In addition, the spill coordinators work with local industries who may handle hazardous substances as part of their business to provide them with technical support for spill prevention as well as spill response.

During a Spill...

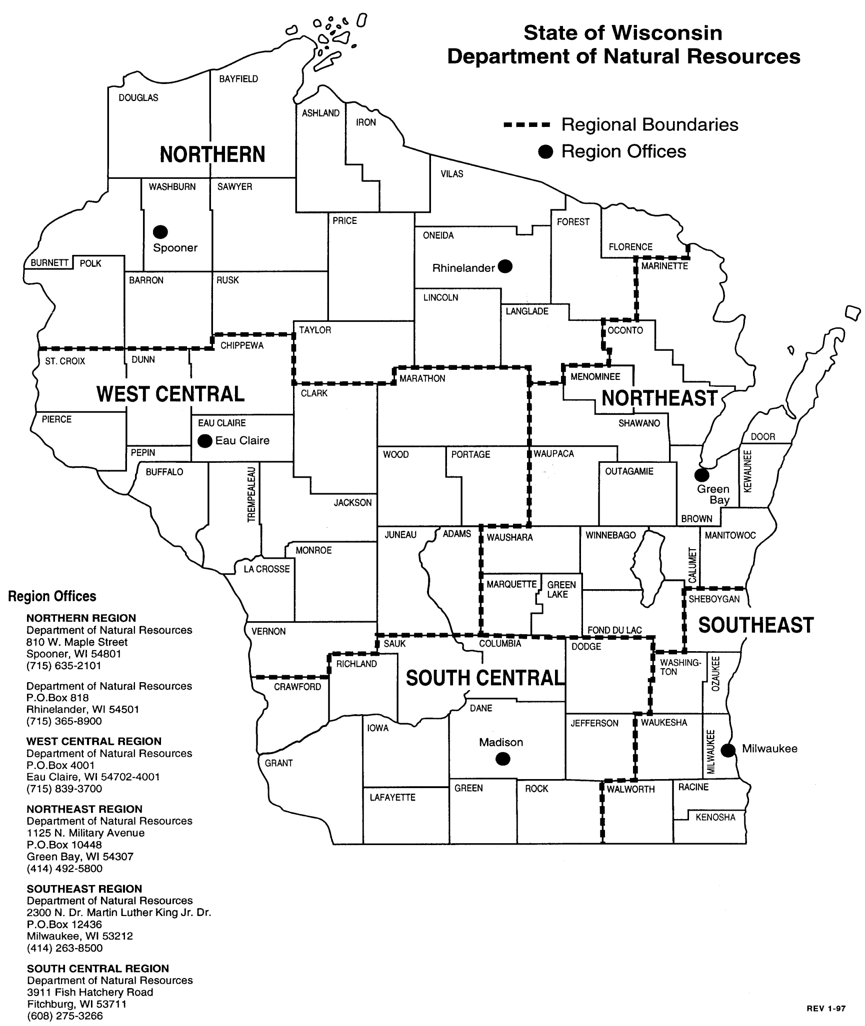
When a spill occurs, the wardens are typically the first responders. However, the spill coordinators can provide assistance in a variety of ways. Spill coordinators have developed packets of information that are provided to persons who are responsible for the spill. Included in these packets are information on DNR regulations, additional DNR contact persons, as well as listings of local contractors and waste management organizations who can assist the responsible party in management of the residual spilled material. The spill coordinator is often consulted by the responsible party for technical advice on spill containment and cleanup.

After a Spill...
The spill coordinators are part of the Remediation and Redevelopment technical staff, and are familiar with DNR regulations relating to site investigation and cleanup. Although smaller cleanups do not receive direct DNR oversight, the coordinators can answer questions and guide responsible parties through the process.

State Spill Response Team

The DNR manages the spills program through the State Spill Response Team. This team is comprised of a State Spill Coordinator, a State Emergency Management Coordinator, a federal Removal Coordinator, the 5 Regional Spill Coordinators, and legal counsel. Through the interactions of these staff persons, we identify and resolve issues to make the spill response program as effective as possible, in an ever changing response mode.

Northeast Regional Spill Coordinator: Roxanne Chronert (920) 492-5592
Northern Regional Spill Coordinator: Norm Dunbar (715) 365-8963
Southeast Regional Spill Coordinator: Scott Ferguson (414) 263-8685
South Central Regional Spill Coordinator: Ted Amman (608) 275-3332
West Central Regional Spill Coordinator: John Grump (715) 839-3775
State Spill Coordinator: Robin Schmidt (608) 267-7569
State Emergency Response Coordinator: David Woodbury (608) 266-2598
Federal Removal Coordinator: Amy Walden (608) 267-5063
Legal Counsel: Joe Renville (608) 266-9454



Wisconsin Spill Reporting Requirements - *Condensed Version*

PUB-RR-560 August 2002

ALL discharges of hazardous substances that adversely impact, or threaten to adversely impact public health, welfare or the environment must be IMMEDIATELY reported to the DNR.

De Minimis Exemptions in Chapter NR 706, Wis. Adm. Code (effective 3/1/97):
***Only* apply when the discharged substance:**
- √ **has evaporated or been cleaned up in accordance** with NR 700 - 726;
- √ **does not adversely impact or threaten to adversely impact** the air, lands, waters of the state as a single discharge, or when accumulated with past discharges
- √ **does not cause or threaten to cause** chronic/acute human health impacts
- √ **does not present or threaten to present** a fire or explosion or other safety hazard

1. Petroleum compounds:
- gasoline or another petroleum product completely contained on an impervious surface.
- < 1 gallon of gasoline onto a pervious surface or runs off an impervious surface.
- < 5 gallons of other petroleum products onto a pervious surface or runs off an impervious surface.

2. Agrichemical compounds:
- < 250 pounds dry fertilizer
- < 25 gallons of a liquid fertilizer
- pesticides that would cover < 1 acre of land if applied according to label instructions.

3. Federal reportable quantities:
- < the federal reportable quantity for a specific substance

Statutory Exemptions - no reporting is required for:
- discharges within the limits authorized by a valid permit or program (Chs. 281, 285, or 289 - 299, Wis Stats)
- law enforcement /fire departments using hazardous substances to protect human health, safety, welfare;
- proper applications of a registered pesticide or a fertilizer

Call 24-hour Hotline 1-800-943-0003 to report a spill of a hazardous substance

Notes:

This document may contain some information about certain state statutes and rules but does not necessarily include all of the details found in the statutes/rules. Readers should consult the actual language of the statutes/rules to answer specific questions.

For More Information

To order this and any other publications, or to find out more information about the Remediation and Redevelopment Program, please call our Information Line at 800-367-6076 (long distance in-state) or 608-264-6020 (local or out-of-state); or check out our web site at http://www.dnr.state.wi.us/org/aw/rr.

INCIDENT REPORT

I. Initial Information Required

1. Name of Informant: ______________________________
2. Phone Number: ______________________________
3. Location of Spill: ______________________________
4. Name of Injured and Type of Injuries (if applicable): ______________________________

   ____
5. Substance Spilled: ______________________________
6. Amount Spilled (estimated): ______________________________
7. Extent of Spill: ______________________________
8. Rate Material Currently Spilling (if applicable): ______________________________
9. Time Spill Occurred (estimated): ______________________________
10. Time of Notification(s): ______________________________
11. Post-event meeting date: ______________________________
12. Post-event questions/answers: ______________________________

____

____

____

____

II. Spill Notification Sequence and Numbers:

1. PM Ken A. Radio or cell phone: (513) 518-2762 Time: ____________
   Alternate Scott M Radio or cell phone: (270) 589-9041

2. Sheboygan Memorial Medical Center (if workers injured) Time: ____________
   (920) 451-5553; Address: 2629 N. 7th Street
   Hospital Poison Center: 1-800-815-8855

3. Fire Department and Police Department Time: ____________
   911 or (920)929-3700 for State Police

4. National Response Center (NRC) (if RQ is exceeded) Time: ____________
   1-800-424-8802

PRS Pollution Risk Services

Sheboygan River and Harbor Superfund Site
Lower River

Mitigation Plan (MP)

November 2010

Prepared for
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Sheboygan River and Harbor Superfund Site
Lower River

Mitigation Plan (MP)

Prepared for
United States Environmental Protection Agency
Region 5

Prepared By
Pollution Risk Services, LLC

November 2010

Mitigation Plan (MP)
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Appendix A Decision Tree

1 Introduction

This Mitigation Plan (MP) for the Lower River and Inner Harbor portion of the Sheboygan River and Harbor Superfund Site has been prepared in response of the selected remedy as set forth the *Record of Decision* (ROD), *Administrative Order on Consent for Remedial Design for the Lower River Portions of the ROD* (AOC), and *Lower River Remedial Design Statement of Work for the Sheboygan River and Harbor Superfund Site* (LRRDSOW). This MP was developed consistent with the following U.S. EPA guidance documents:

- *Guidance on U.S. EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties, Interim Final*, OSWER Directive No. 9355.5-01. P5-6. April 1990
- *U.S. EPA Remedial Design/Remedial Action Handbook*, OSWER Directive No. 9355.0-4B. June 1995
- *Chapter NR-724.13, Remedial and Interim Action Design, Implementation, Operation, Maintenance and Monitoring Requirements* (Oct. 1999).

Should there be any supplemental remediation or dredging activities performed *in addition to* the ROD CERCLA requirements, then this Mitigation Plan (MP) will be revised to meet the supplemental criteria. Specific changes will be made to Section 4 which references results from Post Remediation surface sediment concentrations.

1.1 Site Description

The Sheboygan River and Harbor Superfund Site (the Site) is located on the western shore of Lake Michigan approximately fifty-five miles north of Milwaukee, Wisconsin, in Sheboygan County. The Lower River includes the 11 miles of the river from the Waelderhaus Dam downstream to Lake Michigan and is comprised of the Middle River, Lower River, and Inner Harbor reaches. These reaches were defined by the U.S. EPA during the Remedial Investigations (RI), based on physical characteristics such as average depth, width, and level of polychlorinated biphenyl (PCB) sediment contamination. The Upper River reach of the site was completed in 2007. Each separate reach of the "Lower River Portions" are described below and presented on Figure 1:

Middle River - extends seven miles from the Waelderhaus Dam to the former Chicago & Northwestern (C&NW) railroad bridge.

Lower River - extends three miles from the C&NW railroad bridge to the Pennsylvania Avenue Bridge in downtown Sheboygan.

Inner Harbor - extends from the Pennsylvania Avenue Bridge to the river's outlet to the Outer Harbor. The Outer Harbor is defined as the area formed by the two break-walls.

2 Habitats On or Near the Sheboygan River Site

This plan covers the Lower River and Inner Harbor portion of the Sheboygan River. The Sheboygan River contains habitat for various species of fish and aquatic invertebrates. The riverbanks of the portions of the river to be remediated serve, being in an urban area, as limited habitat for birds, mammals, and insects that depend on the resources of the river. However limited the habitat, the goals are to protect the existing aquatic and terrestrial resources during remediation and to mitigate the areas affected by remediation to the extent practicable. To ensure, the WDNR and US Fish & Wildlife Service will be consulted to determine any threatened or endangered species and appropriate avoidance, minimization, and mitigation measures should they exist in the project area. These details will be provided, if necessary, in the Remedial Action Work Plan (RAWP).

The proposed remedial action in the Lower River and Inner Harbor includes the removal and disposal of PCB contaminated sediments from within the river. The areas that require remediation that are considered for possible protection and mitigation include the following:

- Riverbanks, Boat Slips/Bridge Structures, and Access Points
- Dewatering Area
- Dredged Sediments

The sections that follow outline the measures that are proposed for use in the protection and mitigation efforts.

3 Mitigation Measures Before and During Sediment Removal Activities

Remedial action activities will occur at the Lower River and Inner Harbor river reaches. Protection measures that will be implemented prior to/during the remediation activities in the Sheboygan River are discussed in this section.

3.1 Riverbank, Boat Slips/Bridge Structures, and Access Points

As part of the Soft Sediment removal plan the bank of the river will be protected from erosion and cave-in by establishment of a lateral shoreline setback approximately two (2) foot away from the toe of slope of the bank, i.e. where water meets shoreline or any bank stabilization structure (i.e. rip rap/crushed concrete). In addition, a lateral setback of five (5) feet will be established to protect any bridge or boat slip support structure.

The dredge and booster pumps will be launched from an access area east of the boat ramp near Station 630+00. This area is a property owned by the City of Sheboygan. To prepare for the river access, the City of Sheboygan Deputy Director of Public Works has granted PRS river access. Before any access activities, photographs will document the pre-existing conditions of the road and surrounding area. Boats will be launched, as necessary, using the existing boat ramps near 14th Street and 8th Street bridges.

The 8" HDPE Pipe used to carry dredge slurry will be deployed to the river from the dewatering area. Again, photographs will document the pre-existing conditions and any need to restore the river bank.

A before remediation inspection will be performed by the Project Manager with any city official, inspector, as necessary, to document the before remediation conditions. The inspection will include surveying on a location by location basis. Photographs will further document the noted conditions. These "before" remediation photographs will document the conditions of ingress and egress locations as well as all bridges, slips and other river-harbor physical structures.

3.2 Dewatering Area

Prior to the construction of the dewatering area, photographs will be taken to document baseline conditions of the dewatering site. In addition, a pre-construction site survey will be conducted to document the baseline topography and floodplain conditions. An ASTM Phase I site assessment will be performed to document baseline environmental conditions at the dewatering site. Pre-construction surface samples were collected and analyzed for PCBs at the dewatering area at a rate of one every 5,000 square feet.

State regulations require that fugitive dust emission be controlled. Therefore, all roadways, designated work areas, and other possible sources of dust generation will be controlled by application of water when visible dust is observed.

3.3 Dredged Sediments

During dredging activities, turbidity will be measured and correlated to Total Suspended Solids (TSS) to document the downstream disbursement of suspended solids. A detailed description of the turbidity measurement can be found in the *Verification Sampling Plan* (VSP). Turbidity measurements will be collected every two (2) hours from a 150' upstream (baseline) and 500' downstream location to obtain a change (i.e., delta) in suspended solids. A trigger delta level of greater than 35 parts per million (ppm) will require the dredge operator to reduce cutterhead rotation speed, reduce swing speed of cutterhead, or turn pump off after cutterhead during shutdown and vice versa during start-up. An action delta level of greater than 70 pm will require the dredge operator to cease dredging operations and reduce cut face undercutting by using a maximum lift thickness of 75% of the cutterhead diameter. This will be controlled by the operator who has information displayed on the dredge computer screen. Dredging will resume when the change in turbidity drops below the exceeded action level. Additional detail is provided in the Water Management Plan of the RAWP.

4 Mitigation Measures after Sediment Removal Activities

Remedial action activities will occur at the Lower River and Inner Harbor river reaches. The mitigation measures and materials that are proposed to restore the project areas are discussed in this section. Physical damage from removal activities to the shore line, dredged sediments, river structures or any other property will be mitigated. River ingress and egress locations, if not an existing boat ramp, will be repaired consistent with Wisconsin Department of Natural Resources (WDNR) guidelines.

4.1 Riverbank, Boat Slips/Bridge Structures, and Access Points

After remediation, a "follow-up" walk through inspection with city officials will be performed to document any deficiencies or damages to the physical structure or access area. Any damage or deficiencies will be corrected as documented in the walk through. A second inspection of the mitigating activity will be performed in a 2-3 week period of any correction to assure that any physical structure has been restored to the baseline condition.

4.2 Dewatering Area

Dredged and dewatered sediments will be sampled and removed from the dewatering area. After sediment removal, the entire dewatering pad, perimeter berm, and sump will be pressured washed. The generated water will processed through the Waste Water Treatment Plant (WWTP). Any solid material will be collected with a street brush or vacuum truck, sampled, and disposed at the appropriate licensed facility. The perimeter berm and sump will be removed, tested, and disposed at the appropriate licensed facility. If the asphalt pavement is to remain at the discretion of the property owner, the top layer (1/4") will be stripped, sampled, and disposed at the appropriate licensed facility. If the pavement is to be removed, the entire layer will be stripped, sampled, and disposed at the appropriate licensed facility.

After mitigation, a "follow-up" walk through inspection with landowner(s) will be performed to further document any deficiencies or damages to the site. Any damage or deficiencies will be corrected as documented in the walk through. A post-construction site survey will be conducted to demonstrate that no changes to the floodplain have occurred and the requirements of NR 116 have been met. A second inspection of the mitigating activity will be performed in a 2-3 week period of any correction to assure that the site has been restored to the baseline state. Photographs will be taken to document that the area(s) used for dewatering have been restored to baseline conditions.

A site assessment in conformance with Wisconsin Administrative Code, ch. NR 700 (NR 700) will be performed on the entire dewatering area property, including paved and unpaved areas. If soil or groundwater contamination is discovered, soil and groundwater will be remediated in conformance with NR 700. Site assessment will include sampling for PCBs, PAHs, and Resource Conservation and Recovery Act (RCRA) heavy metals. If final remediation includes a protective cap, a cap maintenance plan shall be developed in accordance with NR 700.

4.3 Dredged Surfaces

Dredged surface will be sampled in accordance with the *Verification Sampling Plan*. Sample results will be compared to the Decision Tree, Appendix A to determine if cover material or additional sediment will be removed.

The following table will be used for designating areas to receive cover so that the SWAC for the river reach[1] is ≤ 3.5 ppm:

River Reach	Action Level PCB Concentration (ppm)	Percentage of the River Reach Surface Area	No More Than "X" Areas Exceeding Action Level (X = number)
Lower River	24 - 26	< 2%	1
Lower River	19.5 - 26	< 9%	11
Inner Harbor (Between Penn Ave & 8th Street Bridge)	24 - 26	< 2%	1
Inner Harbor (Between Penn Ave & 8th Street Bridge)	19.5 - 26	< 9%	8

Cover will be placed over the dredged surface area to protect re-suspension of contaminated sediment. Typical cover design, by respective energy zone, is provided in Figure 2. The basis for the typical design provided is from projects with similar river characteristics (i.e. Fox River) as indicated in the Baird Report, November 2007. As part of the sediment removal action, cover design will be prepared in accordance with appropriate USACE guidance documents. The cover design will range from sand to Type B riprap (12" minus) and the thickness verified with bathymetry measurements.

[1] For SWAC determination sampling and the need for cover placement, River Reach is defined as the Lower River and Inner Harbor (Penn. Ave. Bridge to 8th Street Bridge). For the project SWAC, River Reach is defined as the Lower River and Inner Harbor (Penn. Ave. Bridge to mouth).

5 References

USACE 1998. *Guidance for Subaqueous Dredged Material Capping.* June 1998.

WDNR 1999. *Remedial and Interim Action Design, Implementation, Operation, Maintenance and Monitoring Requirements, Chapter NR-724.13.* October 1999

U.S. EPA. 2000. *U.S.EPA Superfund Record of Decision, Sheboygan River and Harbor, Sheboygan, Wisconsin.* May 2000.

WDNR 2004. *Wisconsin's Floodplain Management Program, Chapter NR-116.* August 2004

WDNR 2007. *General Requirements, Chapter NR-700.* September 2007

USACE 2007. *Sediment Transport Modeling, Sheboygan River, Draft Final Report.* November 2007

U.S. EPA. 2009. *Administrative Order on Consent for Remedial Design for the Lower River Portions of the ROD.* January 2009.

U.S. EPA. 2009. *Statement of Work for the Lower River Remedial Design for the Sheboygan River and Harbor Superfund Site, Sheboygan County, Sheboygan, Wisconsin.* January 2009.

USACE. *Guidance for In-situ subaqueous capping of contaminated sediments, Appendix A.*

Figures

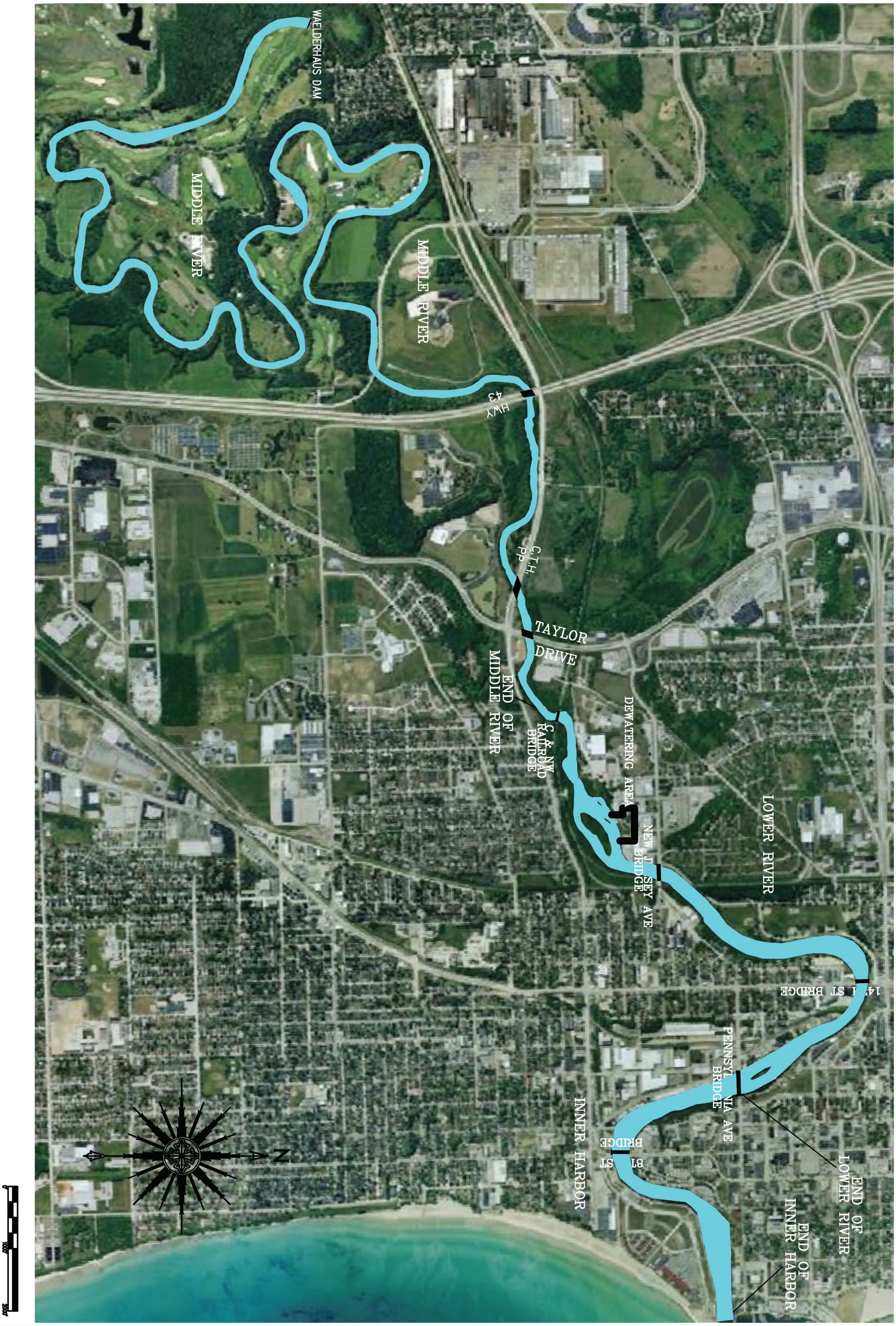


FIGURE NO. 1

Scale: SHOWN

SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
LOWER RIVER DESIGN
SHEBOYGAN FALLS, WISCONSIN

RIVER REACHES

CONFIDENTIAL – ALL RIGHTS RESERVED – PROPERTY OF

PRS Pollution Risk Services
7870 East Kemper Road, Suite 240
Cincinnati, Ohio 45249
Phone: 513-489-2793
Fax: 513-489-2794

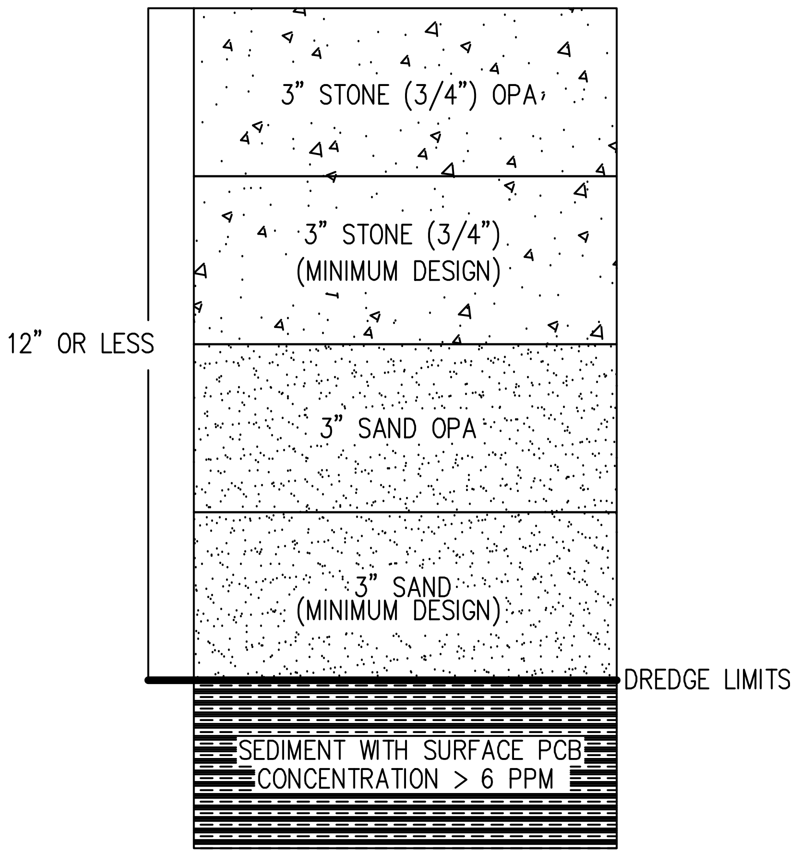
REVISIONS			SIGNATURES	
NO.	BY	DATE	BY	DATE
△	KDA	NOVEMBER 17, 2010	APPROVED	
△			REVIEWED	
△			DESIGNED	

RECORD DRAWINGS OF COMPLETED CONSTRUCTION CONFORMING TO CONTRACTORS AND/OR OWNERS RECORDS. BY ________ DATE ________

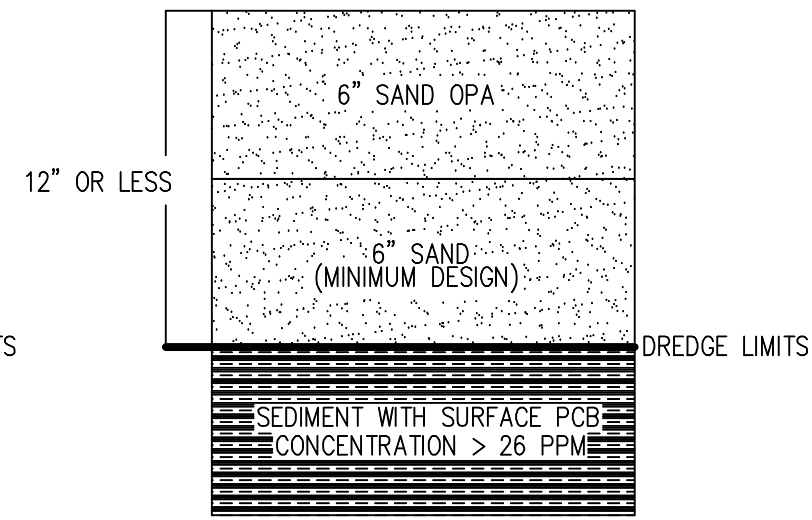
FILE NAME:
DRAWN BY: KDA DATE: NOVEMBER 2009

REUSE OF DOCUMENTS
THIS DOCUMENT HAS BEEN DEVELOPED FOR A SPECIFIC APPLICATION AND NOT FOR GENERAL USE. THEREFORE IT MAY NOT BE USED WITHOUT THE WRITTEN APPROVAL OF FOTH & VAN DYKE and ASSOCIATES. UNAPPROVED USE IS THE SOLE RESPONSIBILITY OF THE UNAUTHORIZED USER.

HIGH ENERGY ZONE



LOW ENERGY ZONE



NOTE

OPA = OVER-PLACEMENT ALLOWANCE

FILE NAME:
DRAWN BY: KDA
DATE: NOVEMBER 2000

NO.	REVISIONS BY	DATE	SIGNATURES BY	DATE
			APPROVED	
			REVIEWED	
			DESIGNED	

PRS Pollution Risk Services
7870 East Kemper Road, Suite 240
Cincinnati, Ohio 45249
Phone: 513-489-2793
Fax: 513-489-2794

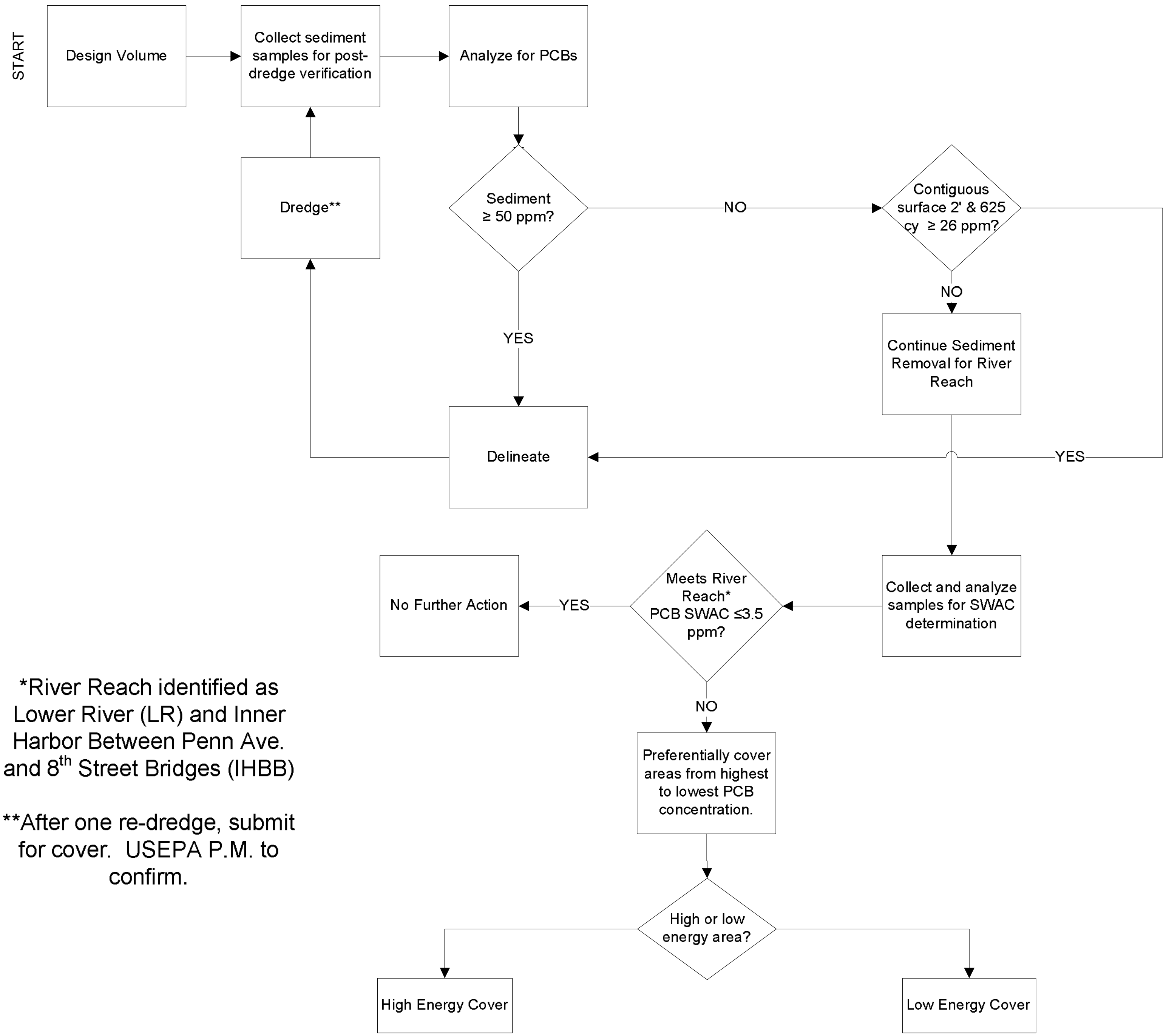
SHEBOYGAN RIVER AND HARBOR SUPERFUND SITE
MITIGATION PLAN
SHEBOYGAN FALLS, WISCONSIN

COVER DESIGN

Scale: NTS

FIGURE NO. 2

Sheboygan River and Harbor – Mitigation Plan Decision Tree



*River Reach identified as Lower River (LR) and Inner Harbor Between Penn Ave. and 8th Street Bridges (IHBB)

**After one re-dredge, submit for cover. USEPA P.M. to confirm.