Cobbs Creek Fish Passage Project - Appendices

Appendix A

Relevant Correspondence

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA GAME COMMISSION
2001 ELMERTON AVENUE, HARRISBURG, PA
17110

"TO MANAGE ALL WILD BIRDS, MAMMALS AND THEIR HABITATS FOR CURRENT AND FUTURE GENERATIONS."

PNDI Project Review

September 8, 2009

Mr. Mark Eberle
Department of the Army
Philadelphia District, Corps of Engineers
Wanamaker Building, 100 Penn Square East
Philadelphia, PA 19107-3390

PNDI Project Review
Cobbs Creek/Woodland Dam
Fish Passage Restoration Project
City and County of Philadelphia, PA

Dear Mr. Eberle:

Thank you for submitting information about the above referenced project for review. The Pennsylvania Game Commission (PGC) screened this project for potential impacts to species and resources of concern under PGC responsibility, which includes birds and mammals only.

No Impact Anticipated

PNDI records indicate that no known occurrences of species or resources of concern under PGC jurisdiction occur in the vicinity of the project. Therefore, the above-referenced project is not expected to impact any birds or mammals of concern, and no further coordination with the PGC is necessary for this project at this time.

This response represents the most up-to-date summary of the PNDI data files and is valid for one (1) year from the date of this letter. An absence of recorded information does not necessarily imply actual conditions on site. Should project plans change or additional information on listed or proposed species become available, this determination may be reconsidered.

Should the proposed work continue beyond the period covered by this letter, please resubmit the project to this agency as an "Update" (including an updated PNDI receipt, project narrative and accurate map). If the proposed work has not changed and no additional information concerning listed species is found, the project will be cleared for PNDI requirements under this agency for n additional year.

This finding applies to impacts to birds and mammals only. To complete your review of state and federally-listed threatened and endangered species and species of special concern, please be sure that the U.S. Fish and Wildlife Service, the PA Department of Conservation and Natural Resources, and/or the PA Fish and Boat Commission have been contacted regarding this project as directed by the online PNDI ER Tool found at www.naturalheritage.state.pa.us.

Sincerely,

James R. Leigey
Wildlife Impact Review Coordinator
Division of Environmental Planning
And Habitat Protection
Bureau of Wildlife Habitat Management
Phone: 717-787-4250, Extension 3128
Fax: 717-787-6957
E-Mail: jleigey@state.pa.us

A PNHP Partner

PNHP
Pennsylvania Natural Heritage Program

Cc: File

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

SEP 10 2009

Minas M. Arabatzis, Chief
Planning Division
Department of the Army
Philadelphia District, Corps of Engineers
Wanamaker Building, 100 Penn Square East
Philadelphia, Pennsylvania 19107-3390

Dear Mr. Arabatzis,

This is in response to your letter providing the scoping summary for proposed improvements at the Woodland Dam along Cobbs Creek in Philadelphia, Pennsylvania. The Army Corps of Engineers (ACOE) and the Philadelphia Water Department (PWD) are currently evaluating alternatives for restoring fish passage at this Dam.

As you know, while several species of listed sea turtles occur seasonally in Delaware waters, including Delaware Bay, and there is a population of endangered shortnose sturgeon (*Acipenser brevirostrum*) in the Delaware River, no listed species are known to occur in Cobbs Creek. It is my understanding that coordination with NMFS' Habitat Conservation Division is currently ongoing. However, as no listed species occur in the action area, no further coordination with NMFS Protected Resources Division regarding the proposed project is necessary. Should project plans change or new information become available that changes the basis for this determination, further coordination should be pursued. If you have any questions regarding these comments, please contact Julie Crocker of my staff at (978)282-8480 or by e-mail (Julie.Crocker@Noaa.gov).

Sincerely,

Mary A. Colligan
Assistant Regional Administrator
for Protected Resources

File Code: Sec 7 No Species Present 2009

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, Pennsylvania 16801-4850

September 4, 2009

Mark Eberle
Environmental Resources Branch (CENAP-PL-E)
U.S. Army Corps of Engineers, Philadelphia District
100 Penn Square East
Philadelphia, PA 19107

Dear Mr. Eberle:

This responds to your July 28, 2009, letter requesting our participation in the scoping process for restoring fish passage at the Woodland Dam on Cobbs Creek in Philadelphia, Pennsylvania. The following comments are provided pursuant to the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*) to ensure the protection of fish and wildlife resources, and the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

Federally Listed Species

Except for occasional transient species, no federally listed or proposed threatened or endangered species under our jurisdiction are known to occur within the project impact area. Therefore, no biological assessment or further consultation under the Endangered Species Act are required with the Service. This determination is valid for two years from the date of this letter. If the proposed project has not been fully implemented prior to this, an additional review by this office will be necessary. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered.

Potential Effects of the Proposed Action Alternatives on Fish and Wildlife Resources

Complete or Partial Dam Removal. The proposed project is located approximately 1.4 miles upstream of the confluence of Cobbs and Darby Creeks. The John Heinz National Wildlife Refuge at Tinicum is located on tidal Darby Creek, approximately 2.6 miles downstream of Woodland Dam. The refuge contains the largest remaining freshwater tidal wetland in Pennsylvania, and provides habitat for many species of birds, mammals, amphibians, reptiles, and resident and anadromous fish. The potential for sediments (especially contaminated sediments) to be released during a breach of Woodland Dam, resulting in adverse impacts to water quality and the fish and wildlife resources of the refuge, needs to be carefully evaluated.

Dam removal projects have become increasingly popular as a watershed restoration option throughout Pennsylvania and nationally. There are many environmental benefits to dam removal, including: re-connection of important seasonal fish habitat, normalized temperature regimes, improved water clarity (in most cases), improved dissolved oxygen concentrations, normalized sediment and energy transport, improved continuity of the movement of sediment and woody debris (both important to instream and riparian ecosystems), and improved biological diversity (American Rivers, 2002; Stanley and Doyle, 2003). In addition, in cases where the original justification and use of dams no longer exist, older dams are liabilities to communities due to maintenance and/or the potential for failure.

Although hundreds of dams have already been removed across the country, and the widespread assumption among dam-removal supporters is that these projects are ecologically beneficial, there are few published, long-term studies that document the biological and/or geomorphic effects of dam removal (Pizzuto, 2002; Bednarek, 2001; Skalak *et al.,* 2009; Thomson *et al.*, 2005). Thomson *et al.* (2005) observed that biota in downstream reaches will not necessarily benefit from removing low-head, run-of-river dams (such as the Woodland Dam). In fact, these authors suggest that the release of sediments resulting from dam removal could seriously deplete downstream benthic invertebrate populations, offsetting any benefits associated with opening up new fish habitats upstream by a loss of the fish food source downstream. Following the removal of an approximately six-foot high dam on Manatawny Creek in southeastern Pennsylvania, the authors documented significant reductions in macroinvertebrate abundance and diatom richness downstream, that lasted at least 12 months, and perhaps at least 48 months, post-dam removal. Nevertheless, Thomson *et al.* (2005) concluded that once the sediments are finally swept from the system, long-term deleterious impacts on downstream benthic communities are unlikely. Given the tidal nature of Cobbs Creek in the project area, we would expect that the amount of time required to "sweep" sediments away would be considerable.

Pizzuto (2002) has provided a comprehensive summary of the various geomorphic processes that occur following dam removal, and the ultimate consequences for aquatic habitats. He cautioned that, depending on the grain size and mass of sediments stored behind dams, it may take decades for the stream channel to establish a new equilibrium. Most importantly, Pizzuto noted that the engineering design and implementation of the removal have profound effects on the resulting geomorphic changes in the former impoundment, and on the extent and nature of sediment impacts downstream of the project.

A survey should be undertaken to characterize upstream and downstream sediments, sediment transport rates, and stream geomorphology, in order to plan for measures to accommodate the change in sediment transport after dam removal. The influence of tidal fluctuations in hindering the efficient transport of released sediments should be considered.

With any complete or partial dam removal, the sediments in the former impoundment become exposed. These sediments are expected to form the new floodplain (if they are not contaminated). Soon after they are exposed, these sediments need to be stabilized with vegetation (preferably using hydroseeding or some other method to hold sediments in place until the vegetation is established). The new vegetation will have to be carefully monitored during its establishment in order to detect and prevent invasive species such as Japanese knotweed, reed canary grass, and purple loosestrife.

If the stabilized sediments are too fine to withstand the floodplain flows, then either floodplain sills or coarser sediments are required to prevent avulsions and bank instabilities. It is important that these sediments are accessible to floodplain flows (*i.e.,* in terms of elevation), and do not restrict the new stream.

Contaminants. Roberts *et al.* (2007) noted that assessing the potential for sediment contamination in dam removal projects is extremely important, especially in urban watersheds with multiple pollution sources. Given the urbanized nature of the Cobbs Creek watershed, fine-grained materials that have accumulated upstream of the dam are probably contaminated with a variety of pollutants common to urban stormwater runoff, such as metals and polycyclic aromatic hydrocarbons. In addition, the project area is downstream of the Havertown PCP National Priorities List (Superfund) site, known to have contaminated the sediments of a Cobbs Creek tributary (Naylors Run), and likely Cobbs Creek itself, with a variety of substances including pentachlorophenol, dioxin, chromium, copper, lead, manganese, zinc, arsenic, cadmium, mercury, nickel, and silver. Many of these contaminants are bioaccumulative, and could pose a risk not only to benthic invertebrates inhabiting downstream areas where the released sediments re-deposit, but also to fish and wildlife further up the food chain. Any sediments released during the dam breaching process could remain trapped by tidal fluctuations within the John Heinz refuge for a considerable period of time.

Because the release of contaminated sediments may pose a risk to downstream fish and wildlife resources, including the wildlife refuge, chemical analysis of sediments in the impounded area is a critical prerequisite to the proposed project. Analysis should include the complete Target Analyte List/Target Compound List suite, including pentachlorophenol, and results should be compared to the U.S. Environmental Protection Agency Region III ecological screening values (available at http://www.epa.gov/reg3hscd/risk/eco/btag/sbv/fwsed/screenbench.htm) to assess potential ecological effects. If contamination is identified, this does not necessarily mean that dam removal shouldn't remain a viable alternative for restoring fish passage, but it may argue for such measures as gradual impoundment dewatering; installing a temporary sediment trap downstream of the project; or rerouting streamflow while a new channel is excavated, stabilized, and revegetated. In addition, depending on the nature and severity of the contamination, the sediments that will form the surface of the new floodplain may need to be replaced, or covered with clean soil, to protect wildlife and human users of the floodplain or to avoid phytotoxic suppression of revegetation efforts.

Engineered Fishway. While not as effective in restoring fish passage as dam removal would be, any of the fishways options under consideration (Denil fish ladder, vertical slot fish passage, or natural rapids/rock ramp) would be an improvement over the current condition at Woodland Dam. For the Denil or vertical slot structure, use of an auto-tracking tailwater gate should be considered, as it would eliminate the need for manually installing or removing boards to adjust for high or low flows or tidal fluctuations. In addition, an eel ladder should be included in any fishway design.

Natural rapids can also be effective at passing fish, provided they are designed and installed correctly (*e.g.,* vertical drops at any given point along the ramp do not exceed the swimming ability of the target fish species).

Engineered fishways require maintenance to remain effective. We recommend that a plan be developed that describes the party(ies) responsible for long-term operation and maintenance of the fishway; the required schedule for maintenance checks, servicing, replacement and repairs; and the source of long-term funding.

Bypass Channel. A bypass channel could effectively restore fish passage, and should be further evaluated for its feasibility.

In summary, while the Service supports the concept of restoring fish passage at Woodland Dam, the probability of sediment contamination, the nature of the contamination, the tidal flow regime, and the presence of the John Heinz National Wildlife Refuge and its important fish and wildlife resources downstream, call for careful analysis of the potential ecological impacts of any alternatives involving dam removal or partial breaching. Our Environmental Contaminants staff would be happy to assist in the development of sampling plans and analysis of data to assess risks, and to assist with development of design options to minimize risk. In addition, we can provide further technical assistance on engineered fishway alternatives.

Thank you for the opportunity to comment. Please direct any questions or comments to me at 814-234-4090.

Sincerely,

Cindy Tibbott

Cindy Tibbott
Acting Supervisor

References

American Rivers. 2002. The ecology of dam removal: a summary of benefits and impacts. Washington, D.C. (www.americanrivers.org)

Bednarek, A.T. 2001. Undamming rivers: A review of the ecological impacts of dam removal. Environmental Management 27(6):803-814.

Pizzuto, J. 2002. Effects of dam removal on river form and process. BioScience 52(8):683-691.

Roberts, S. J., J. F. Gottgens, A. L. Spongberg, J. E. Evans, N. S. Levine. 2007. Assessing potential removal of low-head dams in urban settings: an example from the Ottawa River, NW Ohio. Environ. Manage. 39:113-124.

Skalak, K., J. Pizzuto, and D.D. Hart. 2009. Influence of small dams on downstream channel characteristics in Pennsylvania and Maryland: Implications for the long-term geomorphic effects of dam removal. J. Am. Water Resources Assoc. 45(1):97-109.

Stanley, E. H., and M. W. Doyle. 2003. Trading off: the ecological effects of dam removal. Front. Ecol. Environ. 1(1):15-22.

Thomson, J. R., D.D. Hart, D.F. Charles, T. L. Nightengale, and D. M. Winter. 2005. Effects of removal of a small dam on downstream macroinvertebrate and algal assemblages in a Pennsylvania stream. J. N. Am Benthol. Soc. 24(1):192-207.

Fairmount Park
PHILADELPHIA'S PARK SYSTEM

One Parkway, 10th Floor
1515 Arch Street
Philadelphia, PA 19102
www.fairmountpark.org

September 18, 2009

Erik Rourke, Project Manager
Project Development Branch – Special Studies
U.S. Army Corps of Engineers
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

RE: Comments on Cobbs Creek Fish Passage

Dear Mr. Rourke,

We received the draft scoping summary for the "Alternative Discussions for Cobbs Creek Fish Passage, Philadelphia, PA" on 9/9/09 from the Philadelphia Water Department. (Note that if a copy was mailed to Fairmount Park it never reached us because the Park is not at the address shown in your distribution list. Please replace the Park's address in your system with the address on this letterhead.) This letter constitutes Fairmount Park's (the Park's) comments on the draft scoping summary.

Fairmount Park takes very seriously its responsibility to manage the natural resources of the system--over 10,000 acres of land with over 5,000 acres of natural areas comprised of forests, meadows, streams and wetlands. These natural areas and the native plants and animals that comprise them constitute a biological heritage that extends back thousands of years. They are living museum that preserves some of the historic character of a landscape that has been forever changed. These areas hold enormous importance for local and migratory wildlife. However, we also have a responsibility to preserve and interpret the human history of this city that is held in many of the structures that exist within our natural areas. The challenge that we face is balancing these responsibilities when they come into conflict.

Fairmount Park is strongly interested in prospects for improving fish passage on Cobbs Creek and elsewhere, especially for migratory fish species that have been blocked for several centuries. In general we support the exploration of fish passage alternatives at Woodland Dam, which the Park owns. However, the Park is also charged with protecting cultural and historic assets and the Woodland Dam is a documented significant park resource. In the 1999 NLREEP Natural Lands Restoration Master Plan for Cobbs Creek, the Academy of Natural Sciences recommends removal or modification of the dam above Woodland Avenue to improve conditions in the creek. In 2000, the Fairmount Park's Historic Preservation Office produced a Cultural Landscape Report for Woodland Dam in response to the proposed removal of the dam. Because of the uniqueness of this dam, the first built in Pennsylvania, and the mill site, any modifications made to the dam or spillway must be done in a manner to result in the least loss of historic fabric, and to prevent further damage or deterioration of the dam. The Park will therefore consider all alternatives that permit fish passage which takes into consideration the functional characteristics of the fish passage, historical and cultural aspects of the dam, and the operational and maintenance requirements of the passage. Our position on the five alternatives described in the scoping summary is as follows:

- No action – Not acceptable as it would not permit fish passage.
- Complete Dam Removal – We consider this alternative unacceptable at this time.
- Dam Removal with Partial Remnants – This alternative may be acceptable if the modifications adhere to the conditions outlined above. We support the US ACE investigating this alternative further.
- Engineered Fishway – This alternative is acceptable if the modifications adhere to the conditions outlined above. We support the US ACE investigating this alternative further.
- Bypass Channel – This alternative is acceptable as long as the passage is located on the right bank of the stream (to protect the remnant mill structure). This would require the acquisition of land or a right of way agreement with Colwyn Borough. We support the US ACE investigating this alternative further.

We are confident that the US ACE will consider all aspects of this site during the assessment the fish passage options on Cobbs Creek. If you wish to discuss the alternatives further, please contact Tom Witmer, the Park's Director of Natural Resources at 215.683.0216 or tom.witmer@phila.gov.

Sincerely,

Joan S. Blaustein
Director, Environment Stewardship & Education Division

CC: Theresa Stuhlman
Tom Witmer

Pennsylvania Fish & Boat Commission

established 1866

Division of Environmental Services
Natural Diversity Section
450 Robinson Lane
Bellefonte, PA 16823-9620
(814) 359-5237 Fax: (814) 359-5175

September 1, 2009

IN REPLY REFER TO:
SIR# 32337

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT CORPS OF ENGINEERS
MARK EBERLE
WANAMAKER BUILDING
100 PENN SQUARE EAST
PHILADELPHIA, PA 19107-3390

RE: Species Impact Review (SIR) – Rare, Candidate, Threatened and Endangered Species
Woodland Dam - Fish Passage Project, Cobbs Creek
Philadelphia, Pennsylvania

Dear Mr. EBERLE:

I have examined the map accompanying your recent correspondence, which shows the location for the above-referenced project. Based on records maintained in the Pennsylvania Natural Diversity Inventory (PNDI) database and our own files, the following rare or protected species are known from the vicinity of the project site:

Common Name	Scientific Name	PA Status
Red-bellied turtle	*Pseudemys rubriventris*	threatened
Coastal plain leopard frog	*Rana utricularia*	endangered
Eastern mudminnow	*Umbra pygmaea*	candidate

The red-bellied turtle is one of Pennsylvania's largest native aquatic turtles. This turtle species is known to inhabit relatively large, deep streams, rivers, ponds, lakes, and marshes with permanent water and ample basking sites. Red-bellied turtles are restricted to the southcentral and southeastern regions of the Commonwealth. The existence of this turtle species is threatened by habitat destruction, poor water quality, and competition with aggressive non-native turtle species that share its range and habitat (e.g., red-eared slider, *Trachemys scripta elegans*). Red-bellied turtle presence within the project area is well-documented, and ongoing studies are gathering more information about their habitat uses and needs that may be used in reviews of potential impacts to this species.

The Coastal Plain leopard frog (a.k.a. southern leopard frog) resembles the northern leopard frog, but has a distinguishing whitish spot in the center of its eardrum, fewer dark spots on its sides, and a longer, pointed head. It lives and breeds in shallow, freshwater habitats and slightly brackish coastal marshes, and occurs in southeastern Pennsylvania. Following an early spring mating season, adults may live away from water in summer, when vegetation provides shade and shelter. It is endangered primarily due to loss of its breeding habitat from development and industrial activity.

The eastern mudminnow is highly secretive and inhabits very shallow water under vegetation and debris within marshes, weedy shores of lakes, or stagnant streams within the Delaware River drainage. It occasionally leaps from the water while feeding. This species is rare due to habitat destruction and water pollution.

Given the status and sensitivity of these species of concern, we will need additional information to assess the project's potential for adverse impacts to these species. In order for us to continue our project review, please provide us with the following information: detailed site plans including a project narrative, aerial photographs of the general area, identification and delineation of wetlands expected to be impacted (including acreage), stream characterization (width, depth, channel substrate composition, presence/absence of pools and in-stream turtle basking sites, type of aquatic vegetation), a habitat suitability assessment within the project area of effect for all of the aforementioned species of special concern including documented turtle nesting or basking locations, and color photographs (dated, labeled, and keyed to a map) of wetlands and any bodies of water expected to be impacted.

In any future correspondence with us regarding this specific project, please contact us at 814-359-5237 and **refer to the SIR number** indicated above. Thank you for your cooperation and attention to this matter of nongame species conservation.

Sincerely,

Christopher A. Urban, Chief
Natural Diversity Section

CAU/dmc

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Habitat Conservation Division
James J. Howard Marine
Sciences Laboratory
74 Magruder Road
Highlands, NJ 07732

August 13, 2009

Minas M. Arabatzis, Chief
Planning Branch
U.S. Army Corps of Engineers
Philadelphia District
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

ATTN: Mr. Mark Eberle

Dear Mr. Arabatzis:

This responds to your letter dated July 28, 2009 requesting our participation in the scoping process for the development of alternatives to restore fish passage at the Woodland Dam on Cobbs Creek in the City of Philadelphia and Delaware County, Pennsylvania. NOAA's National Marine Fisheries Service (NMFS) Northeast Region Habitat Conservation Division will gladly participate in this process. We support fully the Army Corps efforts to restore fish passage at the Woodland Dam and at other dams and blockages throughout the Philadelphia District.

According to your letter, NOAA trust resources collected downstream of the dam include American shad (*Alosa sapidissima*), blueback herring (*Alosa aestivalis*), white perch (*Morone americana*), gizzard shad (*Dorosoma cepedianum*) and striped bass (*Morone saxatilis*). Because landing statistics and the number of fish observed on annual spawning runs indicate a drastic decline in blueback herring populations throughout much of their range since the mid-1960's, they have been designated as species of concern by NMFS in a Federal Register Notice dated October 17, 2006 (71 FRN 61022). "Species of concern" are those species about which NMFS has some concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the Endangered Species Act.

No essential fish habitat (EFH) has been designated within the study area. As a result, an EFH consultation by the ACOE agency will not be required for the actions proposed in this feasibility study. However, EFH for bluefish has been designated within the mixing zone of the Delaware Estuary. The EFH final rule published in the Federal Register on January 17, 2002 defines an adverse effect as, "any impacts which reduce the quality and/or quantity of EFH."

The rule further states that:

> an adverse affect may include direct or indirect physical, chemical or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat and other ecosystems components, if such modifications reduce the quality and/or quantity of EFH.

> Adverse effects to EFH may result from action occurring within EFH or outside EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

Buckel and Conover (1997) in Fahey et al. (1999) reports that diet items of juvenile bluefish include *Alosa* species such as blueback herring. As a result, activities that improve the habitat and increase spawning success for anadromous fish could also improve EFH for federally managed species such as bluefish by increasing the availability of prey species.

Your letter states that the Philadelphia District Army Corps of Engineers is working closely with the Philadelphia Water Department and has developed a list of preliminary alternatives to improve fish passage to potential foraging and spawning areas upstream of the dam. Alternatives being considered include: no action, complete dam removal, dam removal with partial remnants, an engineered fishway or a bypass channel. Because engineered fishways and bypass channels are not completely effective and require long-term maintenance and monitoring, we would prefer the full or partial removal of the dam.

We look forward to continued coordination on the project as the various alternatives are evaluated and the environmental assessment is complete. Staff from NOAA NMFS's Restoration Center is also available to provide technical assistance as the alternatives are evaluated and the appropriate National Environmental Policy Act (NEPA) document is prepared. If you have any questions, please contact Karen Greene at 732 872-3023.

Sincerely,

Stanley W. Gorski
Field Offices Supervisor

cf: PRD – J. Crocker
RC- B. Bearmore

LITERATURE CITED

Buckel, J.A. and D.O. Conover. 1997. Movements, feeding periods, and daily ration of piscivorous young-of-the-year bluefish, *Pomatomus saltatrix*, in the Hudson River estuary. Fish. Bull. (U.S.) 95(4):665-679.

Fahey, M.P., P.L. Berrien, D.L. Johnson and W.W. Morse. 1999. Essential Fish Habitat Source Document: Bluefish, *Pomatomus saltatrix* life history and habitat characteristics. U.S. Dep. Commer., NOAA Technical Memorandum NMFS-NE-144.

From:	Humenay, Vincent
To:	Eberle, Mark D NAP
Subject:	FW: Woodland Dam Drawings (UNCLASSIFIED)
Date:	Monday, January 03, 2011 10:03:02 AM
Attachments:	CobbsCreekFloodStudy.pdf

Mark - With respect to hydrology, the breach size is adequate. I would recommend shortening the 27-foot wide section as much as possible to limit obstructions in the stream channel. Please let me know if you have any questions.

-----Original Message-----
From: Mease, Ronald
Sent: Wednesday, December 29, 2010 3:02 PM
To: Humenay, Vincent
Subject: RE: Woodland Dam Drawings (UNCLASSIFIED)

Vince,

I took a look at this location in the FEMA Flood Study. The drainage area is 22 square miles, and the 100-year flood level is more than 10 feet higher than the top of dam (see attached scan of flood study excerpts). The breach opening size will have no impact on the 100-year flood level. In that the breach size seems to provide a width of channel similar to the channel widths upstream and downstream, I don't think we should have any objection to the proposal with regard to hydrology or hydraulics. -Ron Mease

Ronald C. Mease, P.E. | Civil Engineering Consultant
Department of Environmental Protection
Rachel Carson State Office Building
400 Market Street | Harrisburg, PA 17101
Phone: 717.772.5947 | Fax: 717.772.0409
www.depweb@.state.pa.us

Pennsylvania Department of Environmental Protection

2 East Main Street
Norristown, PA 19401
August 14, 2009

Southeast Regional Office

Phone: 484-250-5970
Fax: 484-250-5971
E-mail: daburke@state.pa.us

Mr. Mark Eberle
Department of the Army
Philadelphia District, Corps of Engineers
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

Re: Cobbs Creek fish Passage Project
Philadelphia and Delaware Counties

Dear Mr. Eberle:

This is in response to Mr. Arabatzis' July 28, 2009, letter inviting the Southeast Regional Office of the Department of Environmental Protection (DEP) to provide comments or suggestions on the scoping for restoring fish passage along Cobbs Creek.

The only comments that we have at this time are general ones. First, we will express our support for the idea of enhancing fish passage because of the ecological benefits that it would provide. In addition, we believe that some of the alternatives you are considering would have additional benefits in terms of facilitating a more natural water and sediment flow regime in the creek, and we would support this as a benefit also. The complete or partial removal of the dam and some of the engineered fishway options are the alternatives that would have these physical benefits.

In Pennsylvania (as you know), construction or demolition activity within a stream channel normally requires a state permit under the Dam Safety and Encroachments Act. Considering the range of alternatives you are considering for this project, there are various ways in which the state approval might be granted for this work. We trust that you will continue to consult with DEP as you proceed with this study. We are interested in participating in the deliberation and decision making on what alternative to select, and we are also interested in facilitating the state approval process for the alternative that is selected.

Please consider me as a point of contact for the DEP's Southeast Regional Office, and let me know if there is anything I can do to assist you in this project. You can contact me by telephone at 484-250-5822 or at the above e-mail address.

Sincerely,

David W. Burke
Watershed Manager
Watershed Management

cc: Mr. Newbold
Ms. Nucci
Mr. Daryani
Re 30 (joh09wqm)223-12

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, Pennsylvania 16801-4850

March 4, 2010

Mark Eberle
U.S. Army Corps of Engineers, Philadelphia District
Environmental Resources Branch (CENAP-PL-E)
100 Penn Square East
Philadelphia, PA 19107

Dear Mr. Eberle:

This letter responds to the January 2010 report, Sediment Quality Testing for the Cobbs Creek Fish Passage Project, Philadelphia, Pennsylvania. The following comments are provided pursuant to the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*) to ensure the protection of fish and wildlife resources.

The proposed project is located approximately 1.4 miles upstream of the confluence of Cobbs and Darby Creeks. The John Heinz National Wildlife Refuge (Refuge) at Tinicum is located on tidal Darby Creek, approximately 2.6 miles downstream of Woodland Dam. The refuge contains the largest remaining freshwater tidal wetland in Pennsylvania, and provides habitat for many species of birds, mammals, amphibians, reptiles, and resident and anadromous fish. Sediments released during the dam breaching process could remain trapped by tidal fluctuations within the John Heinz refuge for a considerable period of time.

The U.S. Fish and Wildlife Service (Service) is concerned about potential contaminant migration and aquatic exposure to fish and wildlife and appreciates the opportunity to evaluate the sediment sampling results. Given the urbanized nature of the Cobbs Creek watershed, it is not surprising that fine-grained materials that have accumulated upstream and downstream of the dam are contaminated with a variety of pollutants common to urban stormwater runoff. Although the project area is downstream of the Havertown PCP National Priorities List (Superfund) site, contaminants associated with that site are not present at higher concentrations above the dam. However, the total polycyclic aromatic hydrocarbon concentration of over 25 ppm at CC-5 exceeds typical runoff concentrations and likely has resulted in toxicity to the benthic community in that deposit. In addition, some bioaccumulative pesticides are concentrated in the dam pool and could pose a risk not only to benthic invertebrates inhabiting downstream areas where the released sediments re-deposit, but also to fish and wildlife further up the food chain.

The release of contamination from the CC-5 deposit may pose a risk to downstream fish and wildlife resources, including the Refuge. This risk does not necessarily mean that dam removal shouldn't remain a viable alternative for restoring fish passage. With any complete or partial dam removal, the sediments in the former impoundment become exposed. These sediments are expected to form the new floodplain. The contamination would be less available in floodplain soil and less toxic to terrestrial biota given the high TOC content of the CC-5 deposit. Thus, the Service recommends gradual impoundment dewatering (i.e., at least 4 weeks between dam notching and dam removal). As soon as the deposit at CC-5 is exposed, it should be seeded with a riparian native seed mix, covered with jute matting, and staked with native willow cuttings. The remaining sediment deposits need to be stabilized with vegetation once the channel has formed. The new vegetation will have to be carefully monitored during its establishment in order to detect and prevent invasive species such as Japanese knotweed, reed canary grass, and purple loosestrife.

Thank you for the opportunity to comment. Please direct any questions or comments to Kathleen Patnode of my staff at 304-234-0238.

Sincerely,

Patricia Cole

Patricia Cole
Acting Supervisor

From:	Humenay, Vincent
To:	Eberle, Mark D NAP
Subject:	RE: Cobbs Creek Dam Removal Contaminants Sampling Draft Report
Date:	Wednesday, February 03, 2010 2:35:23 PM

Mark - I took a look at your report. I have no comments and agree with your recommendations that the release of sediment will not cause a significant adverse impact to downstream aquatic communities.

-----Original Message-----
From: Eberle, Mark D NAP [mailto:Mark.D.Eberle@usace.army.mil]
Sent: Friday, January 29, 2010 10:32 AM
To: Patnode, Kathy LRH; Humenay, Vincent
Cc: Patnode, Kathy LRH; cindy_tibbott@fws.gov
Subject: Cobbs Creek Dam Removal Contaminants Sampling Draft Report

Hi Kathy and Vince,
We have received the results of the contaminant testing from the Cobbs Creek dam removal project (attached). We completed the testing as per coordination with both of you from October 2009. Please review the draft
report and provide me with any comments/concerns. If possible, please have
comments to me by Friday, February 12th.

Any questions, please let me know-
Thanks,
Mark

Mark Eberle, Biologist / Project Manager
U.S. Army Corps of Engineers, Philadelphia District
CENAP-PL-E
100 Penn Square East, Wanamaker Bldg.
Philadelphia, PA 19107
(215) 656-6562
F(215) 656-6543

-----Original Message-----
From: Kathleen_Patnode@fws.gov [mailto:Kathleen_Patnode@fws.gov]
Sent: Thursday, October 22, 2009 4:01 PM
To: Eberle, Mark D NAP
Cc: vhumenay@state.pa.us; Patnode, Kathy LRH; cindy_tibbott@fws.gov
Subject: Re: Cobbs Creek Dam Removal Contaminants Sampling Plan

Mark -
I have reviewed the sampling plan. I also spoke with Vince about the conditions at the site since I have never been on Cobbs Creek. I offer the following two recommendations:

1) Shift one of the down stream sediment samples to immediately behind the dam so that you have a pair of samples to cover the span of the dam. Place them at the two deepest areas in the sediment deposit. Two down stream samples will be sufficient to characterize conditions in the free-flowing stream providing the sample locations target depositional areas with fine particles (i.e., wing-walls on the Woodland Avenue bridge).

2) Send the EPA ecological screening criteria to the laboratory to along with the analytical request (http://www.epa.gov/reg3hwmd/risk/eco/btag/sbv/fwsed/screenbench.htm). While they will be unable to meet some of the criteria (e.g., mercury) with standard analytical techniques, they can at least view them as target detection limits. This approach should reduce the number of analytes with detection limits above ecological criteria for which we will be unable to make a definitive statement regarding the

protectiveness.

I appreciate the extra time for the review - Kathy
****
Kathleen A. Patnode, Ph.D.
USFWS Environmental Contaminants Specialist c/o USEPA 1060 Chapline Street Suite 303 Wheeling WV 26003-2995 304-234-0238 (T) 304-234-0282 (F)
****

-----"Eberle, Mark D NAP" <Mark.D.Eberle@usace.army.mil> wrote: -----

To: <vhumenay@state.pa.us>, "Patnode, Kathy LRH" <Kathleen_Patnode@fws.gov>
From: "Eberle, Mark D NAP" <Mark.D.Eberle@usace.army.mil>
Date: 10/08/2009 02:45PM
Subject: Cobbs Creek Dam Removal Contaminants Sampling Plan

Hi Vince/Kathleen,
Please review the attached draft contaminants sampling plan for the Cobbs Creek (Woodland Dam) Dam Removal Project. Kathleen, Cindy Tibbot provided me with your contact information in response to our NEPA scoping letter for the project. At our on-site meeting with PADEP, Vince requested we test for EPA's Priority Pollutants; however, in FWS response to our scoping letter they requested we use the Target Compound List (TCL). After we examined both lists, we decided to use the TCL list since it was more comprehensive. Hopefully, that list also covers the parameters that PADEP requested at the site visit.

Please provide any comments to me on the scope of work by October 16th.

Thanks,
Mark
<<Cobbscontsamplingplan.doc>>
Mark Eberle, Biologist / Project Manager U.S. Army Corps of Engineers, Philadelphia District CENAP-PL-E
100 Penn Square East, Wanamaker Bldg.
Philadelphia, PA 19107
(215) 656-6562
F(215) 656-6543

Appendix B

Sediment Testing Report

SEDIMENT QUALITY TESTING FOR THE COBBS CREEK FISH PASSAGE PROJECT PHILADELPHIA, PA

Prepared for

Mark Eberle
U.S. Army Corps of Engineers
Philadelphia District
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19103

Prepared by

Beth Franks
Katherine Dillow
Versar, Inc.
9200 Rumsey Road, Suite 100
Columbia, MD 21045

Prepared Under the Supervision of
Principle Investigator

William H. Burton

January 2010

EXECUTIVE SUMMARY

An investigation of sediment contaminant concentrations and sediment build up volume was conducted in Cobbs Creek behind Woodland Dam located at the intersection of Cobbs Creek Parkway and Woodland Avenue, Philadelphia, PA in December 2009. As part of a stream restoration project the USACE, Philadelphia District is conducting a feasibility study to potentially remove Woodland Dam to create passage for anadromous fish currently blocked from upstream spawning habitats. Sediment collections upstream and downstream of Woodland dam revealed that two inorganics, cyanide and chromium were above USEA Region III Freshwater Sediment Benchmark concentrations. No organic volatiles over sediment benchmarks were observed, however several semi volatile organics over sediment benchmark values occurred upstream and downstream of Woodland Dam. Given the urbanized watershed of Cobbs Creeks most of these contaminants probably originated from vehicle use on city streets. Five pesticides over benchmark concentrations were reported and Dieldrin was over its 1.9 µg/kg screening level in all upstream samples. Downstream sediments had similar inorganic and organic contaminant concentrations to upstream sediments. However, high resolution PCBs testing revealed that sediment downstream of Woodland Dam had concentrations over 30 times higher than the upstream sediments. Dioxin levels upstream and downstream of Woodland Dam showed a similar trend. With the exception of PCBs and Dioxin contaminant levels observed in the creek sediments were not unexpected since the Creek is located in heavily populated area.

Sediment volume measurements conduct from the dam face to 500 feet upstream of the dam indicated that only a thin layer (less than 1 foot) of sediment exists behind the dam. Pockets of deeper sediments (around 4 feet) existed in a few isolated areas. Total sediment volume to 500 feet behind the dam was estimated to be 1,275 cubic yards. The small volume of sediment build up and the relatively low contaminant levels observed suggest that removal of the Woodland Dam would not release excessive contaminates into downstream habitats of Cobbs Creek.

TABLE OF CONTENTS

I:\WPSHARED\DEPT.74\PHILA06\Cobbs Creek\14560-R.doc

LIST OF TABLES

Table No. **Page**

LIST OF FIGURES

Figure No. **Page**

1.0 INTRODUCTION

The Philadelphia District of the U.S. Army Corps of Engineers (USACE) is conducting a feasibility study for a habitat restoration of an urbanized freshwater stream in the Colwyn/Darby area of southwestern Philadelphia (Figure 1-1). The project entails the potential removal of the Woodland Dam located at the intersection of Cobbs Creek Parkway and Woodland Avenue (Figure 1-2). Cobbs Creek drains into the John Heinz National Wildlife Refuge at Tinicum Island on the Delaware River. The Woodland dam is the first impediment to fish passage on Cobbs Creek and serves as the demarcation between tidal and non-tidal influences along the creek. Cobbs Creek watershed is highly urbanized, and includes a number of cemeteries (Mt. Moriah and Fernwood) and Karakung golf course at the creek's headwaters. Urban stormwater entering Cobbs Creek could potentially contain pesticides/herbicides which are commonly used on the golf course and in the watershed as well urban runoff containing inorganic, organic volatiles, semi volatiles, PCBs and Dioxin .

The USACE restoration project is investigating the best alternative to re-establish fish passage along Cobbs Creek. The most effective method of restoring fish passage is to remove the stream impediment (a 6 foot cement dam) and restore the channel to natural conditions. However, the chemical composition of built-up sediment behind the dam is of concern to natural resource agencies reviewing USACE's restoration plans given the urbanized nature of the watershed. To address the potential environmental impacts of mobilizing contaminants in stream sediments the Philadelphia District tasked Versar, Inc., (Contract No. W912BU-06-D-0003, Task Order 0051) to quantify contaminant concentrations and to estimate the volume of sediment build up behind Woodland Dam.

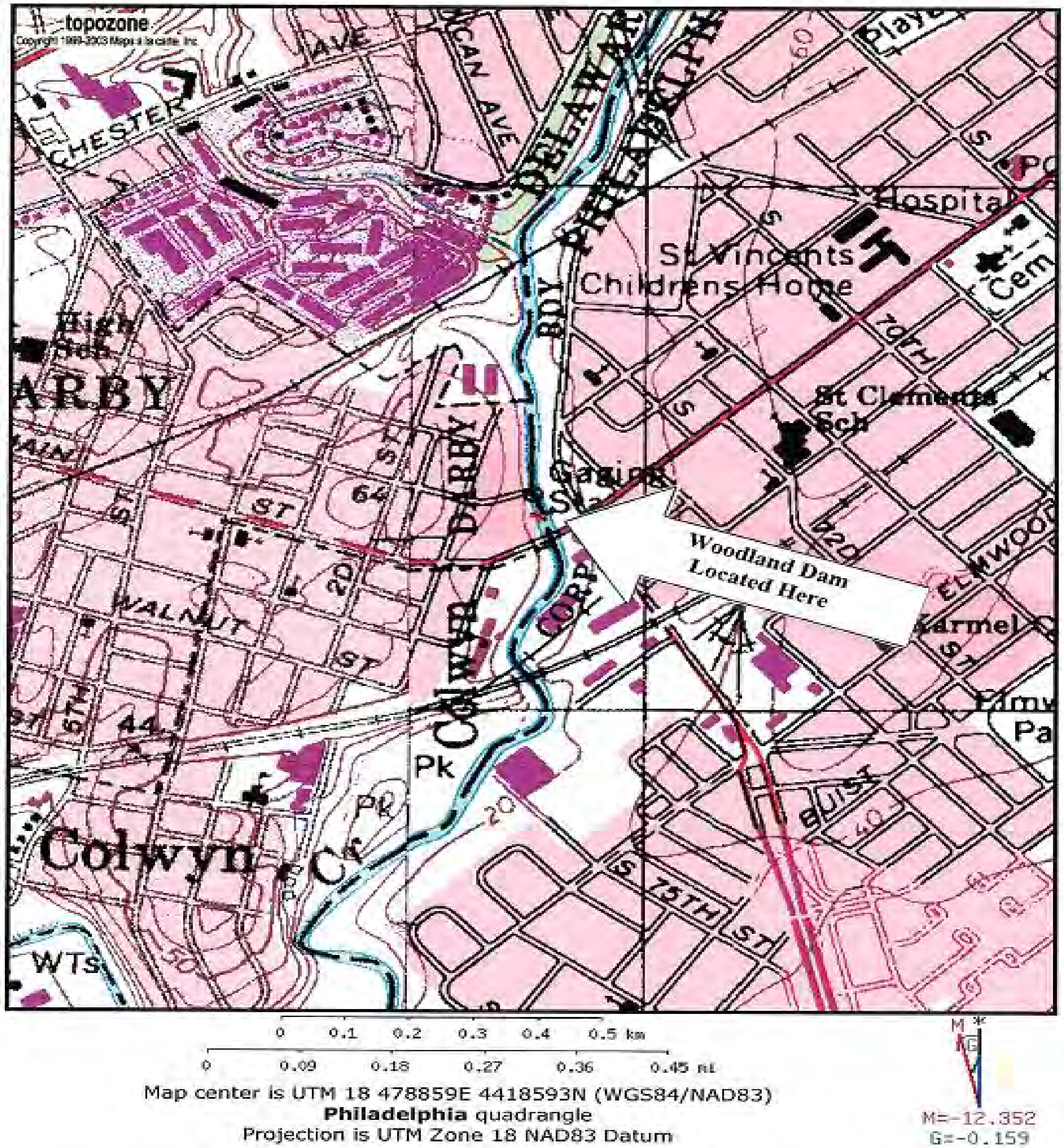


Figure 1-1. USGS Quadrangle depicting the project location. Cobbs Creek acts as the boundary between the City of Philadelphia and Delaware County in the vicinity of the Woodland Dam.

Figure 1-2. Woodland Dam shown from the north bank adjacent to the Blue Bell Inn. Photo taken by Mark Eberle, April 22, 2009.

2.0 METHODS

2.1 MEASURING SEDIMENT DEPTH

Sediment volume behind Woodland Dam was estimated using a transect approach. Six transects perpendicular to the stream channel were established behind the dam. Since the dam is set on an angle to the stream, the first transect was established 24.5 feet upstream from the right-hand side of the dam (when facing downstream toward the dam) and 65 feet upstream from the left-hand side of the dam. The remaining transects were evenly distributed within 500 linear feet upstream of the dam (Table 2-1).

Table 2-1. Location of six transects across Cobbs Creek in Philadelphia, PA where sediment depths were measured in December 2009

Transect	Right End Point Distance from Dam (feet)	Right End Point Coordinates	Left End Point Distance from Dam (feet)	Left End Point Coordinates
1	24.5	Lat. 39. 91745 Long. -75.24738	65	Lat. 39. 91747 Long. -75.24703
2	111.5	Lat. 39.91758 Long. -75.24754	152	Lat. 39.91747 Long. -75.24699
3	198.5	Lat. 39.91787 Long. -75.24745	239	Lat. 39.91792 Long. -75.24738
4	285.5	Lat. 39.91818 Long. -75.24747	326	Lat. 39.91823 Long. -75.24728
5	372.5	Lat. 39.91833 Long. -75.24749	413	Lat. 39.91835 Long. -75.24733
6	459.5	Lat. 39.91859 Long. -75.24754	500	Lat. 39.91865 Long. -75.24720

At each transect, total stream width was measured, and then divided into six equal portions. At the midpoint of each portion, a sediment depth measurement was taken. At each measuring point, half-inch rebar was positioned on top of the stream bed. The initial height of the top of the rebar was measured on a demarcated surveyor's stadia rod. The rebar was then pushed down into the sediment until hard surface was reached and it could not be pushed any further. At this point, the height of the top of the rebar was measured a second time on the stadia rod. The difference between the initial reading and the second reading was recorded as the depth of sediment present at that sampling point. This process was repeated at six sampling points along each of six transects. When water depths precluded wading, sediment depth measurements were taken from a canoe.

2.2 ESTIMATING SEDIMENT VOLUME

Among the six points across six transects upstream of the dam, a total of 36 sediment depth measurements were recorded. These 36 depth measurements were assumed to be representative of depths of sediment in 36 polygons upstream of the dam. For Transects 2 through 6, the polygons were rectangular in shape, each 87 feet long, with polygon width varying based on the width of the stream at that transect (Figure 2-1).

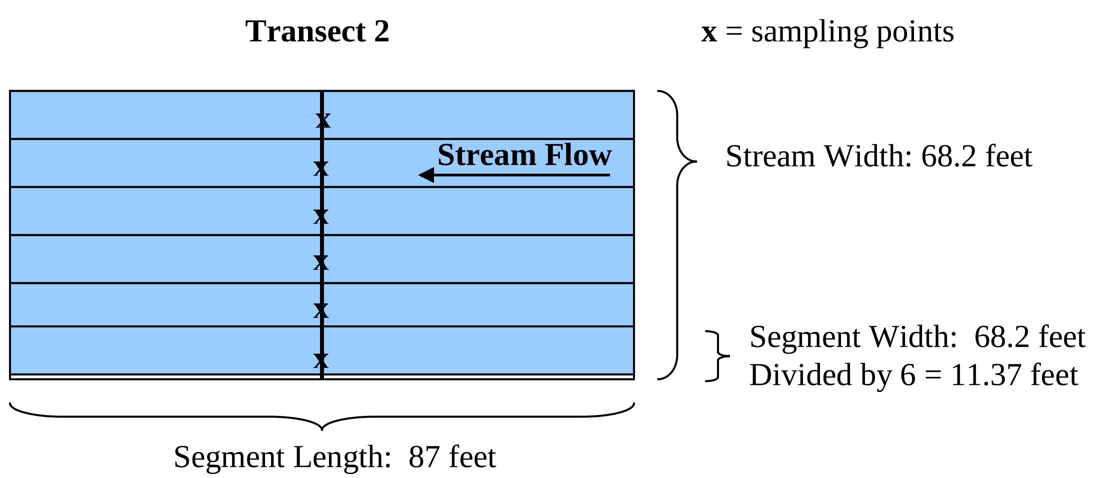


Figure 2-1. Example transect of Cobbs Creek divided into 6 polygons for extrapolating sediment depth measurements. At this location, the stream was 68.2 feet wide. Thus, each polygon at this segment was 11.37 feet wide and 87 feet long.

Due to its proximity to the dam (which was set at an angle across the stream), polygon area and sediment volume estimates for Transect 1 required additional computation. Area indicated by the red asterisk (*) (which was downstream of the dam and therefore not in the sampling area) was subtracted from the polygon area estimates (Figure 2-2). Area indicated by the black plus sign (+) (which was upstream of the dam and could be contributing sediment) was added to the polygon area estimates. Table 2-2 presents the calculated areas for the polygons in Transect 1.

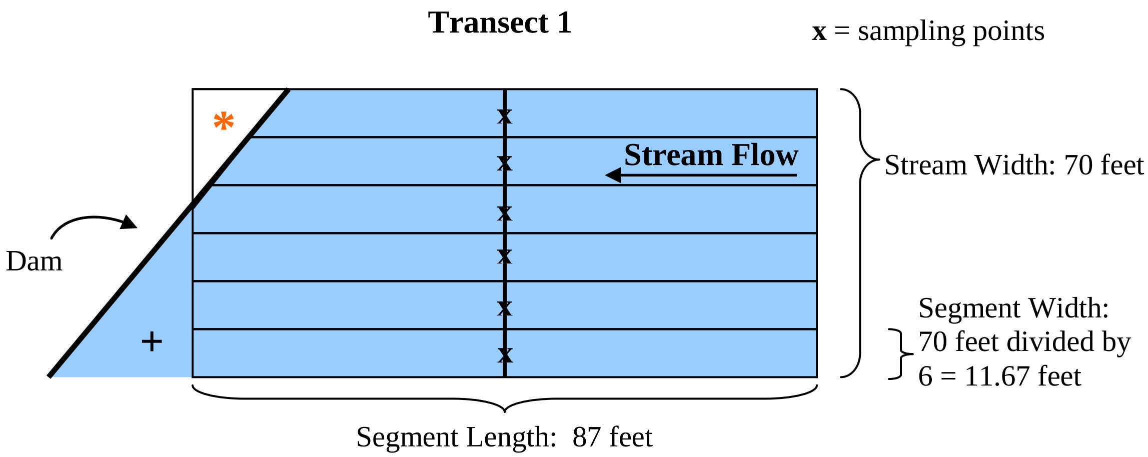


Figure 2-2. Transect 1 polygon configuration at Cobbs Creek. At this location, the stream was 70 feet wide. Area indicated by the red asterisk (*) was subtracted from the polygon area estimates, while area indicated by the black plus sign (+) was added to the polygon area estimates.

Table 2-2. Polygon area calculations for Transect 1 at Cobbs Creek, Philadelphia, PA.

Transect	Polygon	Transect Width (feet)	Polygon Width (feet)	Polygon Length (feet)	Polygon Area (sq. feet)	Polygon Area Correction (Transect 1 only, sq. feet)	Corrected Polygon Area (sq. feet)
1	1	70	11.67	87	1015	+ 211.5	1227
	2		11.67	87	1015	+ 133	1148
	3		11.67	87	1015	+ 54	1069
	4		11.67	87	1015	+1.4 -26.3	990
	5		11.67	87	1015	-103.3	912
	6		11.67	87	1015	- 182	833

2.3 SEDIMENT CONTAMINANT TESTING

Sediment samples were collected from six stations; four upstream and two downstream of Woodland Dam (Figure 2-3). Target collections points had to be repositioned slightly to obtain samples of silt due to the presence of bedrock and rock cobble substrate. Sediment samples for bulk chemical analysis were collected with a decontaminated stainless steel ponar grab. Each of the six samples was analyzed for TCL Volatiles, TCL Semi Volatiles, TCL Pesticides and aroclor PCBs, and TCL Inorganics (see Scope of Work in Appendix A). One composite from the two downstream stations and another from the four upstream stations was prepared and analyzed for high resolution congener specific PCBs (using method 1668a) and Dioxin/Furans using method SW-8468290. All sediment samples were analyzed for grain size using ASTM Method D422-63. Sieve sizes ranged from 4.75 mm (U.S. Standard Sieve No. 4) to 63 µm (U.S. Standard Sieve No. 230). Sediments were categorized by Wentworth's classifications (Table 2-3).

Sample locations were selected based on coordination with Pennsylvania Department of Environmental Protection (PADEP) and U.S. Fish and Wildlife Service (FWS). For the upstream samples, two samples (paired) were taken immediately behind (upstream) the dam and the other two collection points were approximately every 100 feet upstream. For the down-stream samples, the first sample was taken below the dam and the other sample approximately 100 feet further downstream. For all samples, exact locations focused on the areas of apparent fine grain sediment.

The six sample site locations were recorded using Global Positioning System (GPS) units. Sediment contaminant results were compared to U.S. Environmental Protection Agency (USEPA) Region III ecological screening values to assess potential ecological effects of the dam removal. The Region III Screening Benchmark tables provide media-specific sets of ecotoxicological benchmarks that EPA developed for screening level assessments (http://www .epa.gov/reg3hscd/risk/eco/btag/sbv/fwsed/screenbench.htm). These guidelines are meant to be used to screen exposure through routes other than food chain exposure.

Table 2-3. Sieve sizes used for sediment particle distribution and the Wentworth sediment size categories

Sieve Number	Sieve Size	Wentworth Size Category
4	4.75-mm	Pebble
10	2.00-mm	Granule
20	850-µm	Very Coarse Sand
40	425-µm	Coarse Sand
60	250-µm	Medium Sand
140	106-µm	Fine Sand
200	75-µm	Undefined
230	63-µm	Very Fine Sand
	< 63-µm	Silt-Clay

Figure 2-3. Sediment sampling locations for contaminant analysis at Woodland Dam. Transect lines indicate the locations of the sediment depth measurements.

3.0 RESULTS

3.1 SEDIMENT VOLUME BEHIND WOODLAND DAM

The area of each polygon was calculated at each transect by multiplying the width of each segment by the segment length (with the exception of Transect 1). Each of these areas was then multiplied by the sediment depth corresponding to its representative polygon to estimate total sediment volume present in each polygon (Table 3-1).

Table 3-1. Polygon areas, sediment depths, and estimated sediment volumes for Transects 1 through 6 upstream of the dam at Cobbs Creek, Philadelphia, PA in December 2009

Transect	Polygon	Transect Width (feet)	Polygon Width (feet)	Polygon Length (feet)	Polygon Area (sq. feet)	Sediment Depth (feet)	Volume Sediment (cu. feet)
1	1	70	11.67	87	1227*	0.21	257.57
	2		11.67	87	1148*	1.22	1,400.56
	3		11.67	87	1069*	0.84	897.96
	4		11.67	87	990*	0.6	594.06
	5		11.67	87	912*	0.54	492.32
	6		11.67	87	833*	0	0.00
2	1	68.2	11.37	87	989	0.17	168.11
	2		11.37	87	989	1.15	1,137.24
	3		11.37	87	989	0.89	880.12
	4		11.37	87	989	1.14	1,127.35
	5		11.37	87	989	0.52	514.29
	6		11.37	87	989	0.72	712.01
3	1	76	12.67	87	1102	2.12	2,336.24
	2		12.67	87	1102	0.1	110.20
	3		12.67	87	1102	1.99	2,192.98
	4		12.67	87	1102	1.11	1,223.22
	5		12.67	87	1102	3.09	3,405.18
	6		12.67	87	1102	2.31	2,545.62
4	1	70	11.67	87	1015	0	0.00
	2		11.67	87	1015	0.45	456.75
	3		11.67	87	1015	2.89	2,933.35
	4		11.67	87	1015	1.14	1,157.10
	5		11.67	87	1015	1.25	1,268.75
	6		11.67	87	1015	0.05	50.75

Table 3-1. (Continued)							
Transect	**Polygon**	**Transect Width (feet)**	**Polygon Width (feet)**	**Polygon Length (feet)**	**Polygon Area (sq. feet)**	**Sediment Depth (feet)**	**Volume Sediment (cu. feet)**
5	1	65	10.83	87	943	0	0.00
	2		10.83	87	943	0.37	348.73
	3		10.83	87	943	0.31	292.18
	4		10.83	87	943	0.93	876.53
	5		10.83	87	943	0	0.00
	6		10.83	87	943	0.4	377.00
6	1	65.5	10.92	87	950	0.01	9.50
	2		10.92	87	950	0.68	645.83
	3		10.92	87	950	0.71	674.32
	4		10.92	87	950	0.69	655.33
	5		10.92	87	950	0.5	474.88
	6		10.92	87	950	4.44	4,216.89
							Total Volume 34,433
* Adjusted for triangular shaped polygons							

Total sediment volume was then estimated by adding the volume of sediment from each polygon from each transect (1 through 6). Thus, overall sediment volume present above Woodland Dam was estimated to be 34,433 cubic feet, or 1,275.3 cubic yards. Deep pockets of sediment were observed on the right bank (looking downstream) at the most upstream transect and at the third transect from the dam. However, sediment depths behind the dam were generally less than one foot suggesting that the area experiences frequent scouring from storm events (Figures 3-1 and 3-2). Sediments collected for contaminants were analyzed for grain size and Total Organic Carbon (TOC). With the exception of Station CC-6 the sediments had less than 1% percent silt/clay (see Appendix B). Percent gravel ranged from 15 to 75% while percent sand ranged from 24 to 60 %.

3.2 SEDIMENT CONTAMINANT RESULTS

Bulk sediment testing for inorganic concentrations revealed that one sample had chromium over USEPA Region III risk assessment benchmarks for freshwater sediments while all samples had cyanide concentrations over the benchmark values (Table 3-2). Inorganic concentrations between downstream and upstream collections were generally similar.

Fourteen out of the 65 semi volatile organics were observed in concentrations over freshwater sediment benchmarks (Table 3-3). Slightly more semi volatile organics over risk based levels were detected in the upstream sediment samples relative to the two downstream samples. No volatile organic compounds over sediment benchmark values were observed in the contaminant testing (Table 3-4). Only 1, 2, 4,-Trichlorobenzene, Actetone, and Methylene chloride were detected in the VOC analyses. Methylene chloride and Acetone are used in the sample preparation for VOC analysis and therefore routinely detected by the assay.

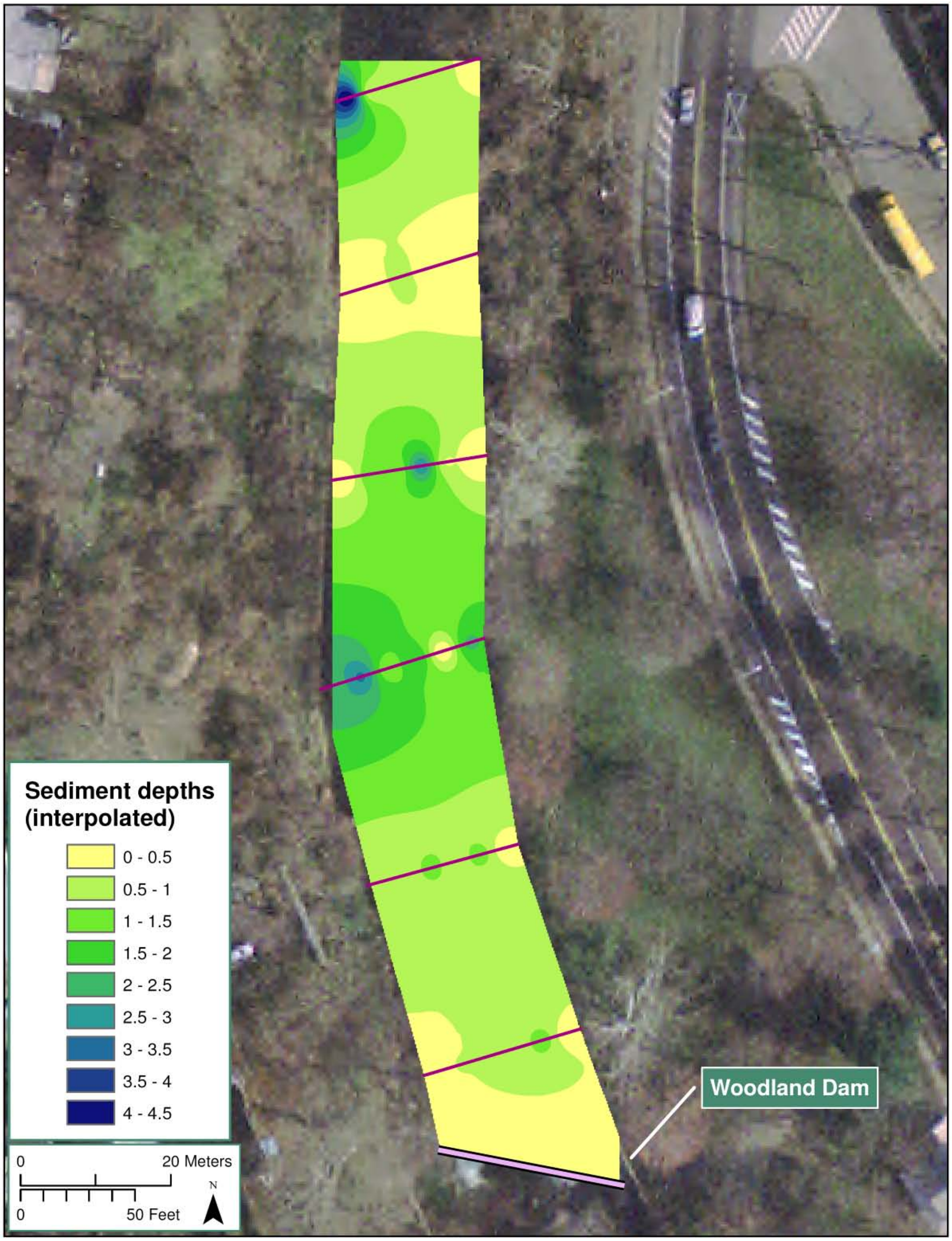


Figure 3-1. Distribution of sediment directly behind Woodland Dam to 500 feet upstream. Sediment measurement transect lines indicate approximate sediment sampling points.

Figure 3-2. Measured sediment depth at each sampling point behind Woodland Dam

Table 3-2. Bulk sediment inorganic concentrations from sediment samples collected downstream and upstream of Woodland Dam in December 2009. Highlighted values are over USEPA Region III sediment benchmark concentrations. Less than sign indicates non-detects at the sample specific detection limit.

		Downstream		**Upstream**				**USEPA Freshwater Sediment Benchmark**
		CC-1	**CC-2**	**CC-3**	**CC-4**	**CC-5**	**CC-6**	
Aluminum	mg/kg	3820	3790	6350	6750	4730	3980	
Antimony	mg/kg	<0.96	<0.96	<0.97	<0.95	<0.98	<0.99	2
Arsenic	mg/kg	0.91	1.3	1.1	0.95	1.5	2.1	9.8
Barium	mg/kg	28.3	29	51.3	75	112	36.1	
Beryllium	mg/kg	0.25	0.44	0.35	0.27	0.51	0.49	
Cadmium	mg/kg	0.061	0.079	0.1	0.076	0.13	0.14	0.99
Calcium	mg/kg	909	1760	3130	1340	3560	1870	
Chromium	mg/kg	8.6	27.4	10.3	36.7	65.2	12.4	43.4
Cobalt	mg/kg	3	2.1	2.7	4.8	3.1	3.1	50
Copper	mg/kg	10.2	7.5	17	10.6	13.3	15.2	31.6
Cyanide, Total	mg/kg	0.6	0.22	0.22	0.23	0.2	0.28	0.1
Iron	mg/kg	7800	8950	7600	13400	12900	13900	20000
Lead	mg/kg	14.3	9.5	21.8	14.8	17.5	20.5	35.8
Magnesium	mg/kg	2010	1800	1620	3420	3250	2120	
Manganese	mg/kg	78.9	79.1	110	124	88.3	79.6	460
Mercury	mg/kg	0.093	0.015	0.03	0.041	0.039	0.04	0.18
Nickel	mg/kg	6.5	4.2	6.2	8.4	6.4	6.7	22.7
Potassium	mg/kg	1530	1030	1310	3280	1440	1180	
Selenium	mg/kg	<0.48	<0.48	<0.49	<0.48	<0.49	<0.50	2
Silver	mg/kg	<0.48	<0.48	<0.49	<0.48	<0.49	<0.50	1.0
Sodium	mg/kg	104	59.3	182	161	72.9	80.6	
Thallium	mg/kg	<0.96	<0.96	<0.97	<0.95	<0.98	<0.99	
Vanadium	mg/kg	11.3	17.1	11.8	22.8	22.1	14.4	
Zinc	mg/kg	55.2	38.3	52.8	77.7	59.8	77.6	121

Table 3-3. Bulk sediment semi volatile organic concentrations from sediment samples collected downstream and upstream of Woodland Dam in December 2009. Highlighted values are over USEPA Region III sediment benchmark concentrations. Less than sign indicates non-detects at the sample specific detection limit.

		Downstream		Upstream				USEPA Freshwater Sediment Benchmark
		CC-1	CC-2	CC-3	CC-4	CC-5	CC-6	
1,1-Biphenyl	µg/kg	<640	<630	<640	<630	<650	<650	1220
2,2-oxybis(1-Chloropropane)	µg/kg	<130	<130	<130	<130	<130	<130	
2,4,5-Trichlorophenol	µg/kg	<640	<630	<640	<630	<650	<650	
2,4,6-Trichlorophenol	µg/kg	<640	<630	<640	<630	<650	<650	213
2,4-Dichlorophenol	µg/kg	<130	<130	<130	<130	<130	<130	117
2,4-Dimethylphenol	µg/kg	<640	<630	<640	<630	<650	<650	29
2,4-Dinitrophenol	µg/kg	<3300	<3300	<3300	<3200	<3300	<3400	
2,4-Dinitrotoluene	µg/kg	<640	<630	<640	<630	<650	<650	41.6
2,6-Dinitrotoluene	µg/kg	<640	<630	<640	<630	<650	<650	
2-Chloronaphthalene	µg/kg	<130	<130	<130	<130	<130	<130	
2-Chlorophenol	µg/kg	<640	<630	<640	<630	<650	<650	31.2
2-Methylnaphthalene	µg/kg	<130	<130	<130	<130	31	<130	20.2
2-Methylphenol	µg/kg	<640	<630	<640	<630	<650	<650	
2-Nitroaniline	µg/kg	<3300	<3300	<3300	<3200	<3300	<3400	
2-Nitrophenol	µg/kg	<640	<630	<640	<630	<650	<650	
3,3-Dichlorobenzidine	µg/kg	<640	<630	<640	<630	<650	<650	127
3-Nitroaniline	µg/kg	<3300	<3300	<3300	<3200	<3300	<3400	
4,6-Dinitro-2-methylphenol	µg/kg	<3300	<3300	<3300	<3200	<3300	<3400	
4-Bromophenyl phenyl ether	µg/kg	<640	<630	<640	<630	<650	<650	1230
4-Chloro-3-methylphenol	µg/kg	<640	<630	<640	<630	<650	<650	
4-Chloroaniline	µg/kg	<640	<630	<640	<630	<650	<650	
4-Chlorophenyl phenyl ether	µg/kg	<640	<630	<640	<630	<650	<650	
4-Methylphenol	µg/kg	<640	<630	<640	<630	<650	<650	670
4-Nitroaniline	µg/kg	<3300	<3300	<3300	<3200	<3300	<3400	
4-Nitrophenol	µg/kg	<3300	<3300	<3300	<3200	<3300	<3400	
Acenaphthene	µg/kg	<130	<130	<130	<130	140	<130	6.7
Acenaphthylene	µg/kg	59	<130	<130	<130	65	28	5.9
Acetophenone	µg/kg	<640	<630	<640	<630	<650	<650	
Anthracene	µg/kg	42	<130	54	<130	490	38	57.2
Atrazine	µg/kg	<640	<630	<640	<630	<650	<650	
Benzaldehyde	µg/kg	<640	<630	<640	<630	<650	<650	
Benzo(a)anthracene	µg/kg	260	<130	270	<130	2300	140	108
Benzo(a)pyrene	µg/kg	280	<130	240	44	1700	120	150
Benzo(b)fluoranthene	µg/kg	320	<130	270	61	2300	140	27.2
Benzo(ghi)perylene	µg/kg	240	<130	220	51	1200	110	170
Benzo(k)fluoranthene	µg/kg	100	<130	130	35	870	91	240
bis(2-Chloroethoxy)methane	µg/kg	<640	<630	<640	<630	<650	<650	

Table 3-3. (Continued)

		Downstream		Upstream				USEPA Freshwater Sediment Benchmark
		CC-1	CC-2	CC-3	CC-4	CC-5	CC-6	
bis(2-Chloroethyl) ether	µg/kg	<130	<130	<130	<130	<130	<130	
bis(2-Ethylhexyl) phthalate	µg/kg	<640	<630	300	<630	<650	92	180
Butyl benzyl phthalate	µg/kg	<640	<630	<640	<630	<650	<650	10900
Caprolactam	µg/kg	<3300	<3300	<3300	<3200	<3300	<3400	
Carbazole	µg/kg	<130	<130	29	<130	410	<130	
Chrysene	µg/kg	280	<130	290	<130	2500	170	166
Di-n-butyl phthalate	µg/kg	<640	<630	<640	<630	<650	<650	6470
Di-n-octyl phthalate	µg/kg	<640	<630	<640	<630	<650	<650	
Dibenz(a,h)anthracene	µg/kg	<130	<130	140	<130	500	<130	33
Dibenzofuran	µg/kg	<640	<630	<640	<630	120	<650	415
Diethyl phthalate	µg/kg	<640	<630	<640	<630	<650	<650	603
Dimethyl phthalate	µg/kg	<640	<630	<640	<630	<650	<650	
Fluoranthene	µg/kg	430	24	550	130	5000	310	423
Fluorene	µg/kg	<130	<130	<130	<130	110	<130	77.4
Hexachlorobenzene	µg/kg	<130	<130	<130	<130	<130	<130	20
Hexachlorobutadiene	µg/kg	<130	<130	<130	<130	<130	<130	
Hexachlorocyclopentadiene	µg/kg	<640	<630	<640	<630	<650	<650	
Hexachloroethane	µg/kg	<640	<630	<640	<630	<650	<650	
Indeno(1,2,3-cd)pyrene	µg/kg	250	<130	260	100	1200	160	17
Isophorone	µg/kg	<640	<630	<640	<630	<650	<650	
N-Nitrosodi-n-propylamine	µg/kg	<130	<130	<130	<130	<130	<130	
N-Nitrosodiphenylamine	µg/kg	<130	<130	<130	<130	<130	<130	2680
Naphthalene	µg/kg	<130	<130	<130	<130	<130	<130	176
Nitrobenzene	µg/kg	<130	<130	<130	<130	<130	<130	
Pentachlorophenol	µg/kg	<640	<630	<640	<630	<650	<650	504
Phenanthrene	µg/kg	120	<130	230	56	3100	240	204
Phenol	µg/kg	<130	<130	<130	<130	<130	<130	420
Pyrene	µg/kg	420	<130	470	110	3800	230	195

Table 3-4. Bulk sediment volatile organic concentrations from sediment samples collected downstream and upstream of Woodland Dam in December 2009. Highlighted values are over USEPA Region III sediment benchmark concentrations. Less than sign indicates non-detects at the sample specific detection limit.

		Downstream		Upstream				USEPA Freshwater Sediment Benchmark
		CC-1	CC-2	CC-3	CC-4	CC-5	CC-6	
1,1,1-Trichloroethane	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	30.2
1,1,2,2-Tetrachloroethane	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	1360
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
1,1,2-Trichloroethane	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	1240
1,1-Dichloroethane	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
1,1-Dichloroethene	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	31
1,2,4-Trichlorobenzene	µg/kg	<6.4	<6.0	1.5	<6.3	<6.1	<6.6	2100
1,2-Dibromo-3-chloropropane	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
1,2-Dibromoethane	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
1,2-Dichlorobenzene	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	16.5
1,2-Dichloroethane	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
1,2-Dichloropropane	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
1,3-Dichlorobenzene	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	4430
1,4-Dichlorobenzene	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	599
2-Butanone	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
2-Hexanone	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
4-Methyl-2-pentanone	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
Acetone	µg/kg	<26	<24	<26	<25	<24	14	
Benzene	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
Bromodichloromethane	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
Bromoform	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	654
Bromomethane	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
Carbon disulfide	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	0.851
Carbon tetrachloride	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	64.2
Chlorobenzene	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	8.42
Chloroethane	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
Chloroform	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
Chloromethane	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
cis-1,2-Dichloroethene	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
cis-1,3-Dichloropropene	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
Cyclohexane	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
Dibromochloromethane	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
Dichlorodifluoromethane	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
Ethylbenzene	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	1100
Isopropylbenzene	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
Methyl acetate	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
Methyl tert-butyl ether	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
Methylcyclohexane	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	

Table 3-4. (Continued)

		Downstream		Upstream				USEPA Freshwater Sediment Benchmark
		CC-1	CC-2	CC-3	CC-4	CC-5	CC-6	
Methylene chloride	µg/kg	3.7	3.7	<6.5	<6.3	<6.1	<6.6	
Styrene	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	559
Tetrachloroethene	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	468
Toluene	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
trans-1,2-Dichloroethene	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
trans-1,3-Dichloropropene	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
Trichloroethene	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	96.9
Trichlorofluoromethane	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
Vinyl chloride	µg/kg	<6.4	<6.0	<6.5	<6.3	<6.1	<6.6	
Xylenes (total)	µg/kg	<19	<18	<19	<19	<18	<20	25.2

Six pesticides over benchmark concentrations were reported and Dieldrin was over its 1.9 µg/kg screening level in all four upstream samples (Table 3-5).

No PCB aroclors were detected (Table 3-6) but the high resolution PCB tests using USEPA method 1668a revealed that higher concentrations of PCB existed in the downstream composite sample relative to the upstream composite (Table 3-7). Downstream PCB sum of congeners were nearly 5 times the 59.8 ng/g sediment benchmark concentration. Congener specific concentrations are presented in Table 3-8.

Similar to the results of the high resolution PCB tests, dioxin concentrations were dramatically higher in the downstream composite relative to upstream concentrations (Table 3-9). The downstream composite had significantly more moisture in the sample (98%) than the upstream composite (23%) and since the data are expressed in dry weigh (by dividing the wet weight concentration by the percent moisture) the calculated dry weight detection limits are different between the two composite samples. The detected concentrations of PCBs and Dioxins are similarly higher in the downstream composite. Differences in the moisture content and conversion into dry weight concentrations are not likely the cause of this observation. Prior to running method 1668a, samples are screened to determine its approximate PCB concentration so the appropriate dilution can be selected for the full high resolution analysis. The downstream composite was categorized as protocol 3 (higher PCB concentration) while the upstream composite was categorized as protocol 1 (lower PCB concentration). Thus initial screening provides further evidence that the downstream composite had higher levels of PCBs.

Table 3-5. Bulk sediment pesticide concentrations from sediment samples collected downstream and upstream of Woodland Dam in December 2009. Highlighted values are over USEPA Region III sediment benchmark concentrations. Less than sign indicates non-detects at the sample specific detection limit.

		Downstream		Upstream				USEPA Freshwater Sediment Benchmark
		CC-1	CC-2	CC-3	CC-4	CC-5	CC-6	
4,4-DDD	µg/kg	71	<1.6	15	0.67	0.41	0.38	4.88
4,4-DDE	µg/kg	<16	<1.6	<17	0.3	0.57	0.3	3.16
4,4-DDT	µg/kg	<16	<1.6	<17	<1.6	<1.7	<1.7	4.16
Aldrin	µg/kg	<16	<1.6	<17	<1.6	0.45	<1.7	2
alpha-BHC	µg/kg	3.2	<1.6	<17	0.69	0.49	0.6	6
alpha-Chlordane	µg/kg	<16	<1.6	13	1.7	1.8	0.98	3.24
beta-BHC	µg/kg	<16	<1.6	<17	<1.6	2.2	2.4	5
delta-BHC	µg/kg	<16	<1.6	<17	<1.6	<1.7	0.27	6400
Dieldrin	µg/kg	<16	1.3	7.5	2.6	3.3	2.2	1.9
Endosulfan I	µg/kg	<16	<1.6	<17	<1.6	<1.7	<1.7	2.9
Endosulfan II	µg/kg	<16	<1.6	<17	<1.6	<1.7	<1.7	14
Endosulfan sulfate	µg/kg	6.3	<1.6	<17	<1.6	<1.7	<1.7	5.4
Endrin	µg/kg	<16	<1.6	<17	<1.6	<1.7	<1.7	2.22
Endrin aldehyde	µg/kg	<16	<1.6	<17	<1.6	<1.7	<1.7	
Endrin ketone	µg/kg	<16	<1.6	<17	<1.6	<1.7	<1.7	
gamma-BHC (Lindane)	µg/kg	<16	<1.6	5.9	0.84	0.93	1.3	2.37
gamma-Chlordane	µg/kg	7.3	0.98	<17	2.9	3.2	2.6	3.24
Heptachlor	µg/kg	44	0.75	<17	1.2	1.5	1.3	68
Heptachlor epoxide	µg/kg	<16	0.34	<17	0.53	<1.7	<1.7	2.47
Methoxychlor	µg/kg	<32	1	<32	<3.1	<3.2	<3.3	18.7
Toxaphene	µg/kg	<650	<64	<650	<64	<66	<66	0.1

Table 3-6. Bulk sediment PCB Aroclor concentrations from sediment samples collected downstream and upstream of Woodland Dam in December 2009. Less than sign indicates non-detects at the sample specific detection limit.

		Downstream		Upstream			
		CC-1	CC-2	CC-3	CC-4	CC-5	CC-6
Aroclor 1016	µg/kg	<16	<16	<16	<16	<16	<17
Aroclor 1221	µg/kg	<16	<16	<16	<16	<16	<17
Aroclor 1232	µg/kg	<16	<16	<16	<16	<16	<17
Aroclor 1242	µg/kg	<16	<16	<16	<16	<16	<17
Aroclor 1248	µg/kg	<16	<16	<16	<16	<16	<17
Aroclor 1254	µg/kg	<16	<16	<16	<16	<16	<17
Aroclor 1260	µg/kg	<16	<16	<16	<16	<16	<17

Table 3-7. Bulk sediment PCB homolog concentrations (sum of congeners) from sediment samples collected downstream and upstream of Woodland Dam in December 2009. Highlighted values are over USEPA Region III sediment benchmark concentrations. Less than sign indicates non-detects at the sample specific detection limit.

		CC-UP	CC-DOWN	USEPA Freshwater Sediment Benchmark
Monochlorobiphenyl (total)	ng/g	0.076	<12	
Dichlorobiphenyl (total)	ng/g	0.61	16	
Trichlorobiphenyl (total)	ng/g	1.7	60	
Tetrachlorobiphenyl (total)	ng/g	1.7	77	
Pentachlorobiphenyl (total)	ng/g	1.6	79	
Hexachlorobiphenyl (total)	ng/g	1.7	47	
Heptachlorobiphenyl (total)	ng/g	0.97	15	
Octachlorobiphenyl (total)	ng/g	0.23	<12	
Nonachlorobiphenyl (total)	ng/g	0.047	<12	
Decachlorobiphenyl	ng/g	0.019	<12	
Sum of Congeners	ng/g	8.652	294	59.8

Table 3-8. Bulk sediment PCB congener concentrations (ng/g) from sediment samples collected downstream and upstream of Woodland Dam in December 2009. Less than sign indicates non-detects at the sample specific detection limit.

	CC-UP	CC-DOWN		CC-UP	CC-DOWN
PCB 1 (BZ)	0.043	<12	PCB 42 (BZ)	0.061	2.7
PCB 2 (BZ)	0.0044	<12	PCB 43 (BZ)	0.006	<12
PCB 3 (BZ)	0.028	<12	PCB 44 (BZ)	0.21	12
PCB 4 (BZ)	0.11	1.8	PCB 45 (BZ)	0.059	<12
PCB 5 (BZ)	0.0031	<12	PCB 46 (BZ)	0.019	<12
PCB 6 (BZ)	0.052	1.3	PCB 47 (BZ)	0.21	12
PCB 7 (BZ)	0.01	<12	PCB 48 (BZ)	0.037	<12
PCB 8 (BZ)	0.19	5	PCB 49 (BZ)	0.14	6.7
PCB 9 (BZ)	0.016	<12	PCB 50 (BZ)	0.045	<12
PCB 10 (BZ)	0.007	<12	PCB 51 (BZ)	0.059	<12
PCB 11 (BZ)	0.038	1.4	PCB 52 (BZ)	0.25	22
PCB 12 (BZ)	0.025	<12	PCB 53 (BZ)	0.045	<12
PCB 13 (BZ)	0.025	<12	PCB 54 (BZ)	<0.010	<12
PCB 14 (BZ)	<0.010	<12	PCB 55 (BZ)	0.0041	<12
PCB 15 (BZ)	0.16	6.5	PCB 56 (BZ)	0.091	2.9
PCB 16 (BZ)	0.088	<12	PCB 57 (BZ)	<0.010	<12
PCB 17 (BZ)	0.11	3.2	PCB 58 (BZ)	<0.010	<12
PCB 18 (BZ)	0.22	8.8	PCB 59 (BZ)	0.024	<12
PCB 19 (BZ)	0.039	<12	PCB 60 (BZ)	0.043	<12
PCB 20 (BZ)	0.39	17	PCB 61 (BZ)	0.29	14
PCB 21 (BZ)	0.13	6.2	PCB 62 (BZ)	0.024	<12
PCB 22 (BZ)	0.12	3.8	PCB 63 (BZ)	0.0053	<12
PCB 23 (BZ)	<0.010	<12	PCB 64 (BZ)	0.092	4.8
PCB 24 (BZ)	0.0038	<12	PCB 65 (BZ)	0.21	12
PCB 25 (BZ)	0.036	<12	PCB 66 (BZ)	0.19	7.3
PCB 26 (BZ)	0.06	2.2	PCB 67 (BZ)	0.0067	<12
PCB 27 (BZ)	0.026	<12	PCB 68 (BZ)	0.0015	<12
PCB 28 (BZ)	0.39	17	PCB 69 (BZ)	0.14	6.7
PCB 29 (BZ)	0.06	2.2	PCB 70 (BZ)	0.29	14
PCB 30 (BZ)	0.22	8.8	PCB 71 (BZ)	0.13	5
PCB 31 (BZ)	0.26	12	PCB 72 (BZ)	0.002	<12
PCB 32 (BZ)	0.1	4.1	PCB 73 (BZ)	0.006	<12
PCB 33 (BZ)	0.13	6.2	PCB 74 (BZ)	0.29	14
PCB 34 (BZ)	<0.010	<12	PCB 75 (BZ)	0.024	<12
PCB 35 (BZ)	0.0061	<12	PCB 76 (BZ)	0.29	14
PCB 36 (BZ)	<0.010	<12	PCB 77 (BZ)	0.031	<12
PCB 37 (BZ)	0.14	2.8	PCB 78 (BZ)	<0.010	<12
PCB 38 (BZ)	<0.010	<12	PCB 79 (BZ)	0.0017	<12
PCB 39 (BZ)	<0.010	<12	PCB 80 (BZ)	<0.010	<12
PCB 40 (BZ)	0.13	5	PCB 81 (BZ)	<0.010	<12
PCB 41 (BZ)	0.13	5	PCB 82 (BZ)	0.031	<12

Table 3-8. (Continued)

	CC-UP	CC-DOWN		CC-UP	CC-DOWN
PCB 83 (BZ)	0.12	5.7	PCB 126 (BZ)	0.0036	<12
PCB 84 (BZ)	0.07	3.7	PCB 127 (BZ)	<0.010	<12
PCB 85 (BZ)	0.04	<12	PCB 128 (BZ)	0.054	<12
PCB 86 (BZ)	0.14	8.6	PCB 129 (BZ)	0.38	17
PCB 87 (BZ)	0.14	8.6	PCB 130 (BZ)	0.021	<12
PCB 88 (BZ)	0.037	<12	PCB 131 (BZ)	0.0027	<12
PCB 89 (BZ)	0.0037	<12	PCB 132 (BZ)	0.13	5.9
PCB 90 (BZ)	0.21	14	PCB 133 (BZ)	0.0049	<12
PCB 91 (BZ)	0.037	<12	PCB 134 (BZ)	0.016	<12
PCB 92 (BZ)	0.043	2.5	PCB 135 (BZ)	0.15	<12
PCB 93 (BZ)	0.0011	<12	PCB 136 (BZ)	0.042	<12
PCB 94 (BZ)	<0.010	<12	PCB 137 (BZ)	0.012	<12
PCB 95 (BZ)	0.25	14	PCB 138 (BZ)	0.38	17
PCB 96 (BZ)	0.0024	<12	PCB 139 (BZ)	0.0037	<12
PCB 97 (BZ)	0.14	8.6	PCB 140 (BZ)	0.0037	<12
PCB 98 (BZ)	0.0053	<12	PCB 141 (BZ)	0.078	<12
PCB 99 (BZ)	0.12	5.7	PCB 142 (BZ)	<0.010	<12
PCB 100 (BZ)	0.0011	<12	PCB 143 (BZ)	0.016	<12
PCB 101 (BZ)	0.21	14	PCB 144 (BZ)	0.016	<12
PCB 102 (BZ)	0.0053	<12	PCB 145 (BZ)	<0.010	<12
PCB 103 (BZ)	<0.010	<12	PCB 146 (BZ)	0.057	<12
PCB 104 (BZ)	<0.010	<12	PCB 147 (BZ)	0.32	12
PCB 105 (BZ)	0.088	3.7	PCB 148 (BZ)	<0.010	<12
PCB 106 (BZ)	<0.010	<12	PCB 149 (BZ)	0.32	12
PCB 107 (BZ)/109 (IUPAC)	0.016	<12	PCB 150 (BZ)	<0.010	<12
PCB 108 (BZ)/107 (IUPAC)	0.0073	<12	PCB 151 (BZ)	0.15	<12
PCB 109 (BZ)/108 (IUPAC)	0.14	8.6	PCB 152 (BZ)	<0.010	<12
PCB 110 (BZ)	0.34	16	PCB 153 (BZ)	0.3	12
PCB 111 (BZ)	<0.010	<12	PCB 154 (BZ)	0.0034	<12
PCB 112 (BZ)	<0.010	<12	PCB 155 (BZ)	<0.010	<12
PCB 113 (BZ)	0.21	14	PCB 156 (BZ)	0.027	<12
PCB 114 (BZ)	0.0044	<12	PCB 157 (BZ)	0.027	<12
PCB 115 (BZ)	0.34	16	PCB 158 (BZ)	0.036	<12
PCB 116 (BZ)	0.04	<12	PCB 159 (BZ)	0.0033	<12
PCB 117 (BZ)	0.04	<12	PCB 160 (BZ)	0.38	17
PCB 118 (BZ)	0.19	11	PCB 161 (BZ)	<0.010	<12
PCB 119 (BZ)	0.14	8.6	PCB 162 (BZ)	0.00077	<12
PCB 120 (BZ)	<0.010	<12	PCB 163 (BZ)	0.38	17
PCB 121 (BZ)	<0.010	<12	PCB 164 (BZ)	0.029	<12
PCB 122 (BZ)	0.0023	<12	PCB 165 (BZ)	<0.010	<12
PCB 123 (BZ)	0.0024	<12	PCB 166 (BZ)	0.054	<12
PCB 124 (BZ)	0.0073	<12	PCB 167 (BZ)	0.012	<12
PCB 125 (BZ)	0.14	8.6	PCB 168 (BZ)	0.3	12

Table 3-8. (Continued)

	CC-UP	CC-DOWN		CC-UP	CC-DOWN
PCB 169 (BZ)	<0.010	<12	PCB 190 (BZ)	0.022	<12
PCB 170 (BZ)	0.11	<12	PCB 191 (BZ)	0.0037	<12
PCB 171 (BZ)	0.031	<12	PCB 192 (BZ)	<0.010	<12
PCB 172 (BZ)	0.019	<12	PCB 193 (BZ)	0.26	9.3
PCB 173 (BZ)	0.031	<12	PCB 194 (BZ)	0.051	<12
PCB 174 (BZ)	0.13	<12	PCB 195 (BZ)	0.017	<12
PCB 175 (BZ)	0.0036	<12	PCB 196 (BZ)	0.027	<12
PCB 176 (BZ)	0.011	<12	PCB 197 (BZ)	<0.010	<12
PCB 177 (BZ)	0.072	<12	PCB 198 (BZ)	0.07	<12
PCB 178 (BZ)	0.024	<12	PCB 199 (BZ)/200 (IUPAC)	0.0067	<12
PCB 179 (BZ)	0.052	<12	PCB 200 (BZ)/201 (IUPAC)	0.0055	<12
PCB 180 (BZ)	0.26	9.3	PCB 201 (BZ)/199 (IUPAC)	0.07	<12
PCB 181 (BZ)	<0.010	<12	PCB 202 (BZ)	0.013	<12
PCB 182 (BZ)	<0.010	<12	PCB 203 (BZ)	0.038	<12
PCB 183 (BZ)	0.075	<12	PCB 204 (BZ)	<0.010	<12
PCB 184 (BZ)	<0.010	<12	PCB 205 (BZ)	0.0027	<12
PCB 185 (BZ)	0.075	<12	PCB 206 (BZ)	0.032	<12
PCB 186 (BZ)	<0.010	<12	PCB 207 (BZ)	0.003	<12
PCB 187 (BZ)	0.15	5.6	PCB 208 (BZ)	0.012	<12
PCB 188 (BZ)	<0.010	<12	PCB 209 (BZ)	0.019	<12
PCB 189 (BZ)	0.0031	<12			

Table 3-9. Bulk sediment dioxin concentrations from sediment samples collected downstream and upstream of Woodland Dam in December 2009. Highlighted values are over USEPA Region III sediment benchmark concentrations. Less than sign indicates non-detects at the sample specific detection limit.

DIOXIN		CC-UP	CC-DOWN	USEPA Freshwater Sediment Benchmark
1,2,3,4,6,7,8-HpCDD	pg/g	12	1100	
1,2,3,4,6,7,8-HpCDF	pg/g	3.2	140	
1,2,3,4,7,8,9-HpCDF	pg/g	<5.0	<150	
1,2,3,4,7,8-HxCDD	pg/g	<5.0	<150	
1,2,3,4,7,8-HxCDF	pg/g	0.39	20	
1,2,3,6,7,8-HxCDD	pg/g	0.53	35	
1,2,3,6,7,8-HxCDF	pg/g	0.43	32	
1,2,3,7,8,9-HxCDD	pg/g	0.36	<150	
1,2,3,7,8,9-HxCDF	pg/g	<5.0	<150	
1,2,3,7,8-PeCDD	pg/g	<5.0	<150	
1,2,3,7,8-PeCDF	pg/g	<5.0	<150	
13C-1,2,3,4,6,7,8-HpCDD	pg/g	51	1500	
13C-1,2,3,4,6,7,8-HpCDF	pg/g	45	1400	
13C-1,2,3,4,7,8,9-HpCDF	pg/g	39	1100	
13C-1,2,3,4,7,8-HxCDD	pg/g	58	1900	
13C-1,2,3,4,7,8-HxCDF	pg/g	44	1500	
13C-1,2,3,6,7,8-HxCDD	pg/g	49	1600	
13C-1,2,3,6,7,8-HxCDF	pg/g	46	1500	
13C-1,2,3,7,8,9-HxCDF	pg/g	45	1400	
13C-1,2,3,7,8-PeCDD	pg/g	56	1800	
13C-1,2,3,7,8-PeCDF	pg/g	56	1800	
13C-2,3,4,6,7,8-HxCDF	pg/g	48	1600	
13C-2,3,4,7,8-PeCDF	pg/g	54	1700	
13C-2,3,7,8-TCDD	pg/g	56	1900	
13C-2,3,7,8-TCDF	pg/g	53	1700	
13C-OCDD	pg/g	97	2300	
2,3,4,6,7,8-HxCDF	pg/g	<5.0	<150	
2,3,4,7,8-PeCDF	pg/g	<5.0	<150	
2,3,7,8-TCDD	pg/g	<1.0	<30	0.85
2,3,7,8-TCDF	pg/g	<1.0	26	
OCDD	pg/g	160	11000	
OCDF	pg/g	4.7	190	
Total HpCDD	pg/g	22	2100	
Total HpCDF	pg/g	8.8	400	
Total HxCDD	pg/g	3	240	
Total HxCDF	pg/g	9.9	510	
Total PeCDD	pg/g	<5.0	<150	
Total PeCDF	pg/g	6.2	510	
Total TCDD	pg/g	<1.0	<30	
Total TCDF	pg/g	4.2	390	

4.0 CONCLUSIONS

The sediment volume estimates revealed that the stream bed behind Woodland Dam is not a high depositional area as only a thin layer of fine material was observed. Given the extensive amount of impervious surface that exists in this urbanized watershed, Cobbs Creek is probably subject to frequent rainfall-induced scouring events and the dam is relative low in height limiting its ability to accumulate silty sediments (approximately 6 feet).

Chromium and cyanide were observed above and below the dam above the USEPA benchmark values. However, average upstream and downstream concentrations were similar and the observed concentrations were not dramatically above sediment screening values. A suite of semi volatile organics over the sediment benchmark values were observed both upstream and downstream of Woodland Dam most of which can be attributed to coal tars and petro-chemicals originating from vehicles using city roadways. The high PCBs and dioxin concentration reported in the downstream composite sample is potentially problematic, but most of the sediment disruption and potential mobilization of contaminants from the dam removal project will occur in the thin layer of upstream sediments behind the dam. PCBs found in the sediment may have originated from leaking electric transformers on city power transmission poles.

Based on the small amount of sediment measured upstream of the dam and the similar nature of the chemical make-up of upstream and downstream sediments, any sediment released during the proposed dam removal should have minimal impact on the downstream ecosystem of Cobbs Creek.

APPENDIX A

SCOPE OF WORK

Sediment Quality Testing for the
Cobbs Creek Fish Passage Project
Philadelphia, PA

SCOPE OF WORK

1.0. PROJECT DESCRIPTION

The project site is located along Cobbs Creek and involves modifications to the Woodland Dam in order to restore fish passage. The Woodland Dam (Figures 1-4) is located close to the Cobbs Creek Parkway and Woodland Avenue in Philadelphia. It is also the first impediment to fish passage on Cobbs Creek and serves as the demarcation between tidal and non-tidal influences along the creek.

This project will investigate, select, design and construct the best alternative to reestablish fish passage along Cobbs Creek. The most effective method of restoring fish passage is to remove the stream impediment and restore the channel to natural conditions. However, existing conditions such as the historical and cultural aspects of the dam, the chemical composition of built-up sediment behind the dam, and the potential for increased downstream flood hazard risk may influence the selection of a recommended plan.

The Philadelphia District and the Philadelphia Water Department have developed an initial list of potential project alternatives and include the following: no action, complete dam removal, and dam removal with partial remnants.

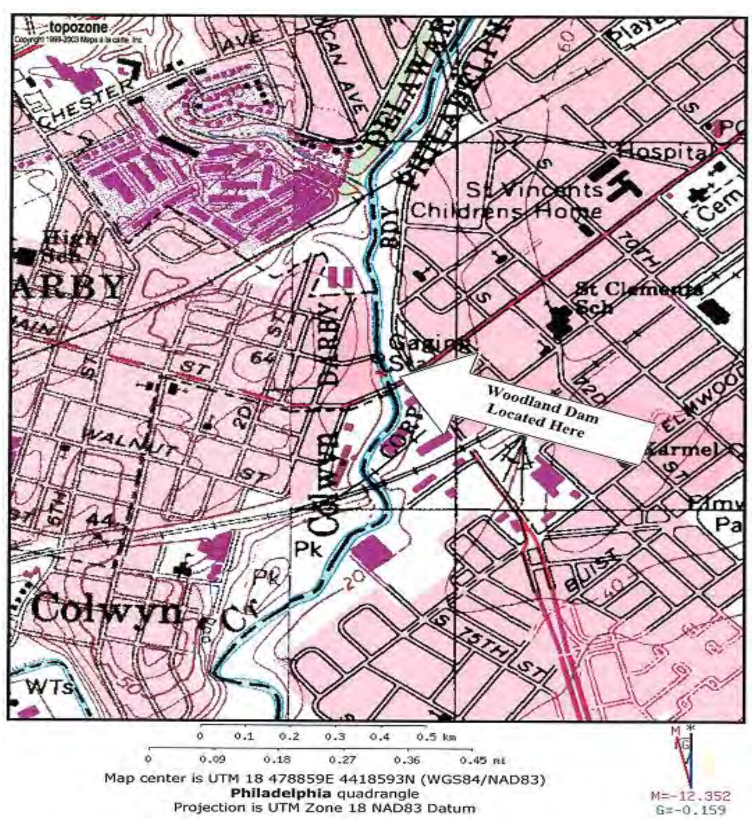


Figure 1. USGS Quadrangle depicting the project location. Cobbs Creek acts as the boundary between the City of Philadelphia and Delaware County in the vicinity of the Woodland Dam.

Figure 2: Woodland Dam shown from the bank adjacent to the Blue Bell Inn. Photo taken April 22, 2009.

Figure 3: Woodland Dam shown from the Woodland Avenue Bridge approximately 200 feet downstream of the dam. Photo taken January 26, 2006.

Figure 7: Aerial photograph of project site showing location of the Woodland Dam in respect to Woodland and Island Avenues. Aerial photograph taken in 2006.

2.0. STUDY PURPOSE

The objective of this effort is to improve fish migration by allowing passage upstream of Woodland Dam to potential foraging and spawning areas. This project is in the information gathering stage and we are soliciting comments from the public and resource agencies identifying any significant issues, problems and concerns, along with any pertinent information regarding establishing fish passage along Cobbs Creek and its list of preliminary alternatives.

3.0. CORPS OF ENGINEERS POINT OF CONTACT

U.S. Army Corps of Engineers, Environmental Resources Branch, 100 Penn Square East, Philadelphia, Pennsylvania 19107. Mark Eberle, Project Biologist (215) 656-6562 and Erik Rourke, Project Manager (215) 656-65??.

4.0. TASKS

A. <u>SEDIMENT SAMPLES</u>

Sediment samples will be collected from six stations; four upstream and two downstream of Woodland dam (Figure 5). Target collections points may need to be repositioned slightly to obtain samples of silt due to the presence of bedrock and rock coble substrate. Sediment samples for bulk chemical analysis will be collected from either a decontaminated stainless steel ponar grab or a decontaminated hand operated Wildco® sediment coring device depending on sediment depth. Each of the six samples will be analyzed for TCL Volatiles, TCL Semi Volatiles, TCL Pesticides and PCBs, and TCL Inorganics (Appendix A). One composite from the two downstream stations and another from the four upstream stations will be prepared and analyzed for 1) high resolution congener specific PCBs (using method 1668a) and 2) Dioxin/Furans. In addition, samples will be analyzed for grain size.

Figure 5. Sample locations on Cobbs Creek.

Sample locations were selected based on coordination with Pennsylvania Department of Environmental Protection (PADEP) and U.S. Fish and Wildlife Service (FWS). One sediment sample will be taken from each location and will be taken approximately every 100 feet apart. For the upstream samples, two samples (paired) will be taken immediately behind (upstream) the dam in the deepest portion of the stream and the other two will be approximately every 100 feet upstream. For the downstream samples, the first sample will be taken below the dam and the other sample approximately 100 feet further downstream. For all samples, exact locations will focus on the areas of apparent fine grain sediment.

The six sample site locations will be recorded using Global Positioning System (GPS) units. The Contractor will use this data to produce a table and map identifying each sampling location in latitude and longitude. Since sediment sampling data will be compared to US Environmental Protection Agency (USEPA) Region III ecological screening values to assess potential ecological effects from the dam removal, target detection limits for the laboratory analysis will attempt to get as close as is reasonably possible to these screening limits.

Records. The contractor shall maintain records of all work performed in this contract. These shall be furnished to the COE Point of Contact in the final report.

Sample Holding Times. A summary of recommended procedures for sample preservation and storage will follow the USEPA guidance.

B. Estimating Sediment Volume behind Woodland Dam

The contractor will conduct a survey to estimate the volume of sediment build up behind Woodland dam to provide data needed to determine if dredging silt will be necessary before the dam removal phase of the project. The contactor will establish six (6) equally spaced transects that will, in total, extend approximately 500 feet upstream of the existing dam. Sediment depth measurement will be taken at six (6) equally spaced points across the stream (stream width behind the dam is approximately 30 feet). At each transect a Self-Leveling Rotating Laser Level with tripod will be positioned to provide a reference point above the water's surface. At each position a survey marker will be lowered vertically into the water to the sediment surface. A steel reinforcement rod will be positioned next to the survey marker and pushed into the sediment until bed rock or rock cobble is encountered. The distance the steel rod moves will be recorded for each sampling point to estimate sediment depth. A survey grade GPS with sub-meter accuracy will be used to geo-reference the beginning and end of each transect. Coordinates for points along each transect survey will be calculated using the stream bank to opposite stream bank transect coordinates. Assuming that each survey position represents a rectangular column of sediment, the total volume of sediment up to 500 feet behind the dam will be calculated. Sediment measurement will be conducted from a canoe or by wading depending on local depths and sediment conditions encountered during the field effort.

5.0. QUALITY ASSURANCE/QUALITY CONTROL

All procedures required under this scope of work will conform to the analytical quality assurance/quality control program identified in the USEPA guidance. In addition, the Contractor will maintain accurate quality control records including at least daily analytical instrument calibration data and appropriate preservation and storage of all excess sediment and water for a period of 60 days subsequent to the initial analyses. This sediment will be used for additional testing, if necessary. The laboratory shall at a minimum be USEPA and PA State certified.

7.0. REPORTING REQUIREMENTS

A table and detailed map identifying sampling locations, coordinates, and corresponding data collection results will be included in the final report.

The following information shall be included on the laboratory data sheets:

1. test method
2. date sample was collected
3. date of analyses
4. testing result
5. detection level
6. tidal cycle

Draft and final reports must be complete with all figures, tables, and appendices and reflect and report the analyses outlined in this scope of work. The recommended content and format should follow quality assurance and quality control guidelines and shall be structured as follows:

(1) TITLE PAGE - bearing the appropriate title, date, author, and contract number.
(2) EXECUTIVE SUMMARY - a brief description of the study's purpose, findings, and conclusions.
(3) TABLE OF CONTENTS - including a list of all figures and tables presented in the report.
(4) INTRODUCTION - stating the purpose of the study with background information on the project and area.
(5) METHODOLOGY - describes the sampling and analysis equipment and methodologies used.
(6) RESULTS - Each sampling reach shall be represented by individual chapters. Each chapter shall contain the sampling results relative to that sampling reach and at a minimum contain the collected data in tabular and graphic form and details of any applicable statistical analyses used. The resulting sediment data shall be summarized.
(7) DISCUSSION – this is a key section that draws inferences regarding the existing water and sediment quality and the potential for impact to natural resources by the dam removal project. This section will discuss the results of the sampling as they relate to appropriate State and Federal water quality standards.
(8) A LIST OF REFERENCES - includes literature cited and agencies or individuals consulted. The bibliography must be in a format used by professional scientific journals.
(9) APPENDICES - for personnel qualifications, a copy of this scope of work, raw data sheets, record logs, and other pertinent information.

Each report page will be produced on 8 1/2" x 11" paper, single spaced, with double spacing between paragraphs. All text pages, including Appendices, must be consecutively numbered. Text print quality must be at least letter quality. In addition, five electronic copies (cd or DVD) of the final report and report data will be submitted.

8.0. PERIOD OF PERFORMANCE

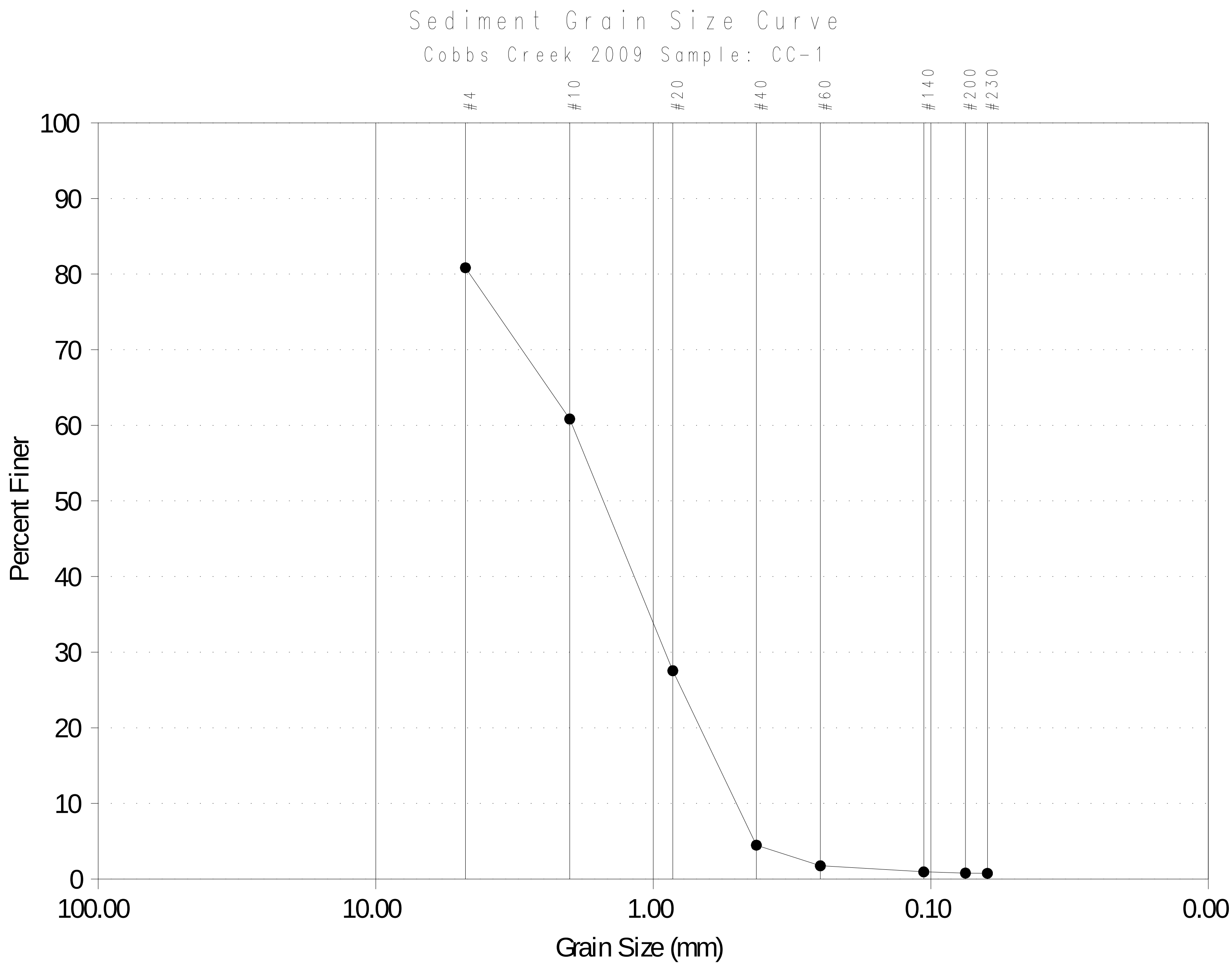
Sediment sampling shall be performed by November 20, 2009. Five hard copies of a draft report, an electronic copy (pdf) (emailed), and 3 cds shall be submitted to the Corps Point of Contact by January 22, 2010. The draft report will be reviewed and returned to the contractor for revision, if necessary, within 45 working days of receipt of the draft. Following the review period, the draft report will be amended, if necessary, and a final report (5 bound, 1 unbound, as well as, 5 cds/DVDs) submitted to the Corps' Point of Contact within 10 working days. This schedule is subject to adjustment by the Corps' Point of Contact for delays on the part of the Government, and for conditions beyond the control of the parties hereto.

Table 1. List of parameters for contaminant testing of sediment collected upstream and downstream of Woodland dam in Cobbs Creek, PA.		
Volatile Organics	**Semivolatile Organics**	**Pesticides**
1,1,2,2-Tetrachloroethane	1,1'-Biphenyl	Aldrin
1,1,2-Trichloro-1,2,2-Trifluoroethane	2,4,5-Trichlorophenol	alpha-BHC
1,1-Dichloroethane	2,4,6-Trichlorophenol	beta-BHC
1,1-Dichloroethene	2,4-Dichlorophenol	delta-BHC
1,2,4-Trichlorobenzene	2,4-Dimethylphenol	gama-BHC (lindane)
1,2-Dibromo-3-Chloropropane (DBCP)	2,4-Dinitrophenol	Chlordane
1,2-Dibromoethane	2,4-Dinitrotoluene	alpha-Chlordane
1,2-Dichlorobenzene	2,6-Dinitrotoluene	gama-Chlordane
1,2-Dichloroethane	2-Chloronaphthalene	4,4'-DDD
1,2-Dichloropropane	2-Chlorophenol	4,4'-DDE
1,3-Dichlorobenzene	2-Methylnaphthalene	4,4'-DDT
1,4-Dichlorobenzene	2-Methylphenol (o-Cresol)	Dieldrin
2-Butanone (Methyl Ethyl Ketone)	2-Nitroanaline	Endosulfan I
2-Hexanone	2-Nitrophenol	Endosulfan II
4-Methyl-2-Pentanone	3,3'-Dichlorobenzidine	Endosulfan Sulfate
Acetone	3-Nitroanaline	Endrin
Benzene	4,6-Dinitro-2-Methylphenol (4,6-Dinitro-o-Cresol)	Endrin Aldehyde
Bromodichloromethane	4-Bromophenyl PhenylEther	Endrin Ketone
Bromoform	4-Chloro-3-Methylphenol	Heptachlor
Bromomethane	4-Chloroanaline	Heptachlor Epoxide
Carbon Disulfide	4-Chlorophenyl Phenyl Ether	Methoxychlor
Carbon Tetrachloride	4-Methylphenol (p-Cresol)	Toxaphene
Chlorobenzene	4-Nitroanaline	
Chloroethane	4-Nitrophenol	**PCBs**
Chloroform	Acenaphthalene	Aroclor 1016
Chloromethane	Acenaphthene	Aroclor 1221
cis-1,3-Dichloroethene	Acetophenone	Aroclor 1232
cis-1,3-Dichloropropene	Anthracene	Aroclor 1242
Cyclohexane	Atrazine	Aroclor 1248
Dibromochloromethane	Benzaldehyde	Aroclor 1254
Dichlorodifluoromethane	Benzo(a)anthracene	Aroclor 1260
Ethylbenzene	Benzo(a)pyrene	
Isopropyl Benzene	Benzo(b)fluoranthene	**Metals/Inorganics**
Methyl Acetate	Benzo(g,h,i)perylene	Aluminum
Methyl tert-Butyl Ether	Benzo(k)fluoranthene	Antimony
Methylcyclohexane	bis(2-Chloroethoxy) Ethane	Arsenic
Methylene Chloride	bis(2-chloroethyl Ether	Barium
Styrene	bis(2-Chloroisopropyl) Ether	Beryllium

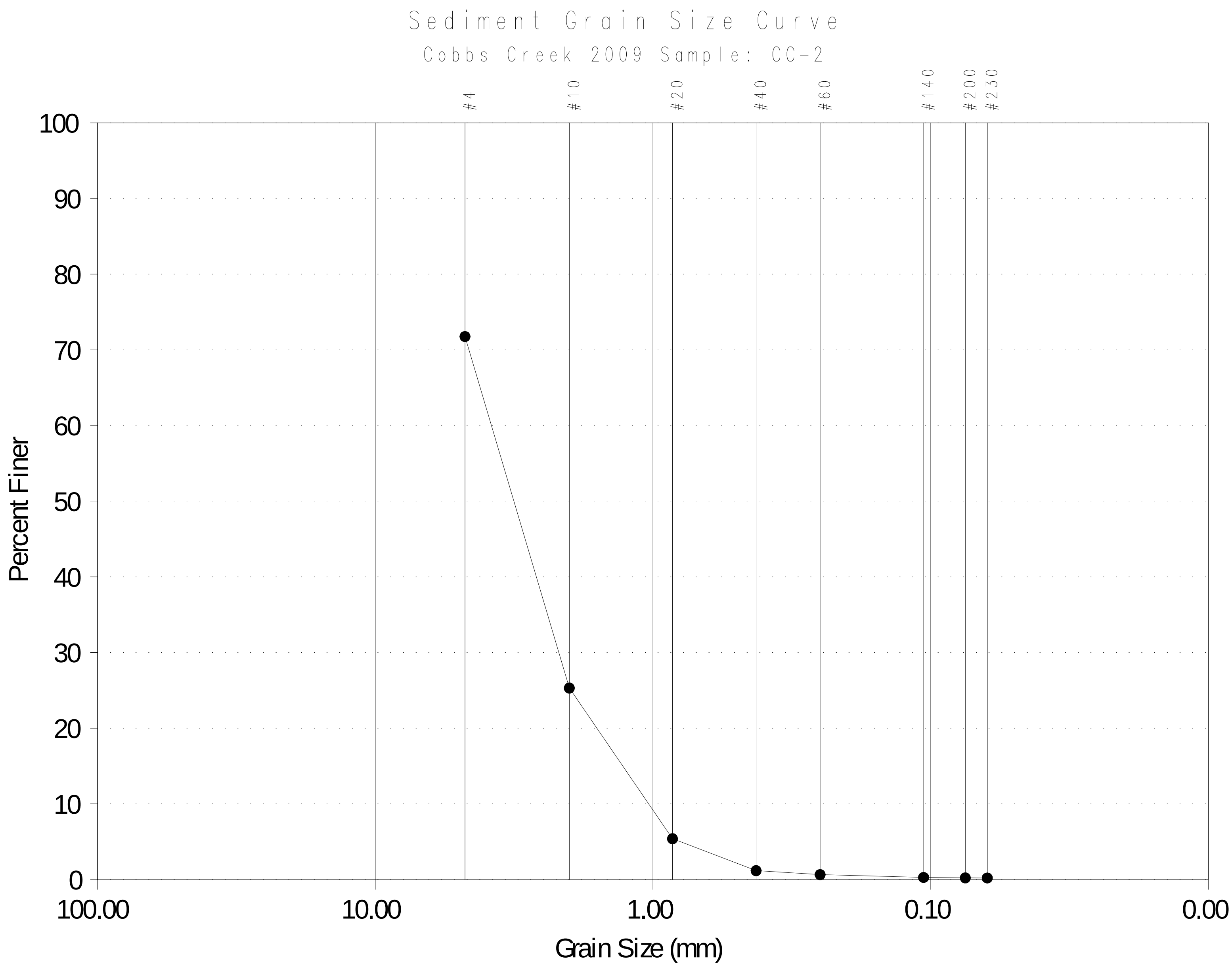
Tetrachloroethene	bis(2-Ehtylhexyl) Phthalate	Cadmium
Trans-1,3-Dichloroethene	Butyl Benzylphthalate	Chromium
trans-1,3-Dichloropropene	Caprolactam	Calcium
Trichlorofluoromethane	Carbazole	Cobalt
Vinyl Chloride	Chrysene	Copper
Xylene (Total)	Debenz(a,h)anthracene	Iron
	Diethyl Phthalate	Lead
	Dimethyl Phthalate	Magnesium
	Di-n-Butylphthalate	Manganese
	Di-n-Octylphthalate	Mercury
	Dobenzofuran	Nickel
	Fluoranthene	Potassium
	Fluorene	Selenium
	Hexachlorobenzene	Silver
	Hexachlorobutadiene	Sodium
	Hexachlorocyclopentadiene	Thallium
	Hexachloroethane	Vanadium
	Indeno(1,2,3-cd)pyrene	Zinc
	Isophorone	
	Naphthalene	Cyanides
	Nitrobenzene	
	N-Nitrosodi-n-propylamine	
	N-Nitrosodiphenylamine	
	Pentachlorophenol	
	Phenanthrene	
	Phenol	
	Pyrene	

APPENDIX B

GRAIN SIZE

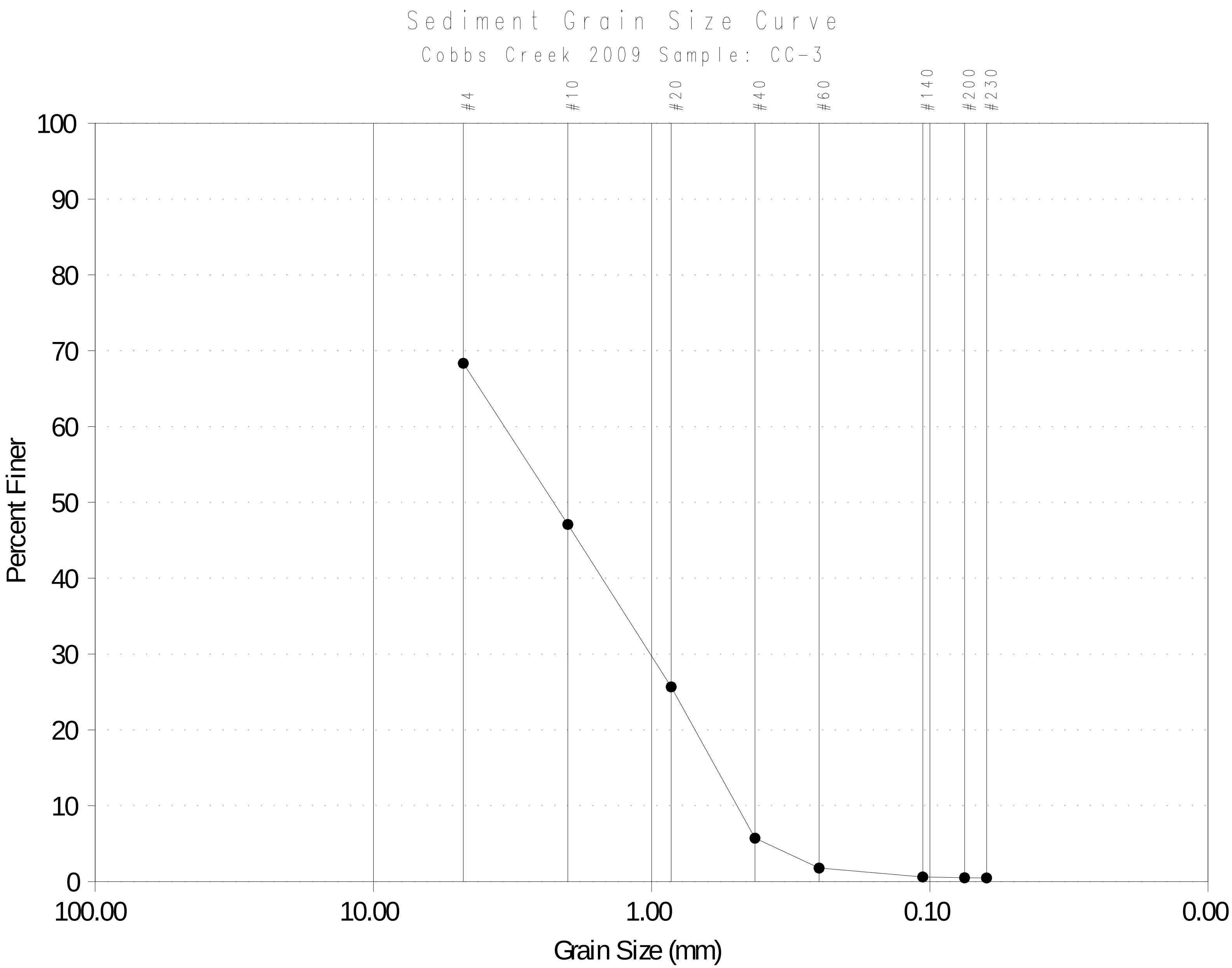


Sediment Grain Size Curve
Cobbs Creek 2009 Sample: CC-1
#4
#10
#20
#40
#60
#140
#200
#230
100
90
80
70
60
50
40
30
20
10
0
Percent Finer
100.00
10.00
1.00
0.10
0.00
Grain Size (mm)

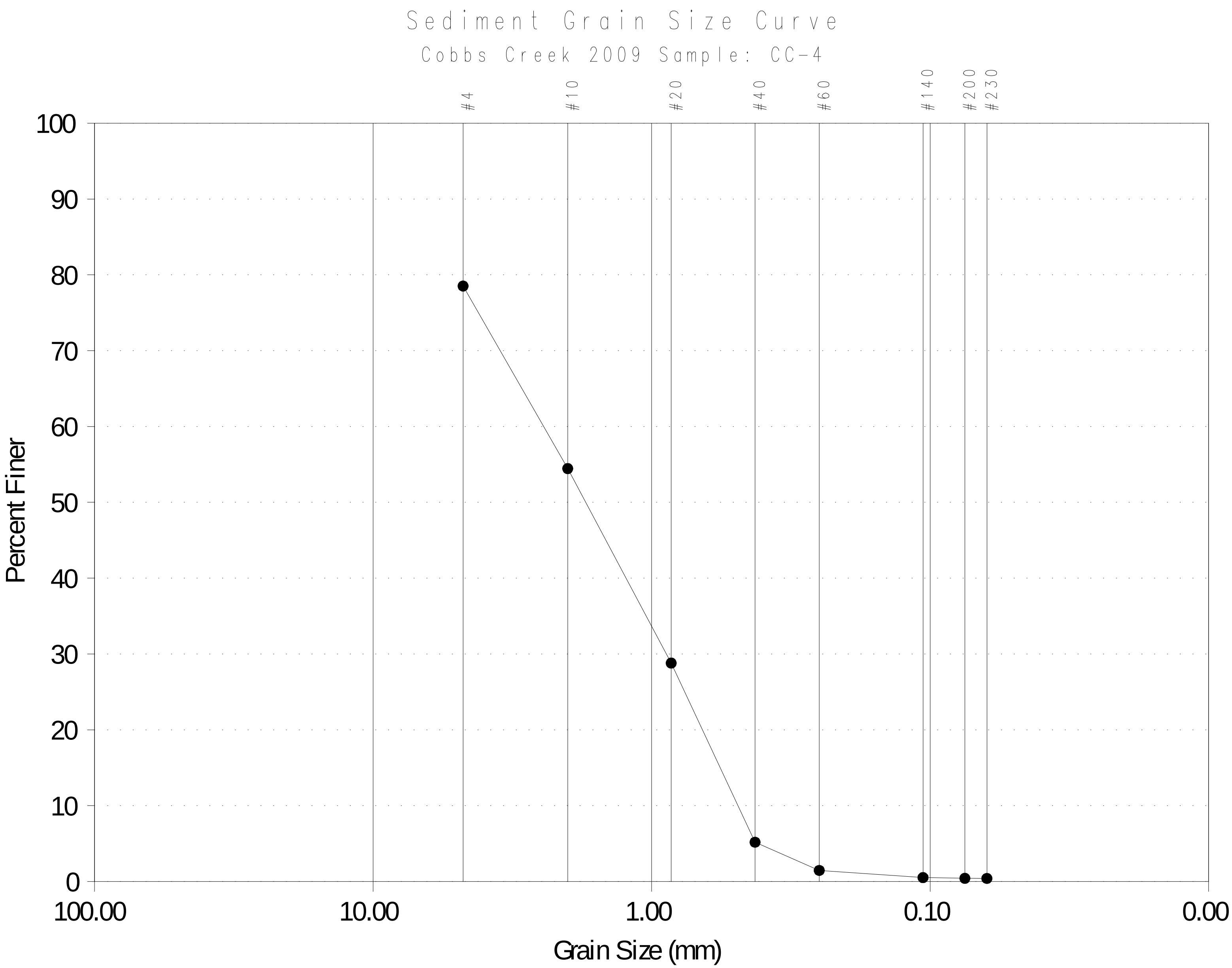


Sediment Grain Size Curve
Cobbs Creek 2009 Sample: CC-2
#4
#10
#20
#40
#60
#140
#200
#230
100
90
80
70
60
50
40
30
20
10
0
Percent Finer
100.00
10.00
1.00
0.10
0.00
Grain Size (mm)

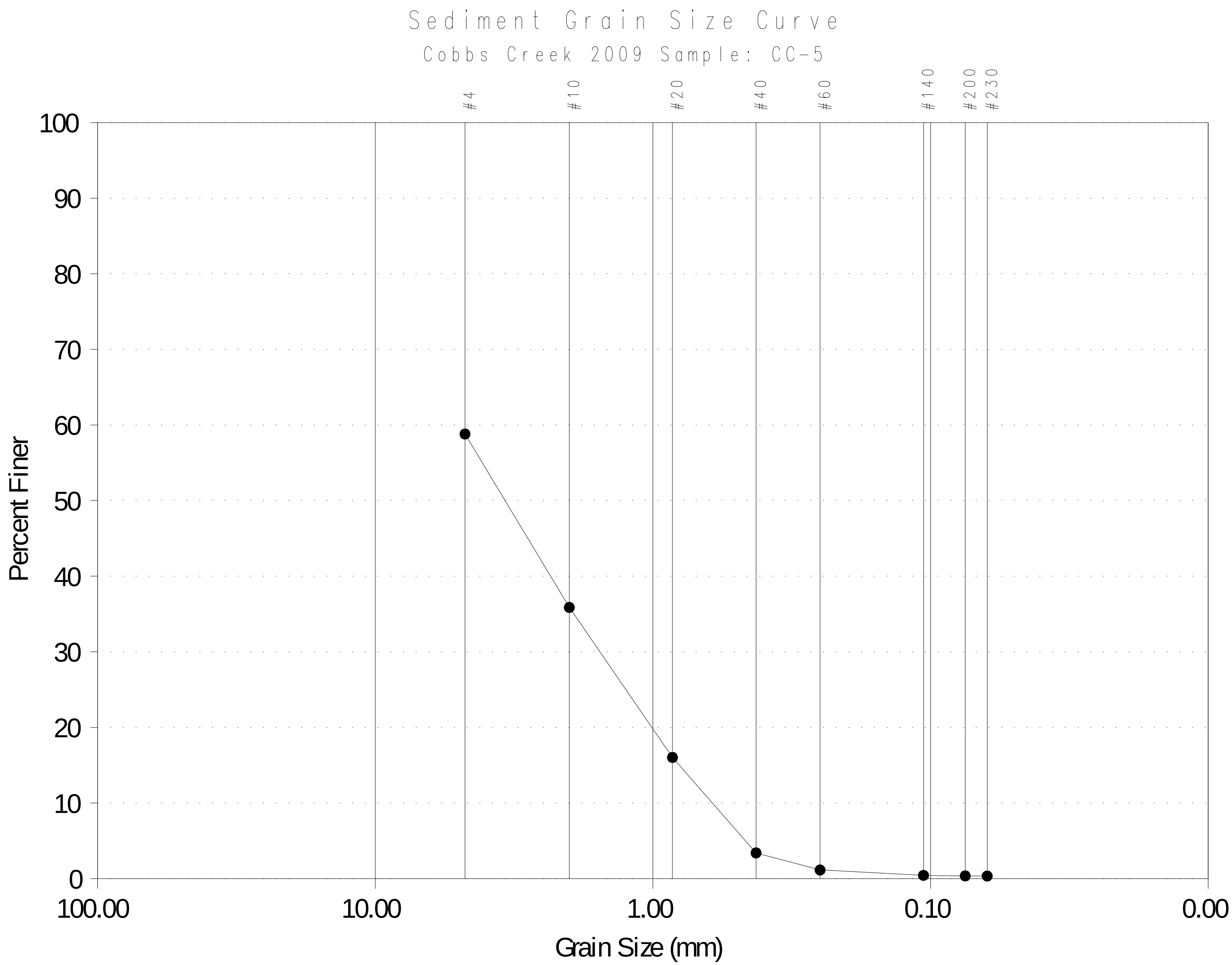
B-5

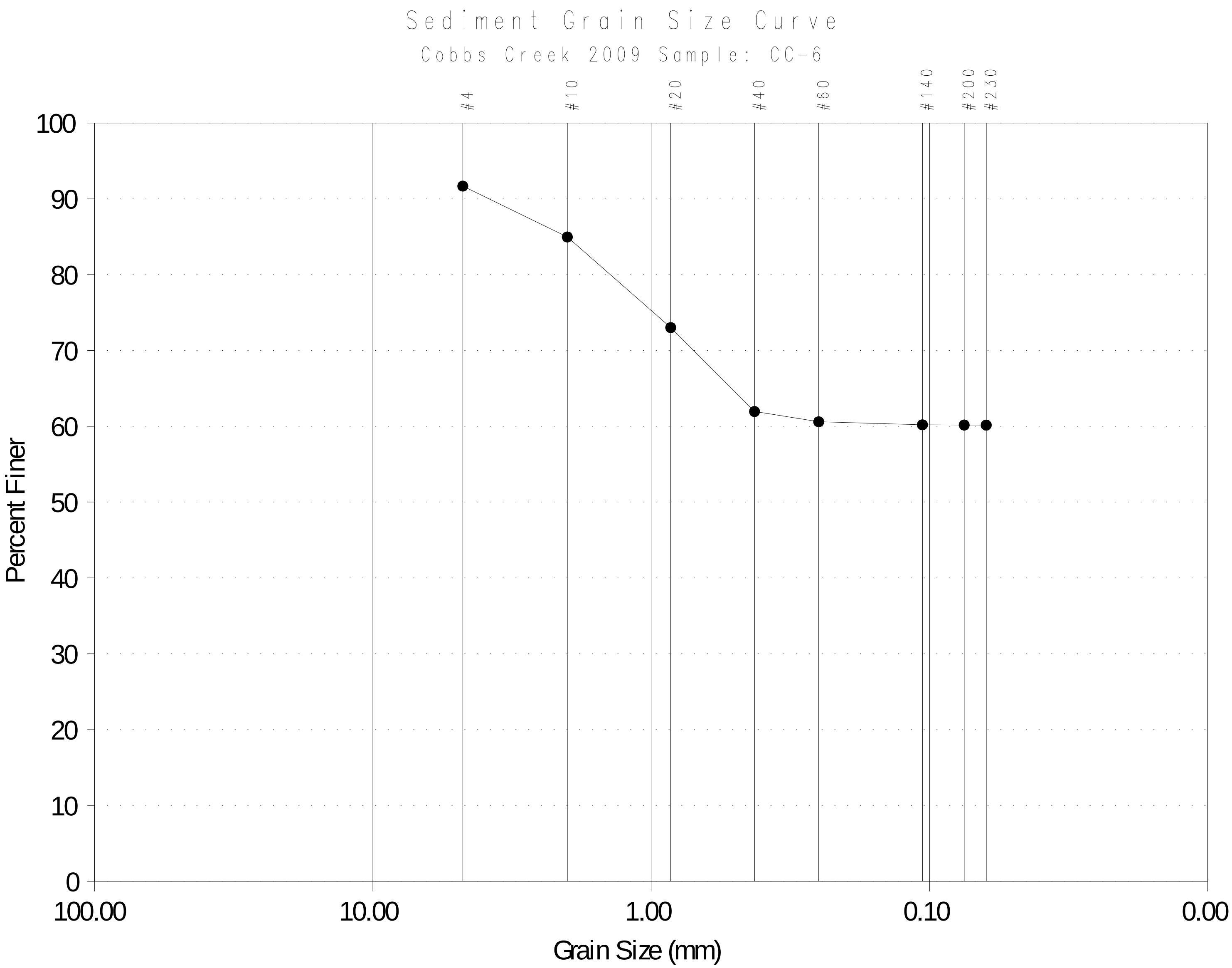


Sediment Grain Size Curve
Cobbs Creek 2009 Sample: CC-3
#4
#10
#20
#40
#60
#140
#200
#230
100
90
80
70
60
50
40
30
20
10
0
Percent Finer
100.00
10.00
1.00
0.10
0.00
Grain Size (mm)



Sediment Grain Size Curve
Cobbs Creek 2009 Sample: CC-4
#4
#10
#20
#40
#60
#140
#200
#230
100
90
80
70
60
50
40
30
20
10
0
Percent Finer
100.00
10.00
1.00
0.10
0.00
Grain Size (mm)


Sediment Grain Size Curve
Cobbs Creek 2009 Sample: CC-5
#4
#10
#20
#40
#60
#140
#200
#230
100
90
80
70
60
50
40
30
20
10
0
Percent Finer
100.00
10.00
1.00
0.10
0.00
Grain Size (mm)



Sediment Grain Size Curve
Cobbs Creek 2009 Sample: CC-6
#4
#10
#20
#40
#60
#140
#200
#230
Percent Finer
100
90
80
70
60
50
40
30
20
10
0
100.00
10.00
1.00
0.10
0.00
Grain Size (mm)

Appendix Table B-1. Percent Total Organic Carbon (TOC), silt/clay, gravel, and sand in sediment samples taken for contaminant analysis from Cobbs Creek in December 2009

Station	Percent TOC	Percent Silt/clay	Percent Gravel	Percent Sand
CC-1	4.40	0.76	39.16	60.08
CC-2	0.51	0.21	74.69	25.11
CC-3	3.03	0.48	52.90	46.62
CC-4	2.09	0.41	45.54	54.05
CC-5	11.24	0.35	64.12	35.52
CC-6	1.44	60.16	15.03	24.81

APPENDIX C

LABORATORY ANALYSIS CERTIFICATES

(See attached CD)

Appendix C

Clean Air Assessment

<u>General Conformity Analysis</u>

Table 1. Project Emission Sources and Estimated Power
Table 2. Emission Estimates (NOx)
Table 3. Emission Estimates (HC)
Table 4. Emission Estimates (SO2)
Table 5. Pollutant Emissions from Employee Vehicles

General Conformity Review and Emission Inventory for Woodland Dam
Table 1. Project Emission Sources and Estimated Power

hp-hr = # of engines*hp*LF*hrs of operation

Load Factor (LF) represents the average percentage of rated horsepower used during a source's operational profile

Equipment/Engine Category	# of engines	hp	LF	hrs of operation	hp-hr
Crane, Mech. Dragline/Clmshell, 2.5 CY, 60 Ton, 50' Boom	1	150	0.43	338	21801
Ldr, F/E, Wheeled, 1.25 cy bkt, 4 x 4	1	76	0.59	320	14349
Tractor, Crwler (Dozer), Powershift w/Univ. Blade	1	119	0.59	208	14604
Trk, HWY Conv., 3/4 ton pickup, 4 x 4	1	130	0.59	352	26998
Trk, HWY 8,600GVW 4 x4 suburban	1	285	0.59	343	57675
Trk, HWY 50,000 GVW, 6 x 4, 3 axle	1	310	0.59	325	59443
Water pump, centrifugal, skid mtd, 3:dia., 293 GPM	1	67	0.43	62	1786
Air Compressor, 600 CFM, 150 psi, w/pav. breaker	1	85	0.43	44	1608
Chainsaw, gas, 24" - 32" bar	1	5	0.43	106	228
Hydroseeder, 3,000 gal., truck mounted	1	90	0.43	6	232

Load Factors taken from Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling
Report No. NR-005c, revised April 2004, EPA420-P-04-005. Environmental Protection Agency, Office of Transportation and Air Quality.

Table 2. Emission Estimates (NOx)

Emissions (g) = Power Demand (hp-hr) * Emission Factor (g/hp-hr)
Emissions (tons) = Emissions (g) * (1 ton/907200 g)
NOx Emissions Factor for Off-Road Construction Equipment is 6.9 g/hp-hr*

Equipment/Engine Category	hp-hr	EF (g/hp-hr)	Emissions (tons)
Crane, Mech. Dragline/Clmshell, 2.5 CY, 60 Ton, 50' Boom	21801	6.90	0.17
Ldr, F/E, Wheeled, 1.25 cy bkt, 4 x 4	14349	6.90	0.11
Tractor, Crwler (Dozer), Powershift w/Univ. Blade	14604	6.90	0.11
Trk, HWY Conv., 3/4 ton pickup, 4 x 4	26998	6.90	0.21
Trk, HWY 8,600GVW 4 x4 suburban	57675	6.90	0.44
Trk, HWY 50,000 GVW, 6 x 4, 3 axle	59443	6.90	0.45
Water pump, centrifugal, skid mtd, 3:dia., 293 GPM	1786	6.90	0.01
Air Compressor, 600 CFM, 150 psi, w/pav. breaker	1608	6.90	0.01
Chainsaw, gas, 24" - 32" bar	228	6.90	0.00
Hydroseeder, 3,000 gal., truck mounted	232	6.90	0.00
	Total NOx Project Emissions (tons) =		1.51

*Emission Factor taken from Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-Compression-Ignition
Report No. NR-009c, Revised April 2004, Assessment and Standards Division EPA, Office of Transportation and Air Quality.

Table 3. Emission Estimates (VOC)

Emissions (g) = Power Demand (hp-hr) * Emission Factor (g/hp-hr)
Emissions (tons) = Emissions (g) * (1 ton/907200 g)
VOC Emissions Factor for Off-Road Construction Equipment is 1.0 g/hp-hr

Equipment/Engine Category	hp-hr	EF (g/hp-hr)	Emissions (tons)
Crane, Mech. Dragline/Clmshell, 2.5 CY, 60 Ton, 50' Boom	21801	1.00	0.02
Ldr, F/E, Wheeled, 1.25 cy bkt, 4 x 4	14349	1.00	0.02
Tractor, Crwler (Dozer), Powershift w/Univ. Blade	14604	1.00	0.02
Trk, HWY Conv., 3/4 ton pickup, 4 x 4	26998	1.00	0.03
Trk, HWY 8,600GVW 4 x4 suburban	57675	1.00	0.06
Trk, HWY 50,000 GVW, 6 x 4, 3 axle	59443	1.00	0.07
Water pump, centrifugal, skid mtd, 3:dia., 293 GPM	1786	1.00	0.00
Air Compressor, 600 CFM, 150 psi, w/pav. breaker	1608	1.00	0.00
Chainsaw, gas, 24" - 32" bar	228	1.00	0.00
Hydroseeder, 3,000 gal., truck mounted	232	1.00	0.00
	Total VOC Project Emissions (tons) =		0.22

*Emission Factor taken from Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-Compression-Ignition Report No. NR-009c, Revised April 2004, Assessment and Standards Division EPA, Office of Transportation and Air Quality.

Table 4. Emission Estimates (PM)

Emissions (g) = Power Demand (hp-hr) * Emission Factor (g/hp-hr)
Emissions (tons) = Emissions (g) * (1 ton/907200 g)
PM Emissions Factor for Off-Road Construction Equipment is 0.4 g/hp-hr*

Equipment/Engine Category	hp-hr	EF (g/hp-hr)	Emissions (tons)
Crane, Mech. Dragline/Clmshell, 2.5 CY, 60 Ton, 50' Boom	21801	0.40	0.01
Ldr, F/E, Wheeled, 1.25 cy bkt, 4 x 4	14349	0.40	0.01
Tractor, Crwler (Dozer), Powershift w/Univ. Blade	14604	0.40	0.01
Trk, HWY Conv., 3/4 ton pickup, 4 x 4	26998	0.40	0.01
Trk, HWY 8,600GVW 4 x4 suburban	57675	0.40	0.03
Trk, HWY 50,000 GVW, 6 x 4, 3 axle	59443	0.40	0.03
Water pump, centrifugal, skid mtd, 3:dia., 293 GPM	1786	0.40	0.00
Air Compressor, 600 CFM, 150 psi, w/pav. breaker	1608	0.40	0.00
Chainsaw, gas, 24" - 32" bar	228	0.40	0.00
Hydroseeder, 3,000 gal., truck mounted	232	0.40	0.00
	Total PM Project Emissions (tons) =		0.09

*Emission Factor taken from Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-Compression-Ignition
Report No. NR-009c, Revised April 2004, Assessment and Standards Division EPA, Office of Transportation and Air Quality

Table 5. Pollutant Emissions from Employee Vehicles

Assumptions:

Average trip distance (1 way) is 25 miles.
Average NOx vehicle emission factor is 1.4 g/mile.
Average VOC vehicle emission factor is 2.8 g/mile.
Work crew comprised of 10 people
Every member of the work crew drives their own vehicle.
Project construction period is 5 months.
Project construction occurs 5 days per week.
There are 2 holidays in the work period.
There are 4 weather days (no work).

Actual days = 150 days - 40 weekend days off - 2 holidays off - 4 weather days off

Actual work days = 104 days

NOx Calculation: 10 workers * 2 trips/work day * 104 work days * 25 miles/trip * 1.4 g of NOx/mile* (1 ton/907200 g)

Total NOx resulting from employee vehicles = 0.08 tons.

VOC Calculation: 10 workers * 2 trips/work day * 104 work days * 25 miles/trip * 2.8 g of VOC/mile* (1 ton/907200 g)

Total VOC resulting from employee vehicles = 0.16 tons.

Pollutant emissions associated with employee vehicles derived from:
Emission Facts: Average Annual Emissions and Fuel Consumption for Passenger Cars and Light Trucks, EPA420-F-00-013, April 2000.

Total (construction and employess) NOx Project Emissions (tons) = 1.59

Total (construction and employees) VOC Project Emissions (tons) = 0.38

Total PM Project Emissions (tons) = 0.09

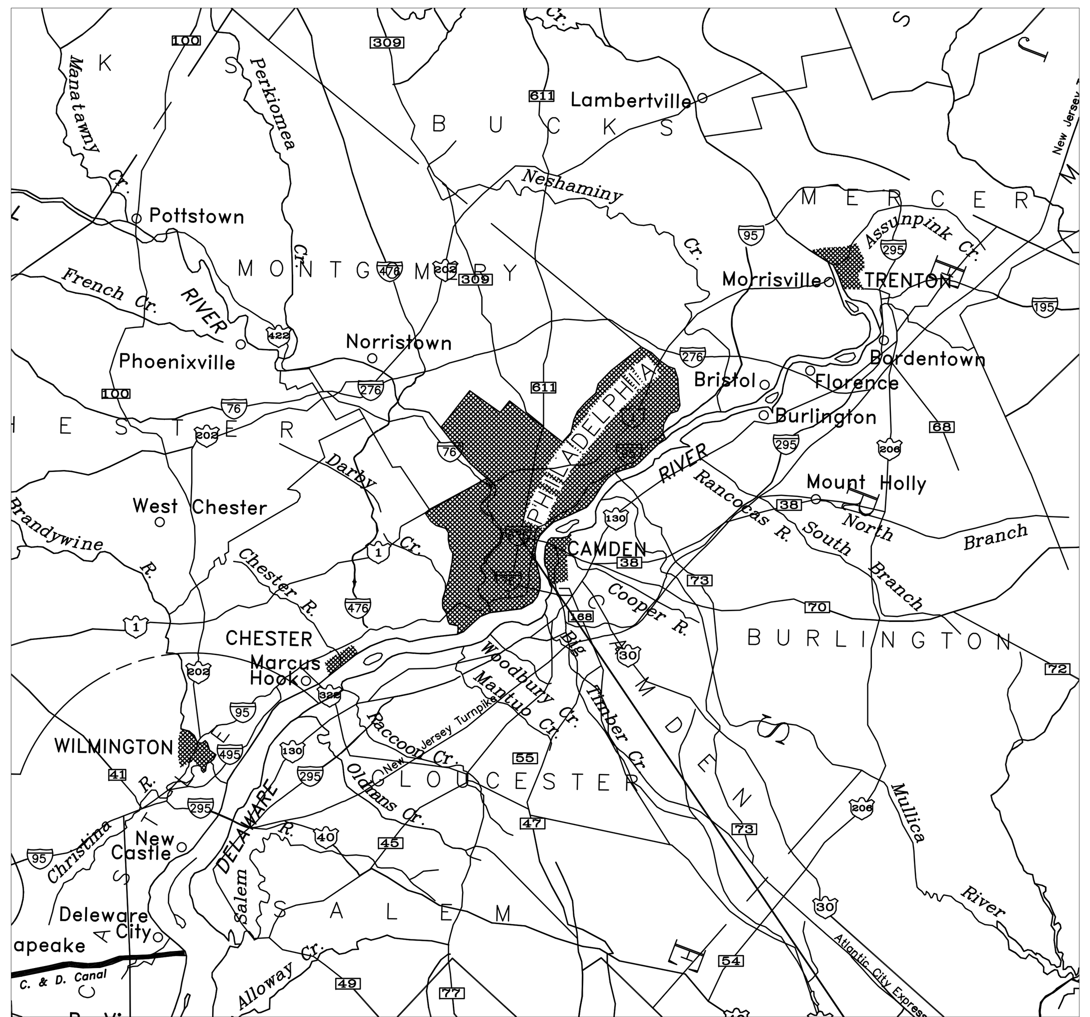
Appendix D

Project Designs

COBBS CREEK FISH PASSAGE - WOODLAND DAM REMOVAL

PHILADELPHIA COUNTY, PENNSYLVANIA

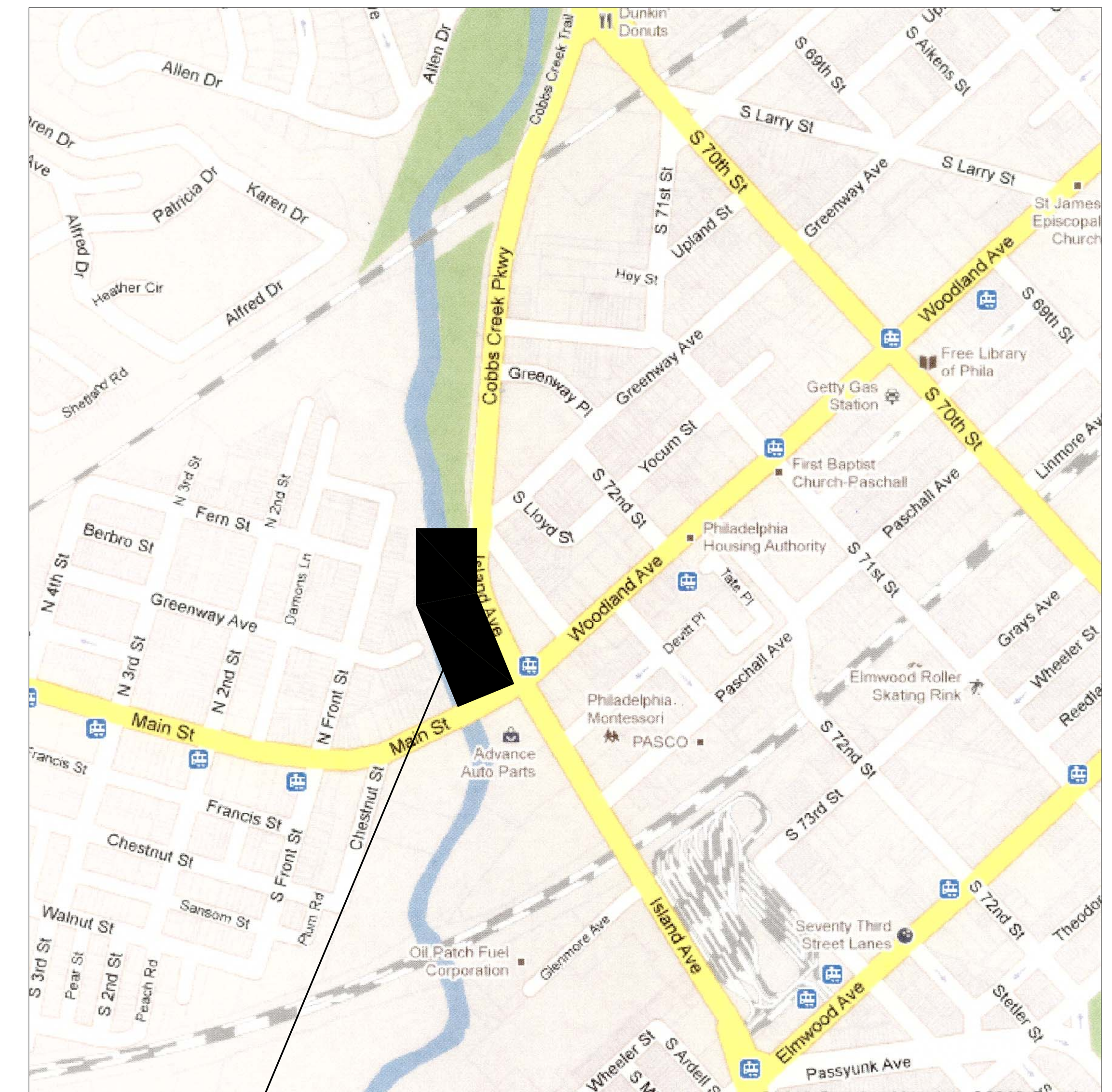
IFB W912BU-16-B-00XX



VICINITY MAP

SCALE IN MILES

LOCATION OF PROJECT



LOCATION OF WORK

LOCATION MAP

SCALE IN MILES

DRAWING INDEX	
SHEET NUMBER	DESCRIPTION
CS-100	COVER SHEET
C-001	GENERAL INFORMATION SHEET
C-101	GENERAL PLAN
C-102	PLAN – EXISTING CONDITIONS
C-103	PLAN – EXISTING CONDITIONS
C-104	PLAN – DEMOLITION STA. 0+00 TO STA. 5+59
C-105	PLAN – DEMOLITION STA. 5+59 TO STA. 11+72
C-106	PLAN – STA. 0+00 TO STA. 5+59
C-107	PLAN – STA. 5+59 TO STA. 11+72
C-201	PROFILE – MAIN CHANNEL AND LOW FLOW CHANNEL
C-301	TYPICAL SECTIONS
C-302	CROSS SECTIONS – STA. 0+00 TO STA. 4+50
C-303	CROSS SECTIONS – STA. 5+00 TO STA. 9+50
C-304	CROSS SECTIONS – STA. 10+00 TO STA. 11+00
CE-001	EROSION AND SEDIMENT CONTROL NOTES
CE-101	EROSION AND SEDIMENT CONTROL PLAN
CE-102	EROSION AND SEDIMENT CONTROL PLAN
CE-501	DETAILS – EROSION AND SEDIMENT CONTROL
CE-502	DETAILS – EROSION AND SEDIMENT CONTROL
CE-503	DETAILS – EROSION AND SEDIMENT CONTROL
CE-504	DETAILS – EROSION AND SEDIMENT CONTROL
L-101	LANDSCAPE PLAN – STA. 0+00 TO STA. 5+59
L-102	LANDSCAPE PLAN – STA. 5+59 TO STA. 11+72
L-501	DETAILS – TREE AND SHRUB PLANTINGS

THIS PROJECT WAS DESIGNED BY THE PHILADELPHIA DISTRICT OF THE U.S. ARMY CORPS OF ENGINEERS. THE INITIALS OR SIGNATURES AND REGISTRATION DESIGNATIONS OF INDIVIDUALS APPEAR ON THESE PROJECT DOCUMENTS WITHIN THE SCOPE OF THEIR EMPLOYMENT AS REQUIRED BY ER 1110-1-8152.

SUBMITTED:

JOSE R. ALVAREZ, P.E.
CHIEF, ENGINEERING BRANCH

APPROVED:

PETER M. TRANCHIK, P.E.
CHIEF, ENGINEERING AND CONSTRUCTION DIVISION

US Army Corps of Engineers Philadelphia District

U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390

PHILADELPHIA COUNTY, PENNSYLVANIA

COBBS CREEK FISH PASSAGE - WOODLAND DAM REMOVAL

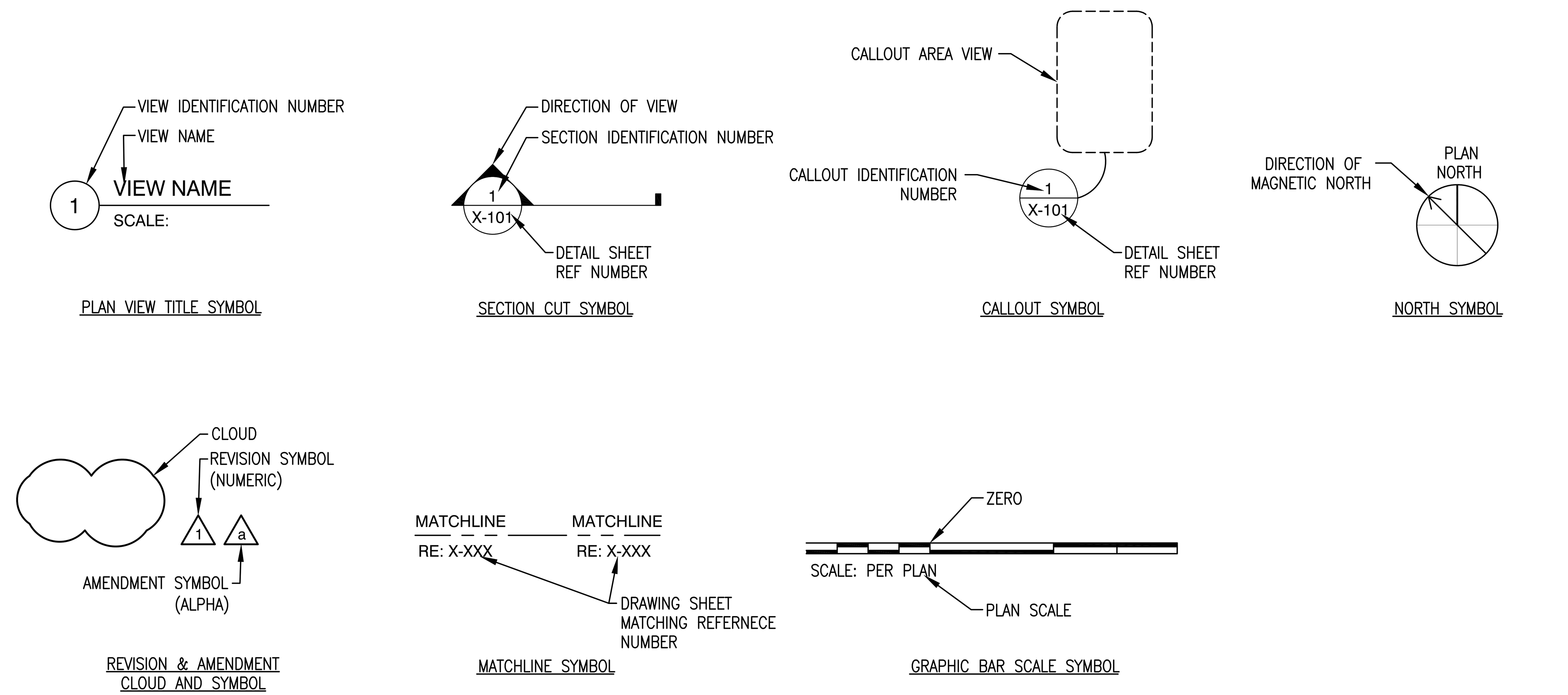
COVER SHEET

SHEET NUMBER

CS-100

SYMBOLS, ABBREVIATIONS AND GENERAL NOTES

DRAWING SHEET SYMBOLS



ABBREVIATIONS

ABBRV	DESCRIPTION	ABBRV	DESCRIPTION	ABBRV	DESCRIPTION
AD	AREA DRAIN	FF	FINISHED FLOOR	PSI	POUNDS PER SQUARE INCH
ADDL	ADDITIONAL	FIN	FINISH	PVI	POST INDICATOR VALVE
AFF	ABOVE FINISHED FLOOR	FL	FLOOR	RAD	RADIUS
BD	BOARD	FM	FORCE MAIN	REINF	REINFORCEMENT
BIT	BITUMINOUS	FT	FOOT, FEET	REM	REMOVABLE
BL	BASE LINE	FTG	FOOTING	ROW	RIGHT OF WAY
BLDG	BUILDING	G	GROUND	S	SOUTH
BM	BEAM	GOVT	GOVERNMENT	SCH	SCHEDULE
BMP	BEST MANAGEMENT PRACTICE	GR	GRADE	SECT	SECTION
BOT	BOTTOM	HORIZ	HORIZONTAL	SPEC	SPECIFICATION
BVCE	BEGINNING OF VERTICAL CURVE ELEVATION	HS	HIGH STRENGTH	SPRT	SUPPORT
BVCS	BEGINNING OF VERTICAL CURVE STATION	HT	HEIGHT	SQ	SQUARE
CMU	CONCRETE MASONRY UNIT	HVY	HEAVY	SST	STAINLESS STEEL
CO	CLEAN OUT	IN	INCH	STA	STATION
COL	COLUMN	INSUL	INSULATION, INSULATED	STD	STANDARD
CONC	CONCRETE	IINT	INTERIOR	STRUCT	STRUCTURAL
CONSTR	CONSTRUCTION	INV	INVERT	SUSP	SUSPENDED
CONT	CONTINUOUS	LL	LIVE LOAD	SYS	SYSTEM
CTRL	CONTROL	LP	LOW POINT	TEMP	TEMPORARY
CWL	CONTRACTOR WORK LIMITS	LT	LIGHT	TD	TRENCH DRAIN
DET	DETAIL	LVC	LENGTH OF VERTICAL CURVE	TDO	TRENCH DRAIN OUTLET PIPE
DGA	DENSE GRADED AGGREGATE	JCT	JUNCTION	TELE	TELEPHONE
DIA	DIAMETER	MATL	MATERIAL	TOPO	TOPOGRAPHY
DIM	DIMENSION	MAX	MAXIMUM	TYP	TYPICAL
DL	DEAD LOAD	MIN	MINIMUM	UD	UNDERDRAIN
DWG	DRAWING	MISC	MISCELLANEOUS	UDO	UNDERDRAIN OUTLET PIPE
E	EAST	N	NORTH	UE	UNDERGROUND ELECTRIC
EA	EACH	NLT	NOT LESS THAN	UGND	UNDERGROUND
ECM	EROSION CONTROL MAT	NTS	NOT TO SCALE	UNO	UNLESS NOTED OTHERWISE
EJ	EXPANSION JOINT	OC	ORIGINAL CONSTRUCTION	UOP	UNDERDRAIN OUTLET PIPE
EL	ELEVATION	OD	OUTSIDE DIAMETER	UXO	UNEXPLODED ORDINANCE
ELEC	ELECTRIC	OH	OVERHEAD	VB	VINYL BASE
EOP	EDGE OF PAVEMENT	OPG	OPENING	VC	VERTICAL CURVE
EOS	EDGE OF SHOULDER	OPP	OPPOSITE	VCT	VINYL COMPOSITION TILE
EQ	EQUAL	PC	POINT OF CURVE	VOL	VOLUME
EQUIP	EQUIPMENT	PD	PAVEMENT DRAIN	VERT	VERTICAL
EXH	EXHAUST	PI	POINT OF INFLECTION	VTR	VENT THROUGH ROOF
EXIST	EXISTING	PI	POINT OF INFLECTION	W/	WITH
EXP	EXPANSION, EXPOSED	PIV	POINT OF VERTICAL INFLECTION	W	WEST
EXP JT	EXPANSION JOINT	POT	POINT OF TANGENT	WL	WATER LEVEL
EXT	EXTERIOR	PMP	PROBABLE MAXIMUM PRECIPITATION	WS	WATER SURFACE
FIG	FIGURE SINGLE	PNL	PANEL	W/O	WITHOUT
FDTN	FOUNDATION	PSF	POUNDS PER SQUARE FOOT		

GENERAL NOTES:

1. ELEVATIONS ARE EXPRESSED IN FEET AND TENTHS OF A FOOT AND REFER TO THE NORTH AMERICAN VERTICAL DATUM (NAVD) 1988.
2. HORIZONTAL CONTROL IS REFERENCED TO PENNSYLVANIA STATE PLANE COORDINATE SYSTEM (NAD 1983).
3. THE EXISTING SITE CONDITIONS ARE A RESULT OF FIELD SURVEYS PERFORMED BY HAKS ENGINEERS, ARCHITECTS AND LAND SURVEYORS, P.C. FROM APRIL 2011 TO JUNE 2011.
4. LOCATION OF EXISTING UTILITY LINES IS APPROXIMATE AND IS BASED ON THE MOST CURRENT INFORMATION AVAILABLE. THE CONTRACTOR WILL BE REQUIRED TO PERFORM PA-ONE-CALL PRIOR TO BEGINNING CONSTRUCTION.
5. ALL CROSS SECTIONS ARE REFERENCED LOOKING AHEAD STATION ALONG THE SURVEY AND CONSTRUCTION BASELINE.
6. ALL STATION/OFFSETS REFERENCED ARE PERPENDICULAR TO THE SURVEY AND CONSTRUCTION BASELINE.
7. THE ELEVATIONS AND GEOMETRY OF THE EXISTING STREAM BED MAY VARY BASED ON RAINFALL AND STREAM FLOW CONDITIONS.
8. THE CONTRACTOR WORK LIMIT AND LIMIT OF DISTURBANCE LINES SHALL BE AS SHOWN ON SHEETS C-104 TO C-105.
9. THE CONTRACTOR SHALL STAGE AND ACCESS THE SITE FROM THE LOCATIONS SHOWN ON SHEETS C-104 AND C-105.

CIVIL AND SITEWORK LEGEND

CONTRACTOR WORK LIMIT
LIMIT OF DISTURBANCE — LOD —

PLAN SYMBOLS LEGEND

- COMMUNICATION MANHOLE (C)
- DIAMETER Ø
- ELECTRIC MANHOLE (E)
- STORM MANHOLE (D)
- POST INDICATOR VALVE
- WATER VALVE
- LAMP POST
- BOLLARD
- POWER POLE
- EXISTING SPOT ELEVATION ×1237
- NEW SPOT ELEVATION ×1249
- NEW TOPSOIL, SEED, AND MULCH
- NEW SLOPE LINE
- GAS VALVE
- GAS METER (G)
- GAS MARKER
- VERT. CONTROL (BM)
- SURVEY MONUMENT
- CONTROL POINT
- DEMOLITION AREAS
- TREE TO BE REMOVED
- TREE PROTECTION FENCE
- LOW FLOW CHANNEL WEIRS
- 12" THICK RIVER COBBLE
- AREA OF DAM TO REMAIN
- TOPSOIL, ECM AND SEED
- RESIDENT PARKING AREA
- RIPRAP LOCATION

PROFILE LEGEND

- EXISTING GROUND ELEVATION
- PROFILE PIPE ELEVATION
- 25.2 / 28.83
- 13+00 ALIGNMENT STATION
- EXISTING GROUND
- FINISH GRADE
- −0.50% PROFILE GRADE

EROSION AND SEDIMENT CONTROL SYMBOLS LEGEND

- SUPER SILT FENCE — SSF —
- STANDARD SILT FENCE — SF —
- FILTER BAG INLET PROTECTION
- ROCK FILTER (RF)
- STABILIZED CONSTRUCTION ENTRANCE
- STONE FILTER BERM
- CONTRACTOR STAGING AREA
- CONTRACTOR STOCKPILE AREA
- PROPOSED TEMPORARY CONSTRUCTION ACCESS
- SOIL TYPE BOUNDARY

Ch	CHEWACLA SILT LOAM
GeB2	GLENELG CHANNERY SILT LOAM, 3 TO 8 PERCENT SLOPES, MODERATLEY ERODED
GeC3	GLENELG CHANNERY SILT LOAM, 8 TO 15 PERCENT SLOPES, SEVERELY ERODED
Ma	MADE LAND, GRAVELLY MATERIALS
Mc	MADE LAND, SILT AND CLAY MATERIALS
Me	MADE LAND, SCHIST AND GNEISS MATERIALS
MhE	MANOR LOAM AND CHANNERY LOAM, 25 TO 35 PERCENT SLOPES
MkF	MANOR SOILS, 35 TO 60 PERCENT SLOPES
Ro	ROWLAND SILT LOAM
Ub	URBAN LAND
Uh	URBAN LAND - HOWELL COMPLEX
W	WATER
We	WEHADKEE SILT LOAM

LANDSCAPE AND PLANTING SYMBOLS LEGEND

- RIPARIAN PLANTING ZONE
- FORREST PLANTING ZONE

EXISTING SITE FEATURES

MINOR CONTOUR	22
MAJOR CONTOUR	25
CHAIN-LINK FENCE	
WOOD FENCE	
ELECTRIC LINE	P
GAS LINE	GAS
OVERHEAD WIRE	OH
TELEPHONE LINE	T
WOODS LINE	
CONCRETE FOOTWAY	
BRICK FOOTWAY	Br. Ftw.
SLATE FOOTWAY	Sl.Ftw.
GRANITE FOOTWAY	Gr.Ftw.
BRICK GUTTER	Br.Gut.
CONCRETE DRIVEWAY	C.Dr.
HANDICAP RAMP	H/R
CONCRETE CURB	
DEPRESSED CURB	Dep. Curb
GRANITE CURB	Gr.Curb
BLUE STONE CURB	Bl.St.Curb
STONE WALL	St. Wall
BRICK WALL	Br.Wall
CABLE TV BOX	CATV
DOWNSPOUT	DS
FIRE ALARM BOX	FA
FIRE HYDRANT	FH
GAS VALVE	GV
GAS BOX	G
GUIDE RAIL POST	
IRON POST	IP
LAMP POST	LP
MAIL BOX	MB
P.E.POLE W/LIGHT	
PARKING METER	PM
SEPTA POLE	SP
SEWER RETURN LOC. (TO CENTER OF EXIST. SEWER)	S.R.L
SEWER RETURN ELEV.	S.R.E.
SIGN	
SPOT ELEVATION	×85.3
STAND PIPE	StP
TRAFFIC LIGHT	TL
TRAFFIC SIGNS- ALL	TS
TREE STUMP	#"Stump
UNKNOWN CURB BOX	?
UTILITY POLE	
VENT BOX	V
WATER BOX	W
WHEEL STOP	
DECIDUOUS TREE	# denotes trunk size
CONIFEROUS TREE	
GAS MANHOLE	
UNKNOWN MANHOLE	
STORM MANHOLE	
SANITARY MANHOLE	
TELEPHONE MANHOLE	
WATER MANHOLE	
STEPS	
CELLAR DOORS	
PORCH	
EXIST CITY INLET	CI
# TO DENOTE SIZE	#2
EXIST.GRATE INLET	
WINDOW GRATE	
REBAR W/ CAP	
STAKE	northing easting elevation
X-CUT	×
TOP OF WALL	TW
TOP OF DAM	TD
BOTTOM OF DAM	BD

US Army Corps of Engineers
Philadelphia District

MARK	ACTION	DATE	BY
-	-	-	-

DESCRIPTION

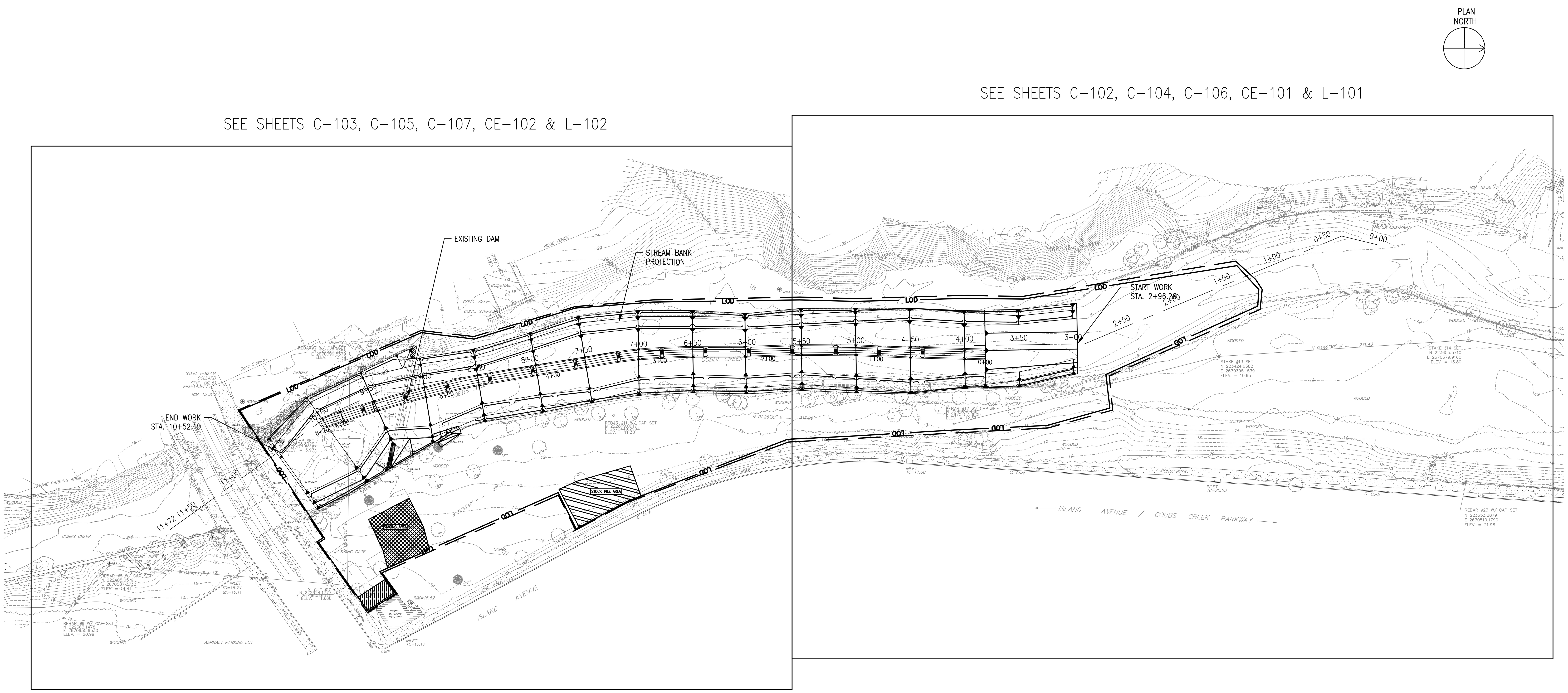
U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390
www.nap.usace.army.mil

DWN BY: DTB	DESIGNED BY: DTB	ISSUE/RELEASE DATE: 19 JAN 2016
CKD BY: DAN	REVIEWED BY: TEH	PROJ. NUMBER: -
		SOLICITATION NUMBER: IFB W912BU-16-B-00XX
DWG SCALE: NTS		CONTRACT NUMBER: ----
DWG. SIZE: 30"x42" Arch E1	FILE NAME: C-001 GENERAL INFORMATION SHEET.dwg	

PHILADELPHIA COUNTY, PENNSYLVANIA

COBBS CREEK FISH PASSAGE - WOODLAND DAM REMOVAL
GENERAL INFORMATION SHEET
-

SHEET NUMBER
C-001



1 GENERAL PLAN
SCALE: AS SHOWN

40 0 40 80
SCALE IN FEET

US Army Corps of Engineers
Philadelphia District

MARK	ACTION	DATE	BY	DESCRIPTION
-	-	-	-	
-	-	-	-	
-	-	-	-	
-	-	-	-	
-	-	-	-	
-	-	-	-	
-	-	-	-	

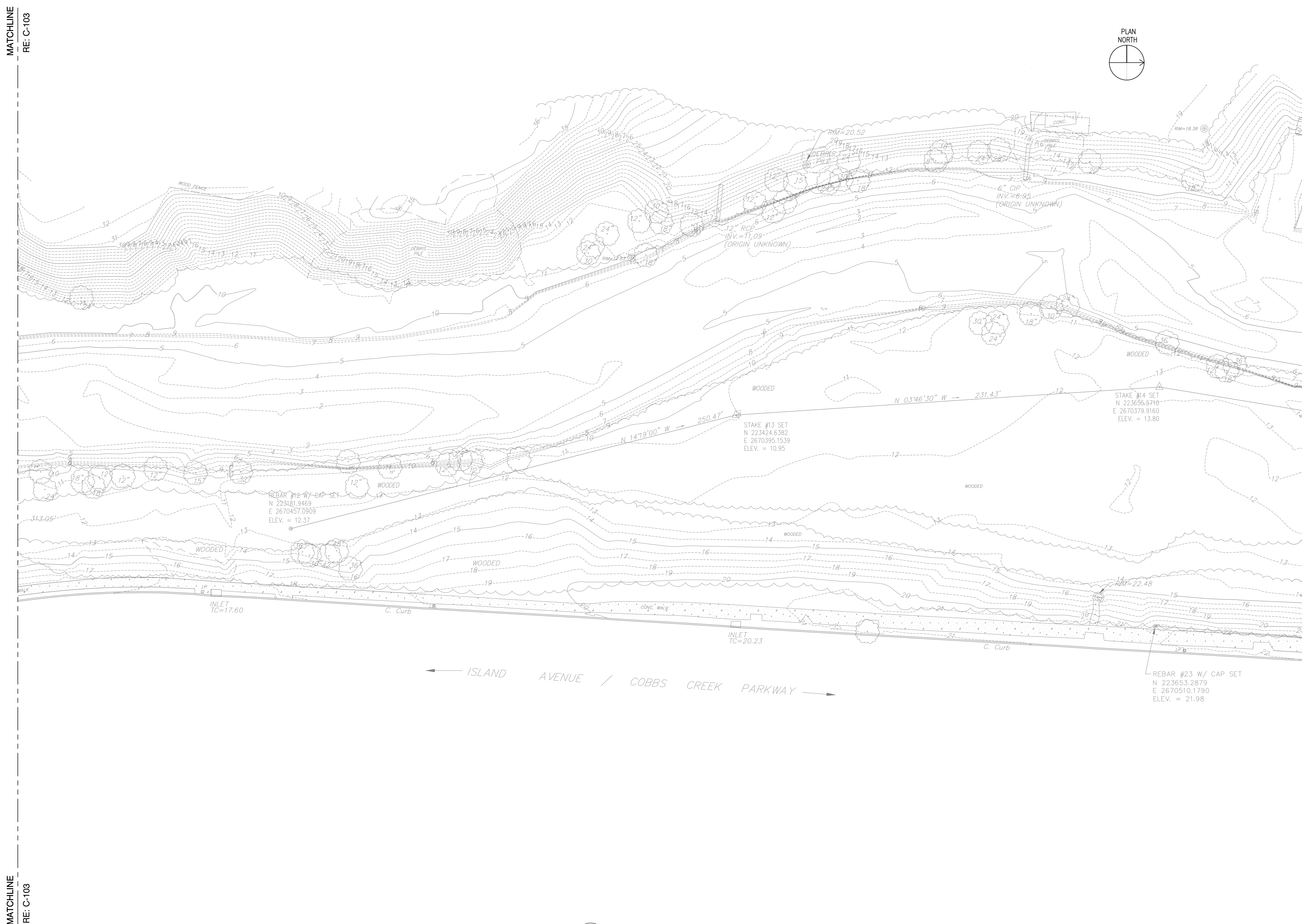
DWN BY: PGS/DAN	DESIGNED BY: DTB	ISSUE/RELEASE DATE: 19 JAN 2016
CKD BY: DAN	REVIEWED BY: TEH	PROJ. NUMBER: -
		SOLICITATION NUMBER: IFB W912BU-16-B-00XX
DWG SCALE: AS SHOWN		CONTRACT NUMBER: ----
DWG. SIZE: 30"x42" Arch E1	FILE NAME: C-101 GENERAL PLAN.dwg	

U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390
www.nap.usace.army.mil

PHILADELPHIA COUNTY, PENNSYLVANIA

COBBS CREEK FISH PASSAGE - WOODLAND DAM REMOVAL
GENERAL PLAN
-

SHEET NUMBER
C-101



1 PLAN - EXISTING CONDITONS
SCALE: AS SHOWN

20 0 20 40
SCALE IN FEET

US Army Corps of Engineers
Philadelphia District

MARK	ACTION	DESCRIPTION	DATE	BY

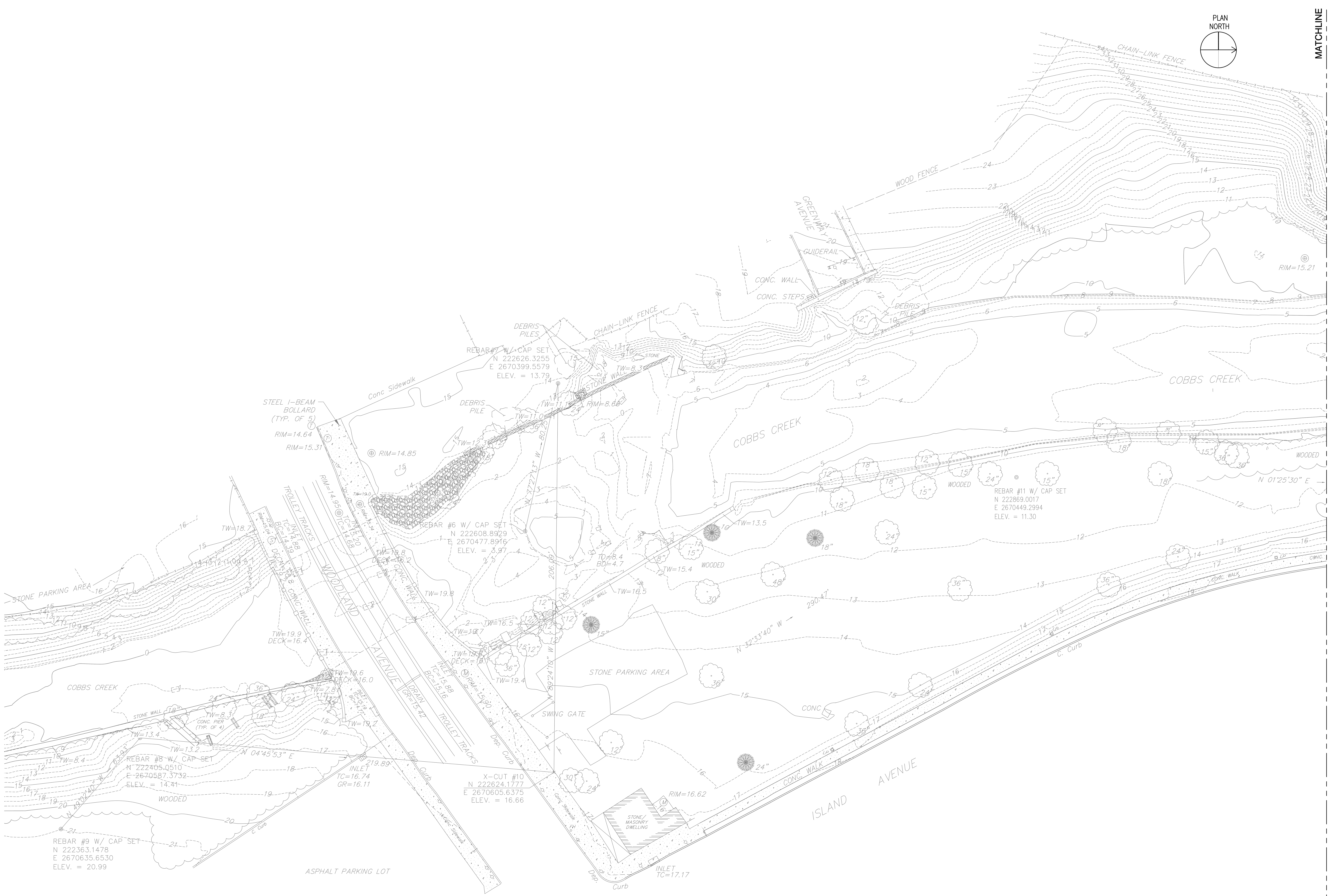
U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390
www.nap.usace.army.mil

DWN BY: DTB	DESIGNED BY: DTB	ISSUE/RELEASE DATE: 19 JAN 2016
CKD BY: DAN	REVIEWED BY: TEH	PROJ. NUMBER: -
		SOLICITATION NUMBER: IFB W912BU-16-B-00XX
DWG SCALE: AS SHOWN		CONTRACT NUMBER: ----
DWG. SIZE: 30"x42" Arch E1	FILE NAME: C-102 PLAN - EXISTING CONDITIONS.dwg	

PHILADELPHIA COUNTY, PENNSYLVANIA

COBBS CREEK FISH
PASSAGE - WOODLAND DAM REMOVAL
PLAN - EXISTING CONDITIONS
-

SHEET NUMBER
C-102



1 PLAN - EXISTING CONDITIONS
SCALE: AS SHOWN

20 0 20 40
SCALE IN FEET

US Army Corps of Engineers
Philadelphia District

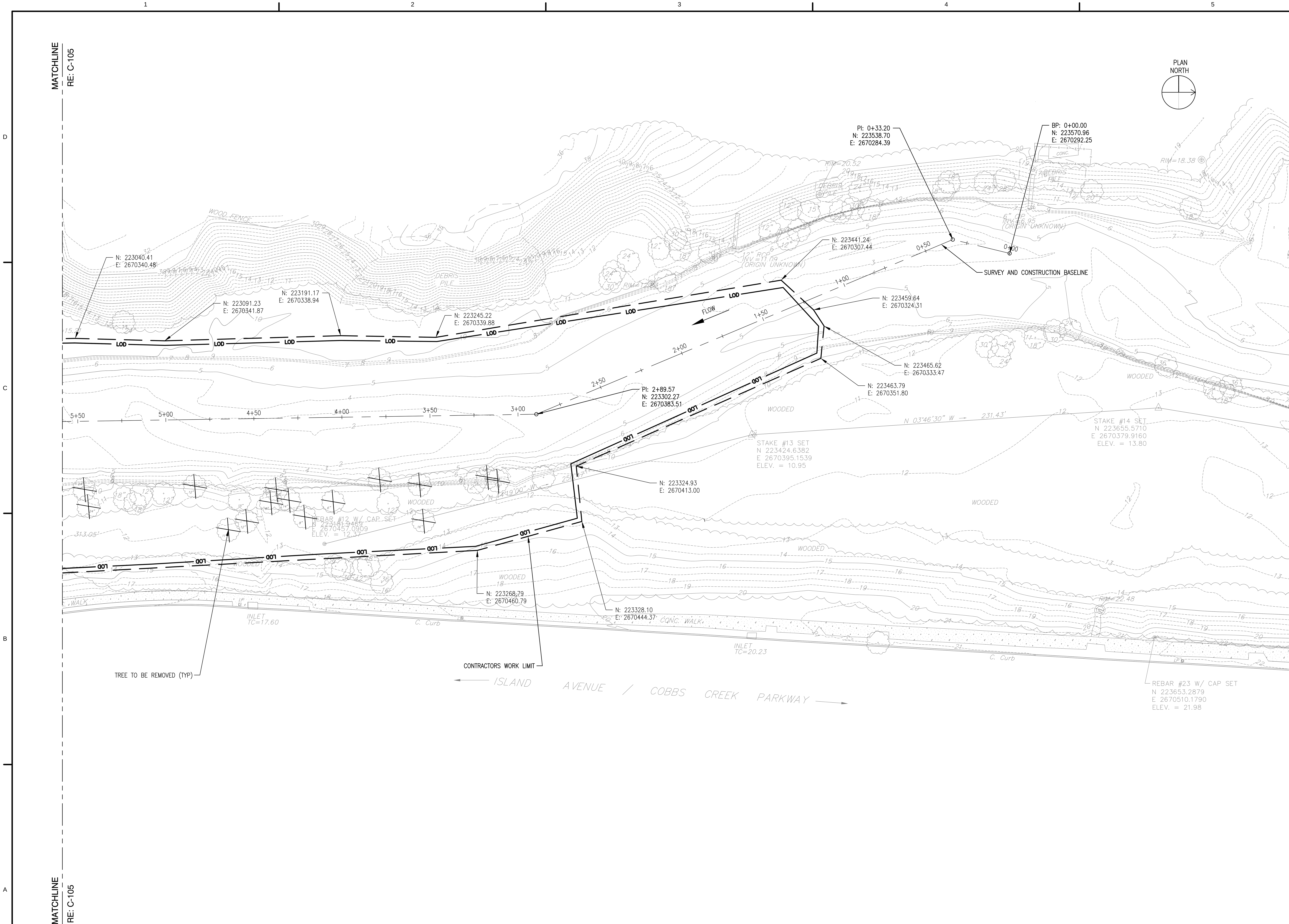
MARK	ACTION	DESCRIPTION	DATE	BY

DESIGNED BY: DTB | ISSUE/RELEASE DATE: 15 JAN 2016
DWN BY: DTB | REVIEWED BY: TEH | PROJ. NUMBER:
CKD BY: DAN | SOLICITATION NUMBER: W912BU-16-B-00XX
DWG. SCALE: AS SHOWN | CONTRACT NUMBER:
DWG. SIZE: 36"x42" Arch E | FILE NAME: C103 PLAN - EXISTING CONDITIONS.dwg

U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390
www.nap.usace.army.mil

PHILADELPHIA COUNTY, PENNSYLVANIA
COBBS CREEK FISH PASSAGE - WOODLAND DAM REMOVAL
PLAN - EXISTING CONDITIONS

SHEET NUMBER
C-103



1 PLAN - DEMOLITION STA. 0+00 TO STA. 5+59
SCALE: AS SHOWN

20 0 20 40
SCALE IN FEET

US Army Corps of Engineers
Philadelphia District

MARK	ACTION	DATE	BY	DESCRIPTION
-	-	-	-	-

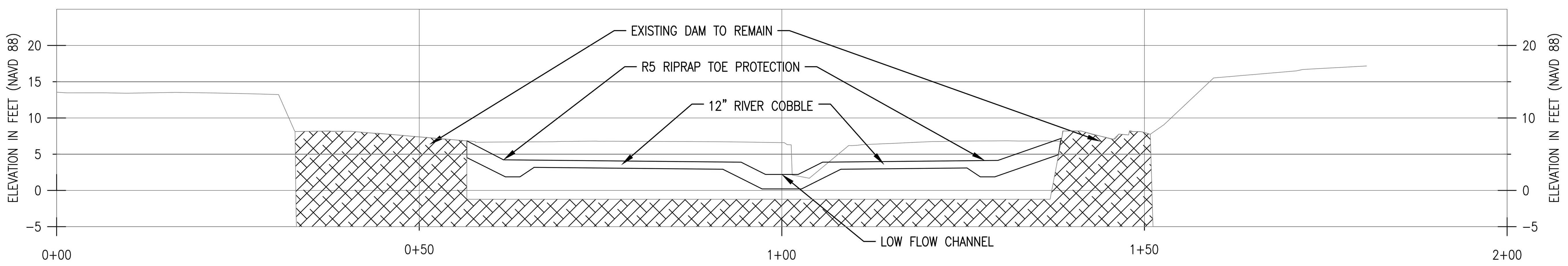
U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390
www.nap.usace.army.mil

DWN BY: DTB	DESIGNED BY: DTB	ISSUE/RELEASE DATE: 19 JAN 2016
CKD BY: DAN	REVIEWED BY: TEH	PROJ. NUMBER: -
		SOLICITATION NUMBER: IFB W912BU-16-B-00XX
DWG SCALE: AS SHOWN		CONTRACT NUMBER: ----
DWG. SIZE: 30"x42" Arch E1	FILE NAME: C-104 PLAN - DEMOLITION STA. 0+00 TO STA. 5+59.dwg	

PHILADELPHIA COUNTY, PENNSYLVANIA

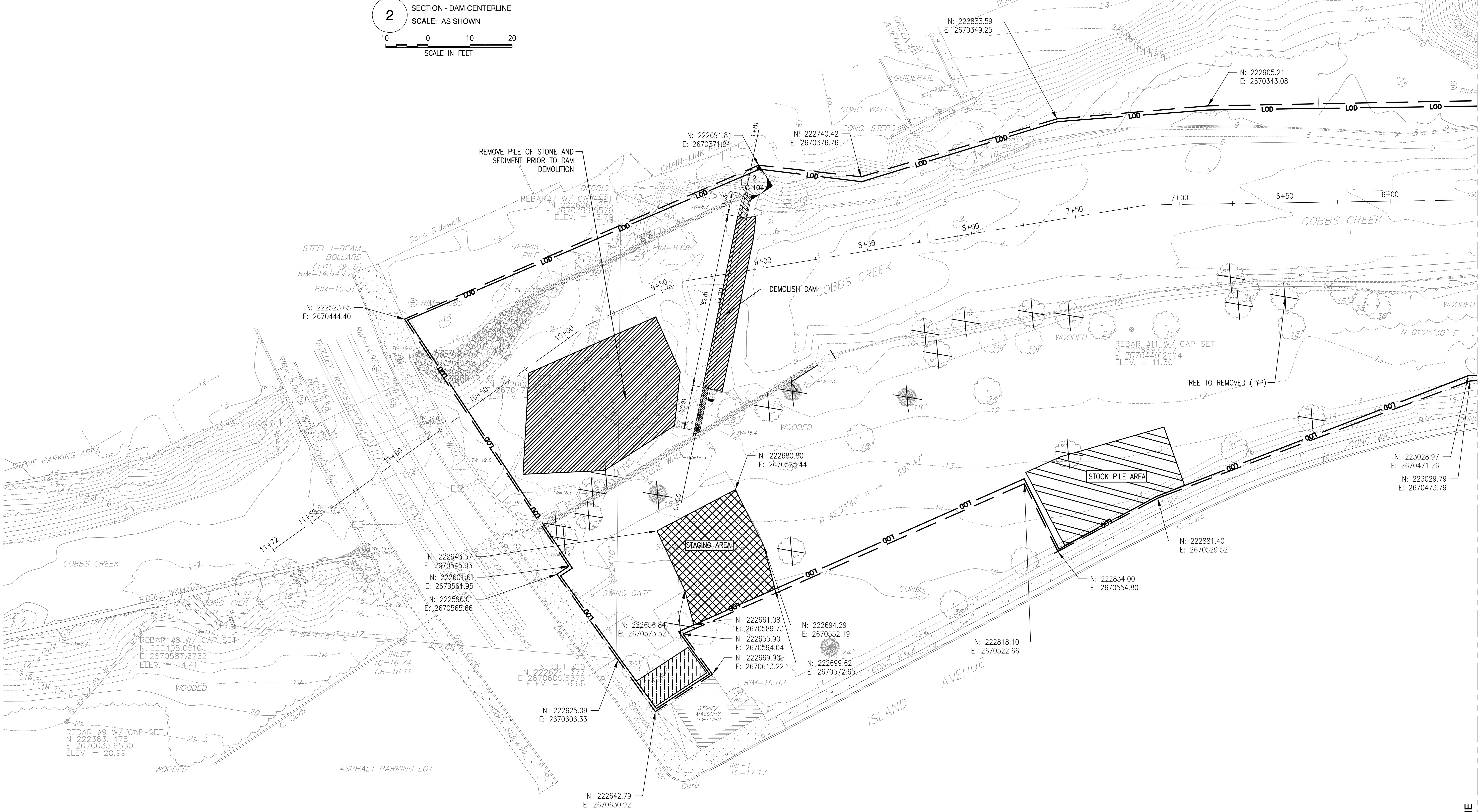
COBBS CREEK FISH
PASSAGE - WOODLAND DAM REMOVAL
PLAN - DEMOLITION STA. 0+00 TO STA. 5+59
-

SHEET NUMBER
C-104



2 SECTION - DAM CENTERLINE
SCALE: AS SHOWN

10 0 10 20
SCALE IN FEET



1 PLAN - DEMOLITION STA. 5+59 TO STA. 11+72
SCALE: AS SHOWN

20 0 20 40
SCALE IN FEET

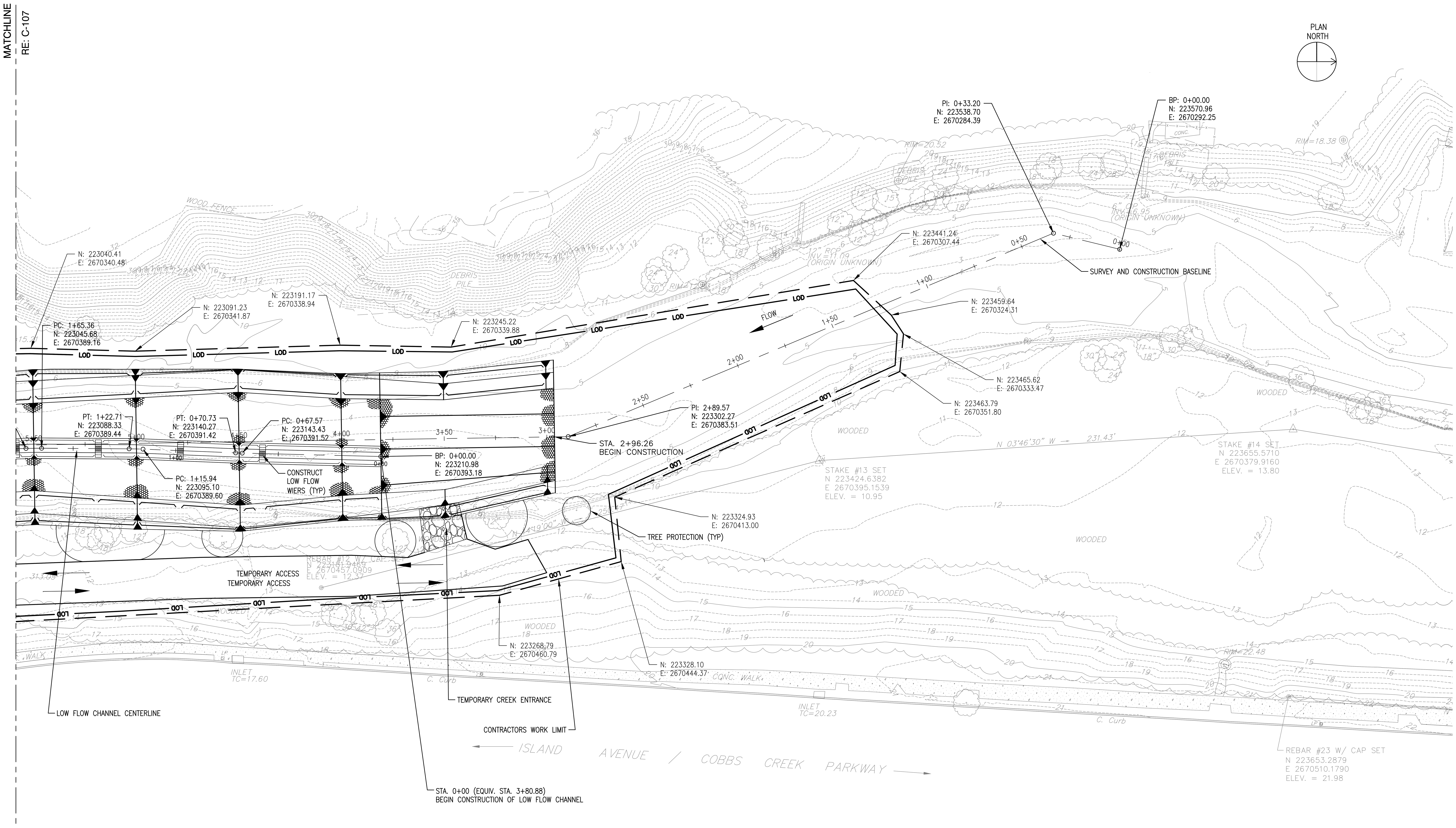
US Army Corps of Engineers
Philadelphia District

U.S. ARMY CORPS OF ENGINEERS PHILADELPHIA DISTRICT PHILADELPHIA, PA 19107-3390 www.nap.usace.army.mil	DWN BY: DTB	DESIGNED BY: DTB	ISSUE/RELEASE DATE: 19 JAN 2016
	CKD BY: DAN	REVIEWED BY: TEH	PROJ. NUMBER: -
			SOLICITATION NUMBER: IFB W912BU-16-B-00XX
	DWG SCALE: AS SHOWN		CONTRACT NUMBER: ----
	DWG. SIZE: 30"x42" Arch E1	FILE NAME: C-105 PLAN - DEMOLITION STA. 5+59 TO STA. 11+72.dwg	

PHILADELPHIA COUNTY, PENNSYLVANIA

COBBS CREEK FISH PASSAGE - WOODLAND DAM REMOVAL
PLAN - DEMOLITION STA. 5+59 TO STA. 11+72
-

SHEET NUMBER
C-105



1 PLAN - STA. 0+00 TO STA. 5+59

SCALE: AS SHOWN

20 0 20 40
SCALE IN FEET

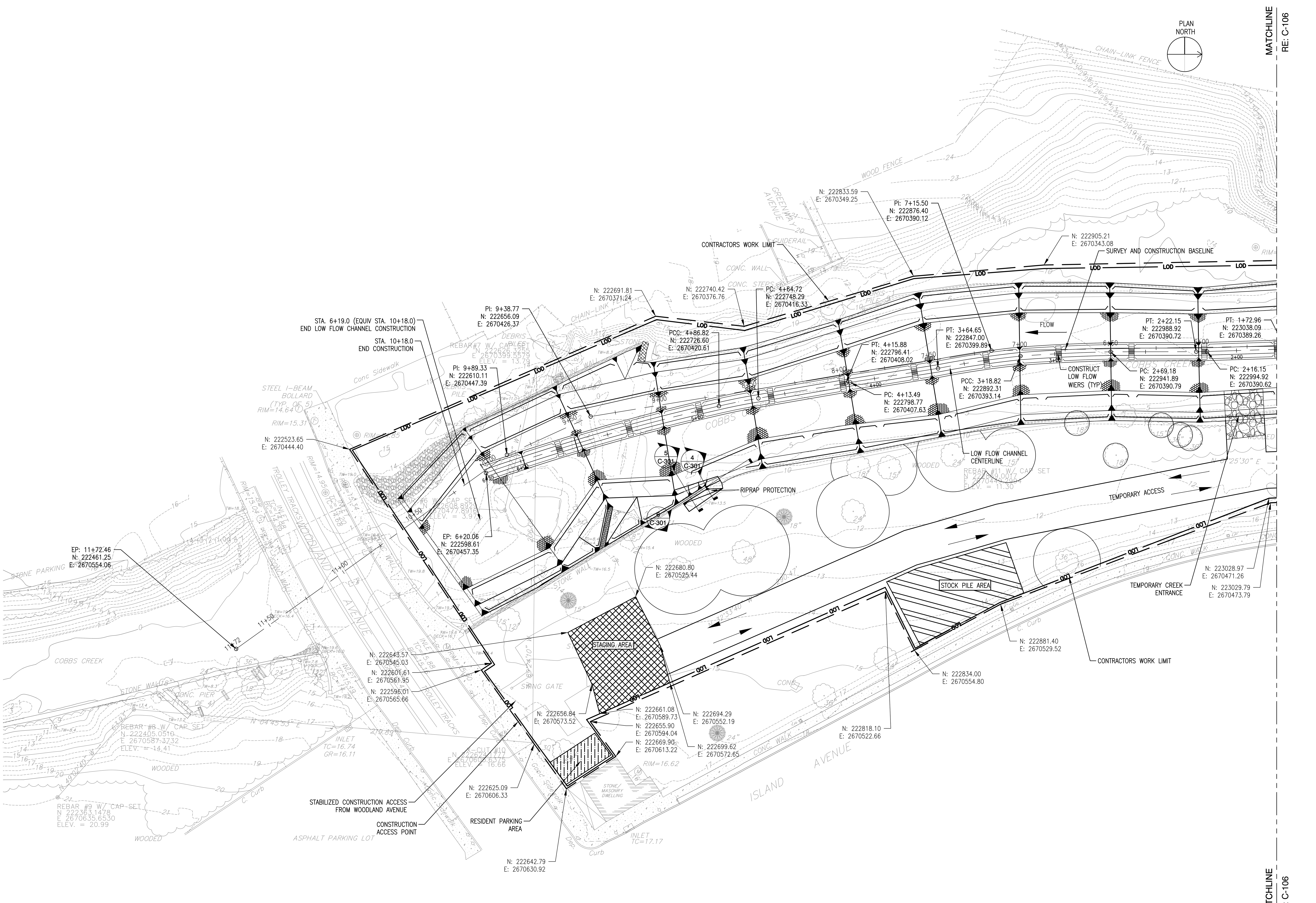
US Army Corps of Engineers
Philadelphia District

U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390
www.nap.usace.army.mil

PHILADELPHIA COUNTY, PENNSYLVANIA

COBBS CREEK FISH
PASSAGE - WOODLAND DAM REMOVAL
PLAN - STA. 0+00 TO STA. 5+59

SHEET NUMBER
C-106



1 PLAN - STA. 5+59 TO STA. 11+72
SCALE: AS SHOWN

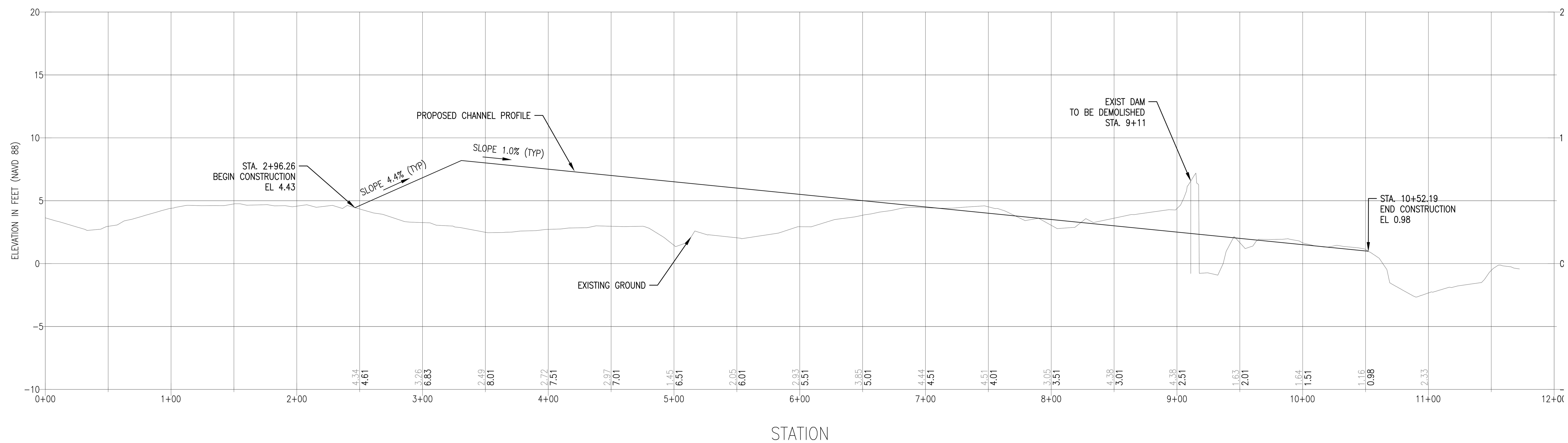
20 0 20 40
SCALE IN FEET

US Army Corps of Engineers
Philadelphia District

U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390
www.nap.usace.army.mil

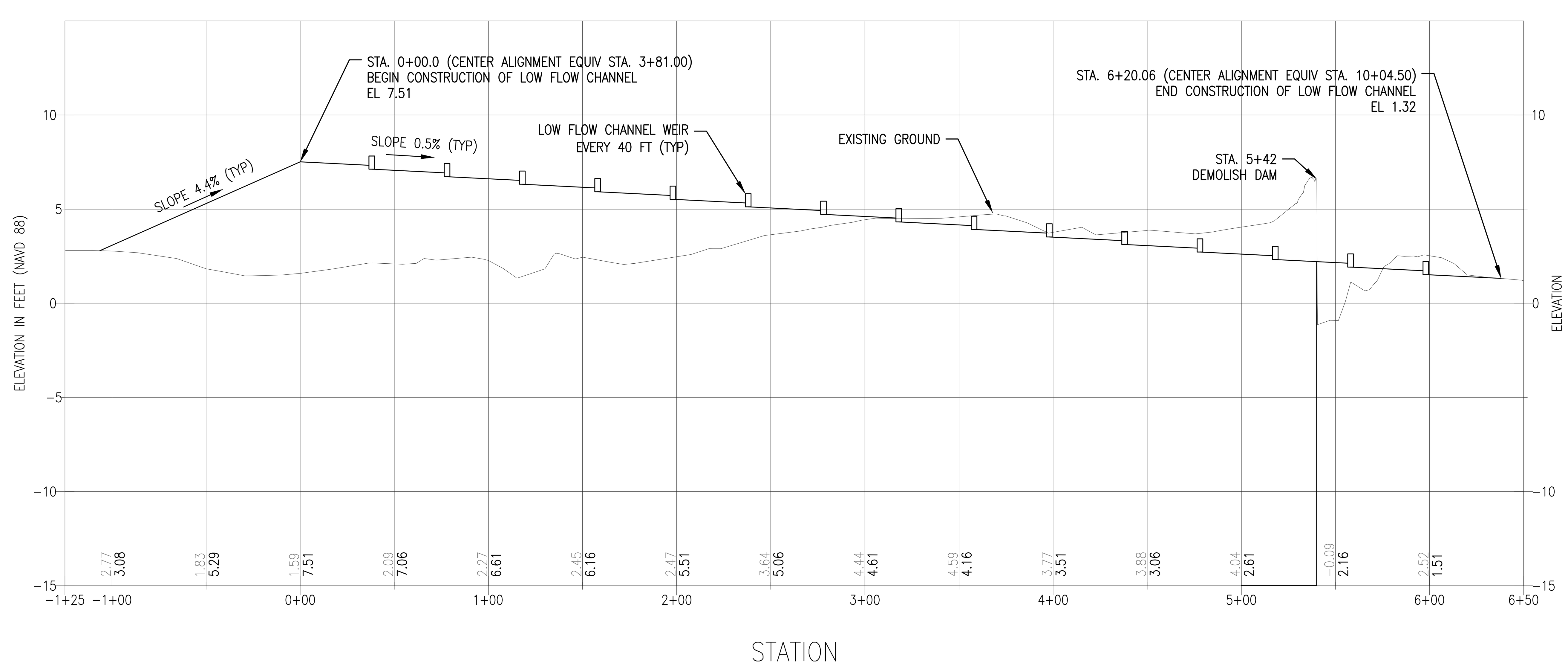
PHILADELPHIA COUNTY, PENNSYLVANIA
COBBS CREEK FISH PASSAGE - WOODLAND DAM REMOVAL
PLAN - STA. 5+59 TO STA. 11+72

SHEET NUMBER
C-107



1 PROFILE - MAIN CHANNEL
SCALE: AS SHOWN

40 0 40 80
SCALE IN FEET



2 PROFILE - LOW FLOW CHANNEL
SCALE: AS SHOWN

40 0 40 80
SCALE IN FEET

US Army Corps of Engineers
Philadelphia District

MARK	ACTION	DESCRIPTION	DATE	BY

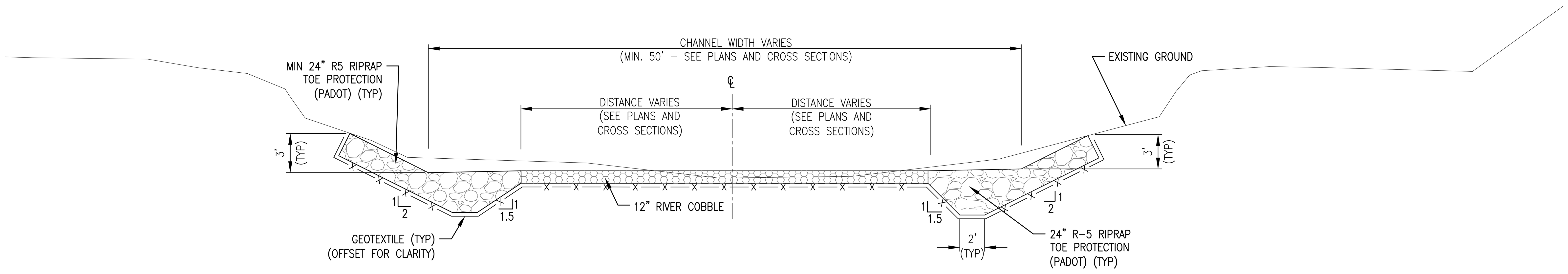
U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390
www.nap.usace.army.mil

DWN BY: DTB	DESIGNED BY: DTB	ISSUE/RELEASE DATE: 19 JAN 2016
CKD BY: DAN	REVIEWED BY: TEH	PROJ. NUMBER: -
		SOLICITATION NUMBER: IFB W912BU-16-B-00XX
DWG SCALE: AS SHOWN		CONTRACT NUMBER: ----
DWG. SIZE: 30"x42" Arch E1	FILE NAME: C-200 PROFILE - MAIN CHANNEL AND LOW FLOW CHANNEL.dwg	

PHILADELPHIA COUNTY, PENNSYLVANIA

COBBS CREEK FISH
PASSAGE - WOODLAND DAM REMOVAL
PROFILE - MAIN CHANNEL AND LOW FLOW CHANNEL
-

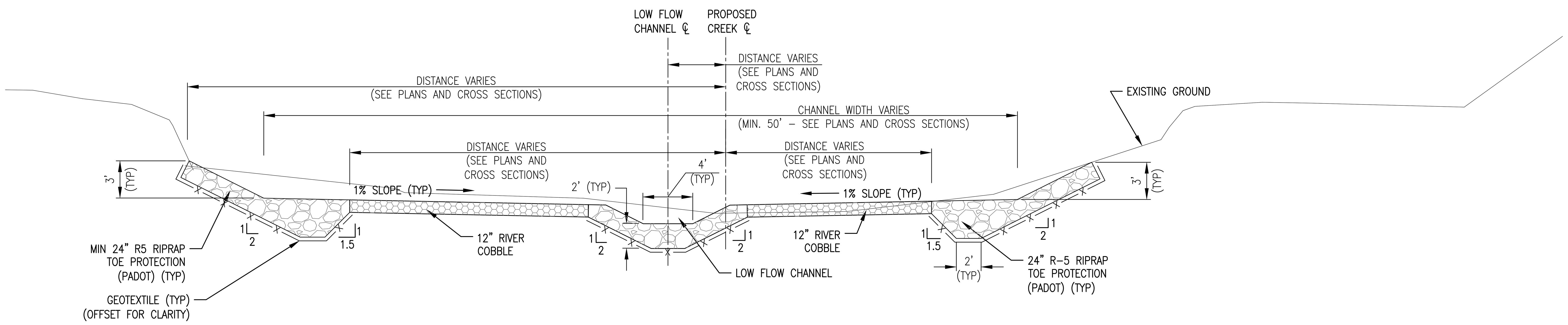
SHEET NUMBER
C-201



1 TYPICAL SECTION - STA. 2+96.26 TO STA. 3+80.88

SCALE: AS SHOWN

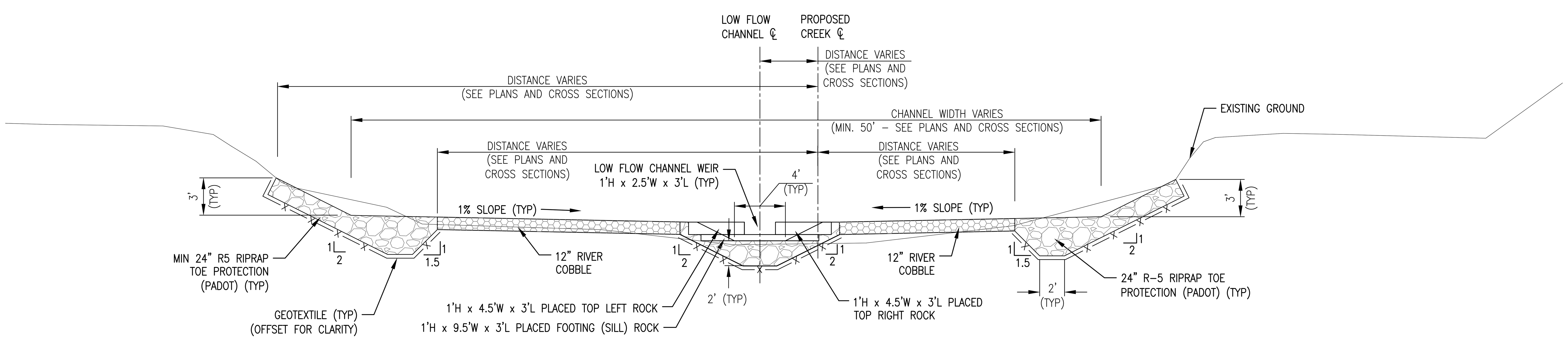
5 0 5 10
SCALE IN FEET



2 TYPICAL SECTION - STA. 3+80.88 TO STA. 10+18.00

SCALE: AS SHOWN

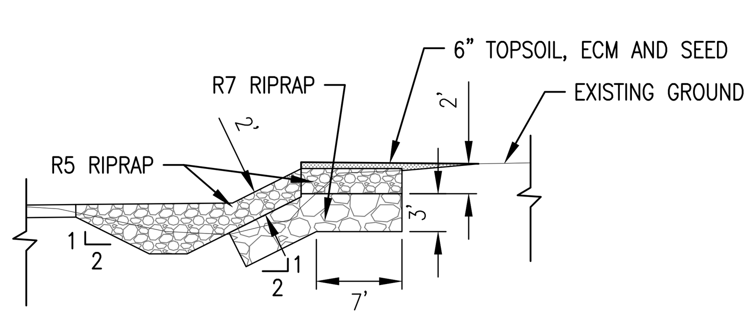
5 0 5 10
SCALE IN FEET



3 TYPICAL SECTION - AT THE WEIRS

SCALE: AS SHOWN

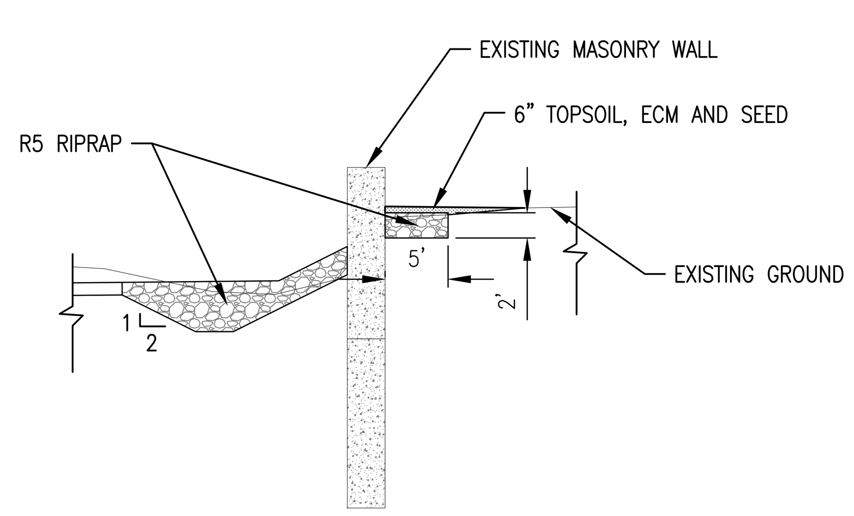
5 0 5 10
SCALE IN FEET



4 SECTION

SCALE: AS SHOWN

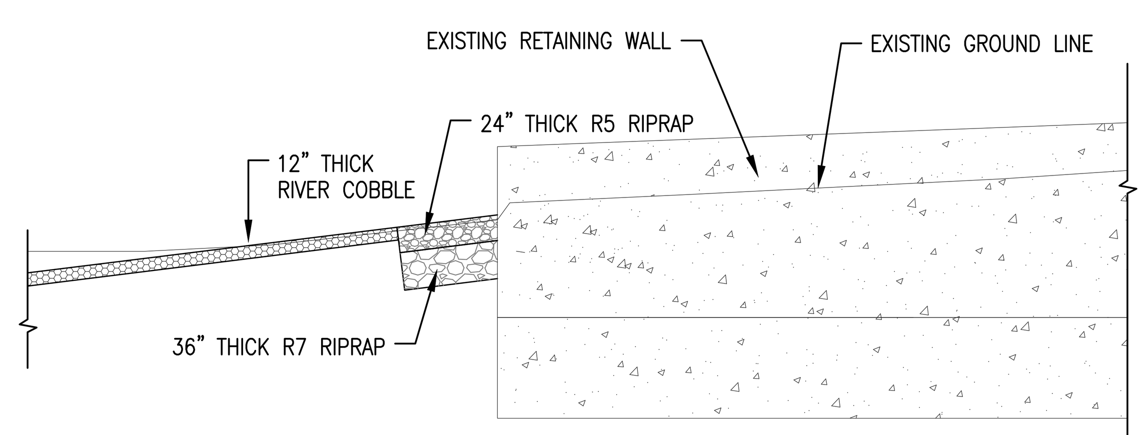
10 0 10 20
SCALE IN FEET



5 SECTION

SCALE: AS SHOWN

10 0 10 20
SCALE IN FEET



6 SECTION

SCALE: AS SHOWN

10 0 10 20
SCALE IN FEET

US Army Corps of Engineers ®
Philadelphia District

MARK	ACTION	DESCRIPTION	DATE	BY
-	-	-	-	-

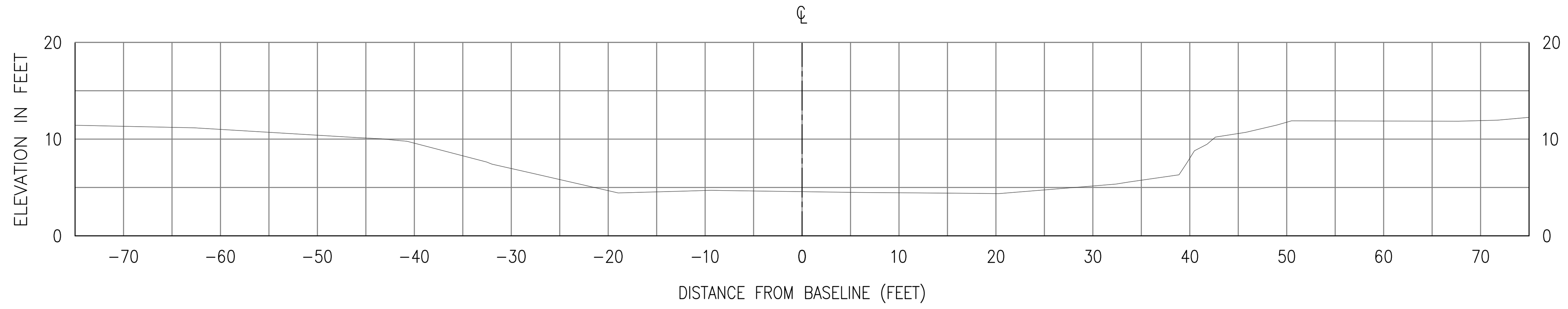
U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390
www.nap.usace.army.mil

DWN BY: DTB/PGS	DESIGNED BY: DTB	ISSUE/RELEASE DATE: 19 JAN 2016
CKD BY: DAN	REVIEWED BY: TEH	PROJ. NUMBER: -
		SOLICITATION NUMBER: IFB W912BU-16-B-00XX
DWG SCALE: AS SHOWN		CONTRACT NUMBER: ----
DWG. SIZE: 30"x42" Arch E1	FILE NAME: C-200 TYPICAL SECTIONS.dwg	

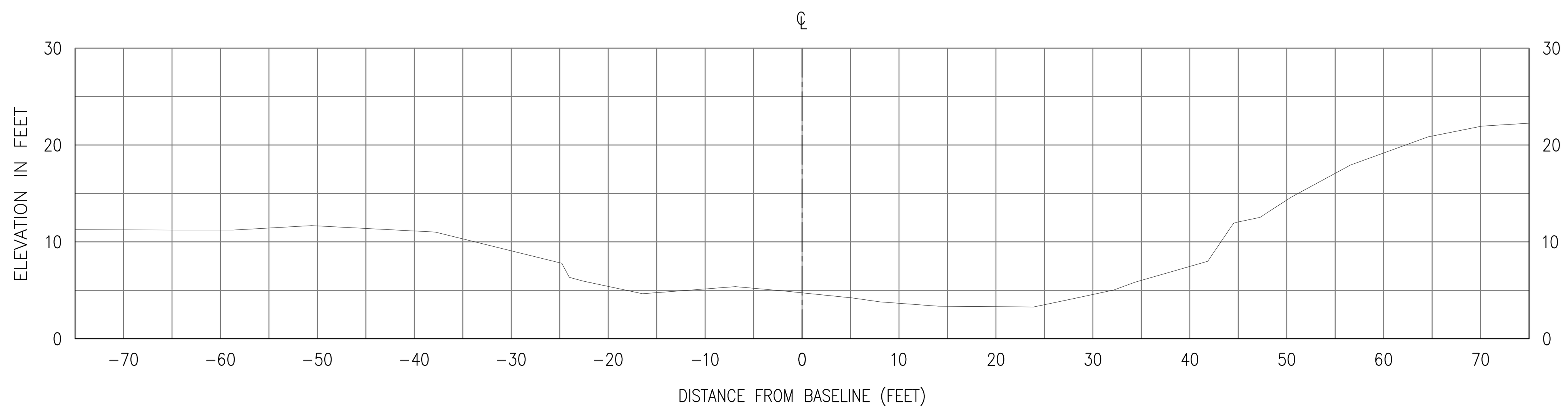
PHILADELPHIA COUNTY, PENNSYLVANIA

COBBS CREEK FISH PASSAGE - WOODLAND DAM REMOVAL
TYPICAL SECTIONS
-

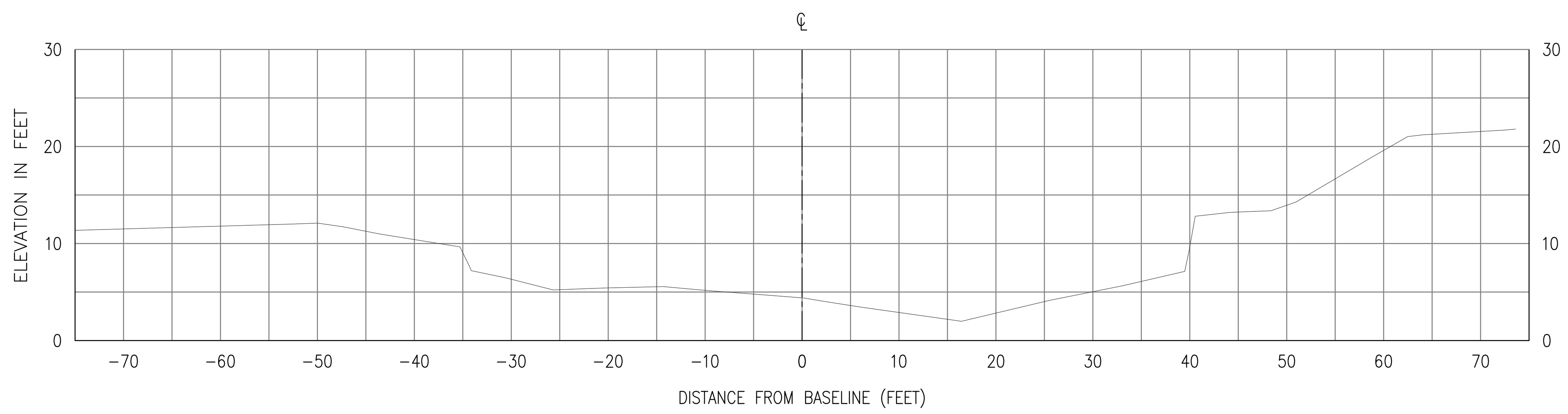
SHEET NUMBER
C-301



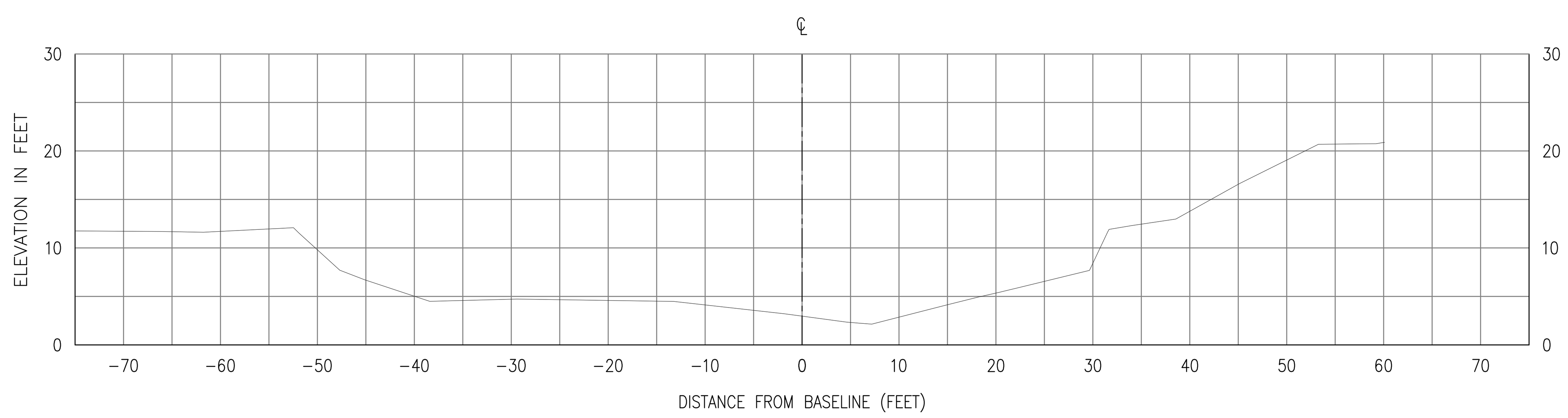
STA. 2+00



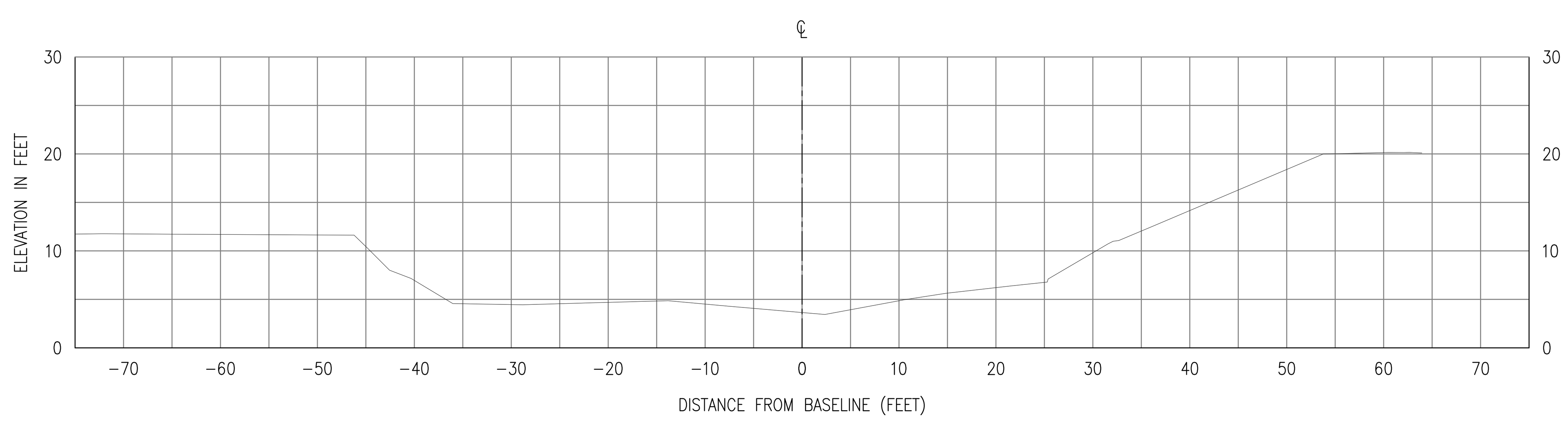
STA. 1+50



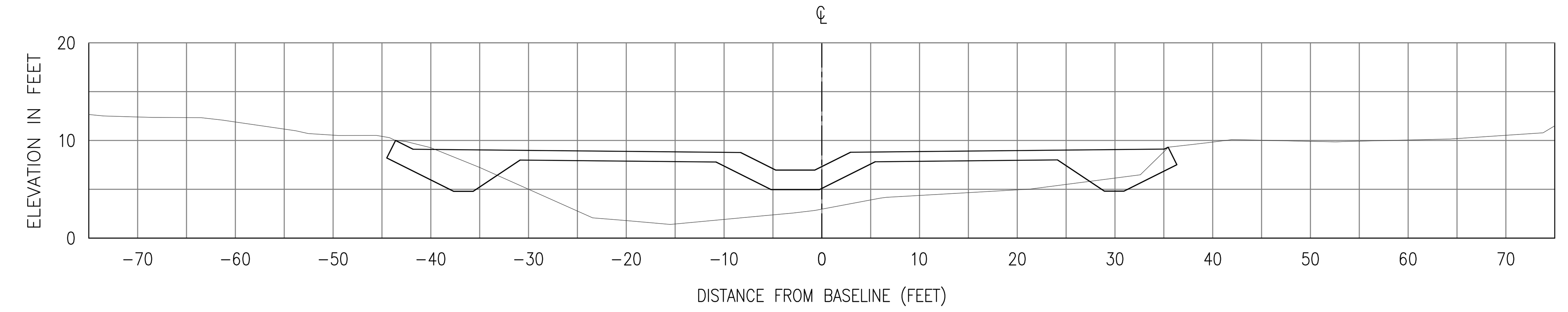
STA. 1+00



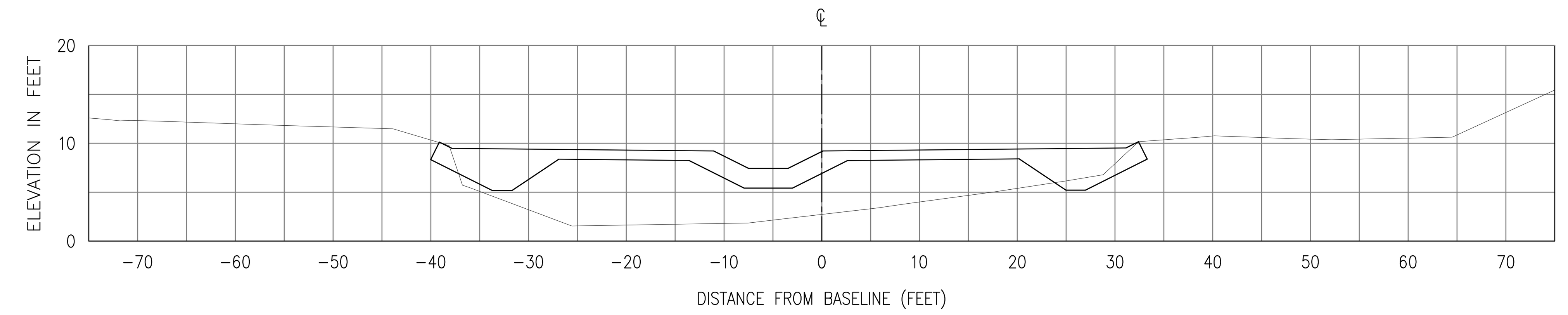
STA. 0+50



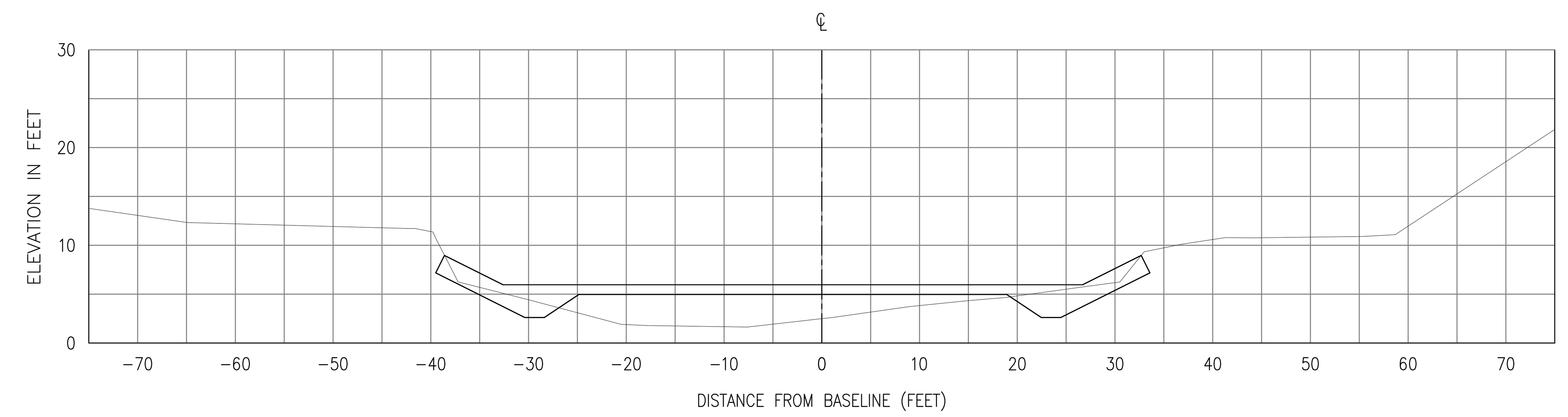
STA. 0+00



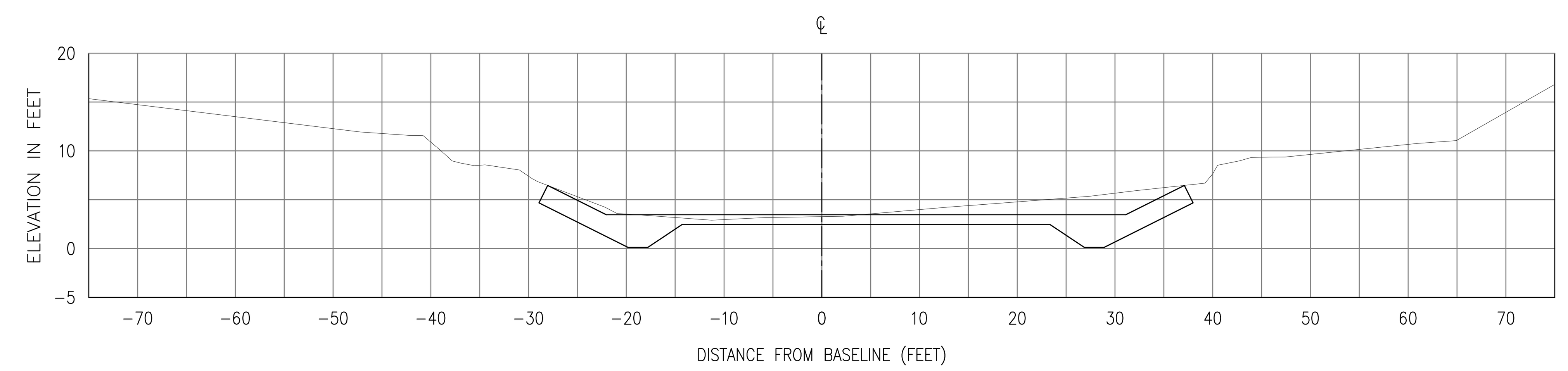
STA. 4+50



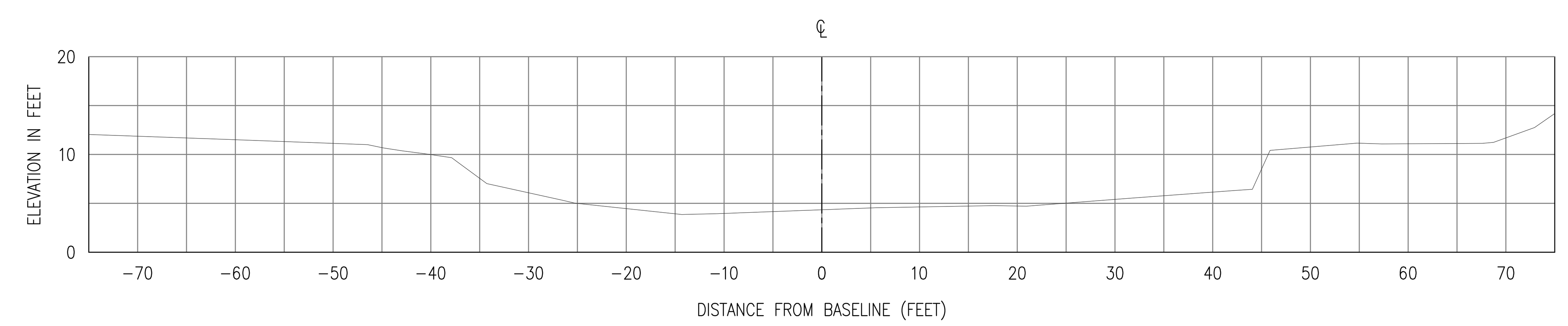
STA. 4+00



STA. 3+50



STA. 3+00



STA. 2+50

H 10 0 10 20
V 10 0 10 20
SCALE IN FEET

US Army Corps of Engineers
Philadelphia District

MARK	ACTION	DESCRIPTION	DATE	BY
-	-		-	-

MARK	ACTION	DESCRIPTION	DATE	BY
-	-		-	-

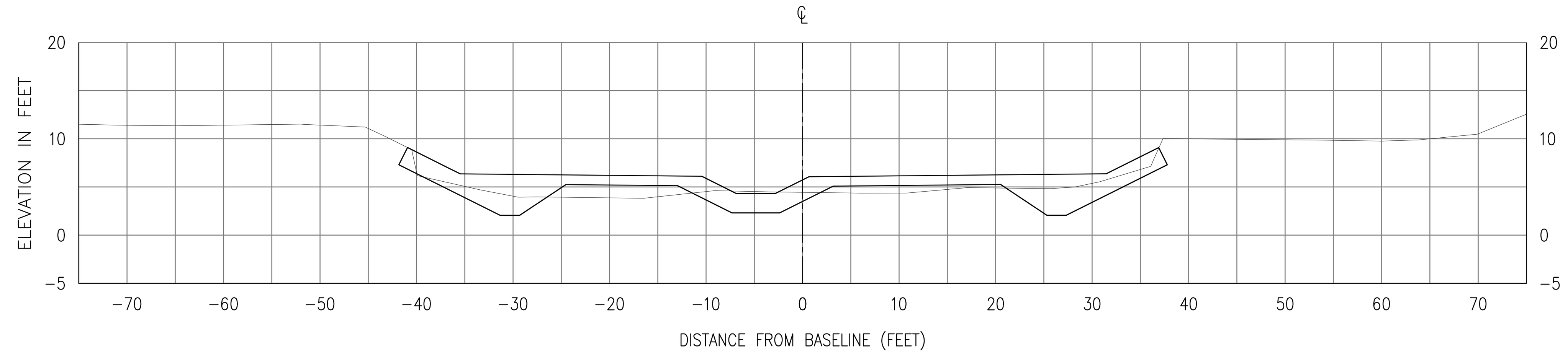
DWN BY: DTB	DESIGNED BY: DTB	ISSUE/RELEASE DATE: 19 JAN 2016	
CKD BY: DAN	REVIEWED BY: TEH	PROJ. NUMBER: -	
		SOLICITATION NUMBER: IFB W912BU-16-B-00XX	
DWG SCALE: AS SHOWN		CONTRACT NUMBER: ----	
DWG. SIZE: 30"x42" Arch E1	FILE NAME: C-301 CROSS SECTIONS - STA. 0+00 TO STA. 4+50.dwg		

U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390
www.nap.usace.army.mil

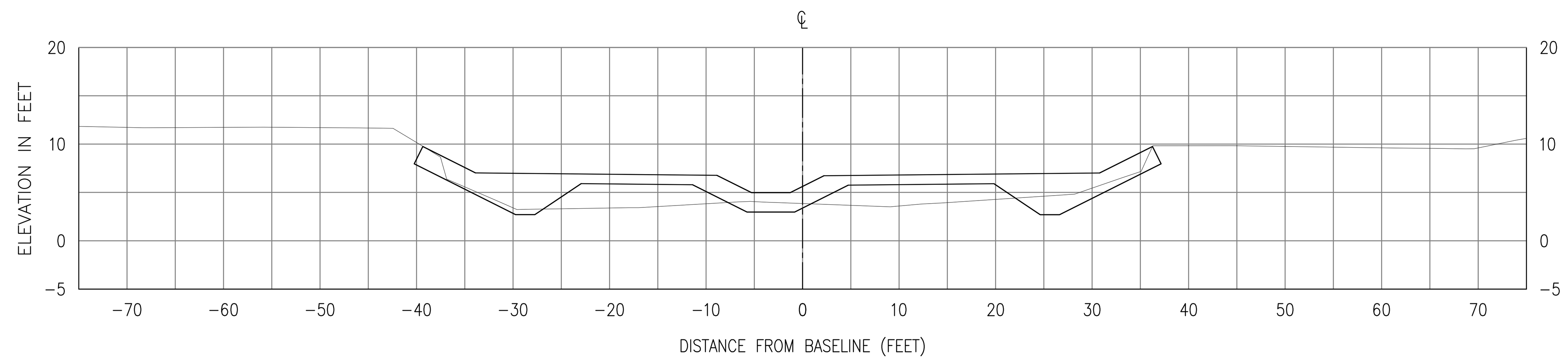
PHILADELPHIA COUNTY, PENNSYLVANIA

COBBS CREEK FISH
PASSAGE - WOODLAND DAM REMOVAL
CROSS SECTIONS - STA. 0+00 TO STA. 4+50
-

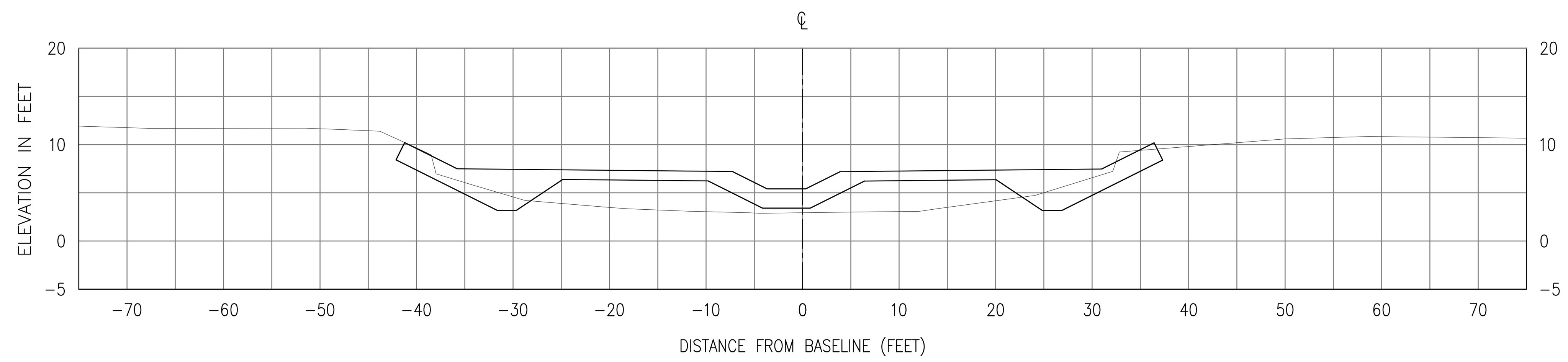
SHEET NUMBER
C-302



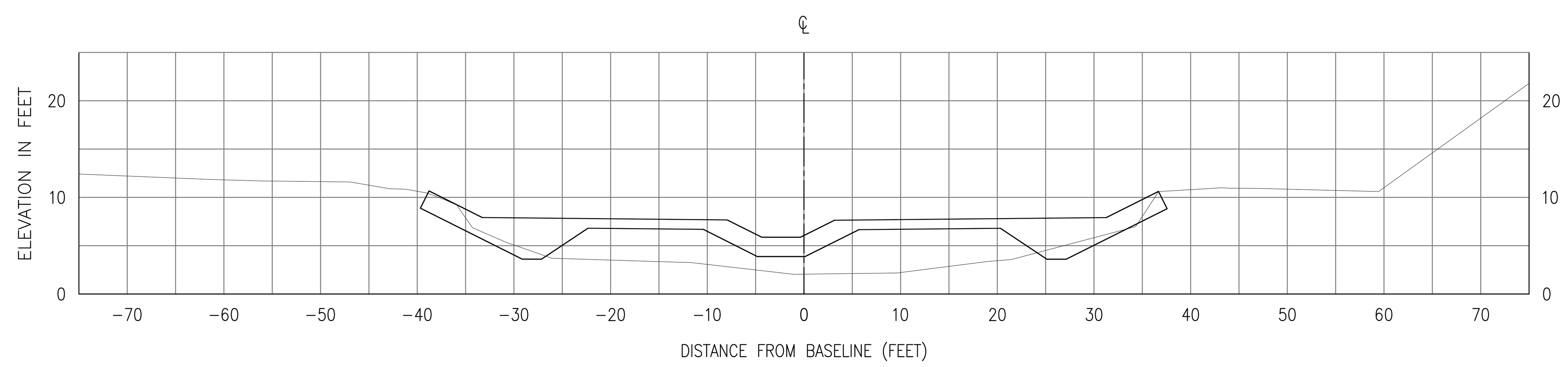
STA. 7+00



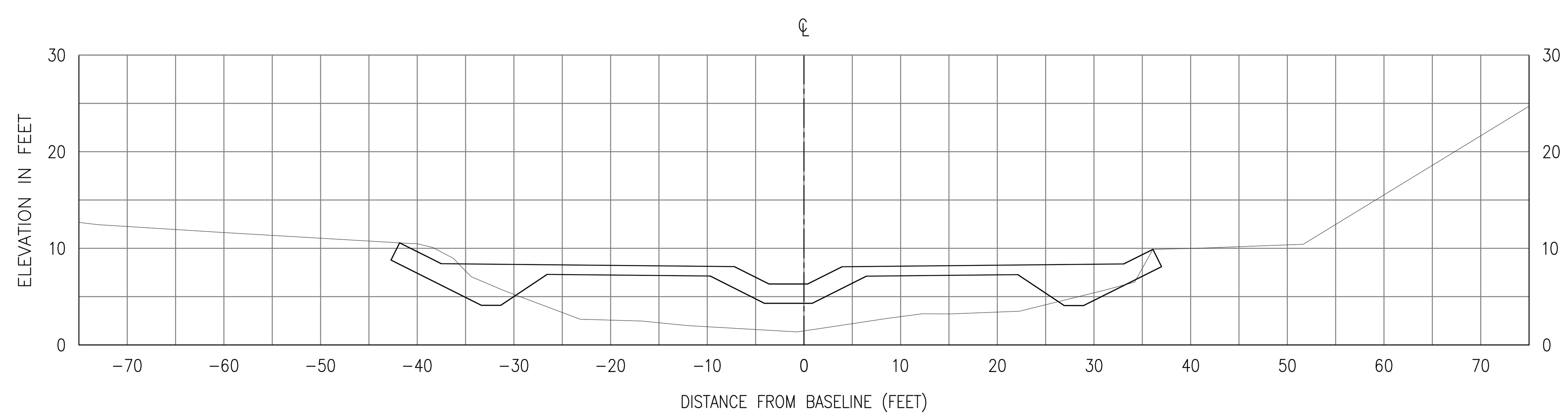
STA. 6+50



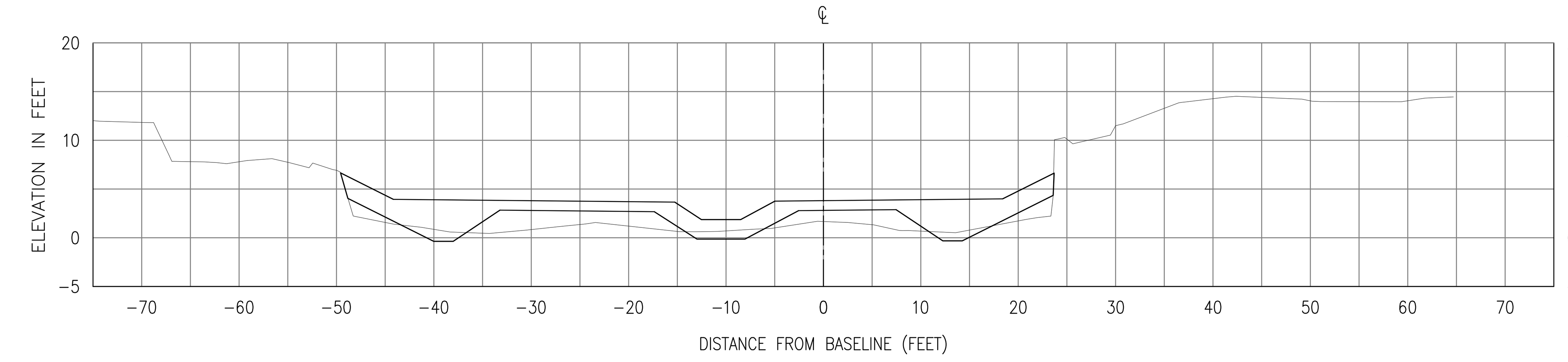
STA. 6+00



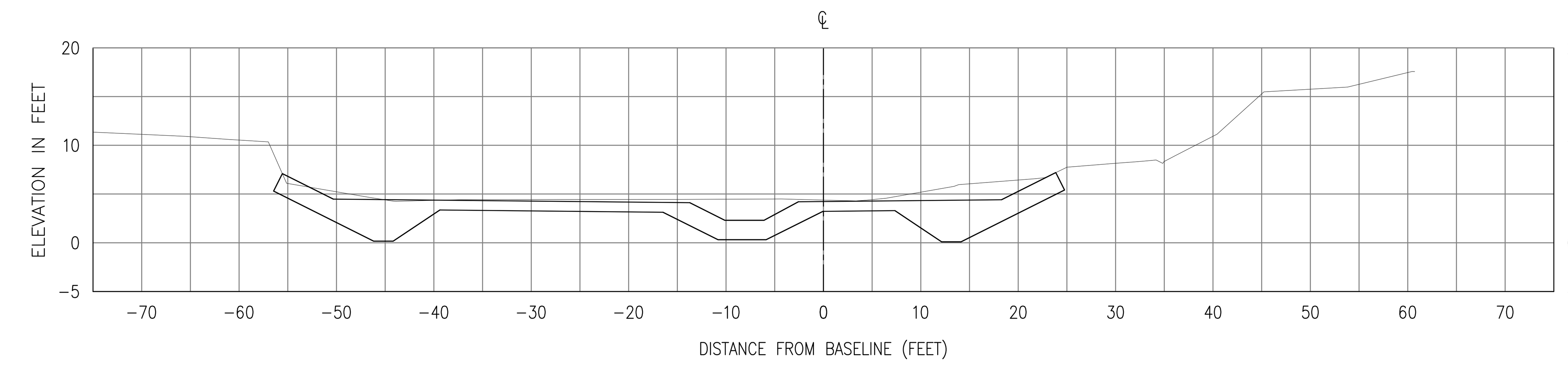
STA. 5+50



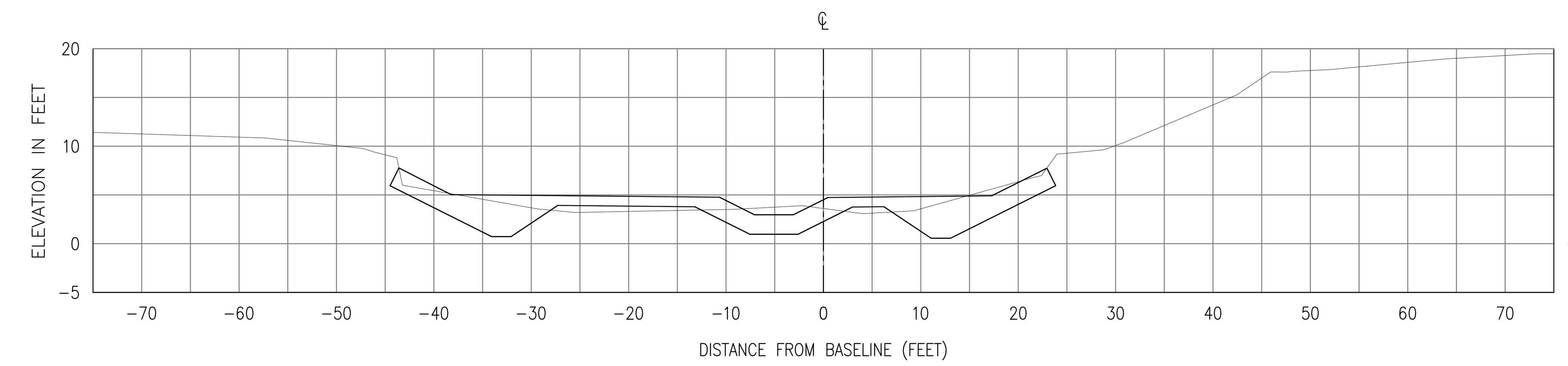
STA. 5+00



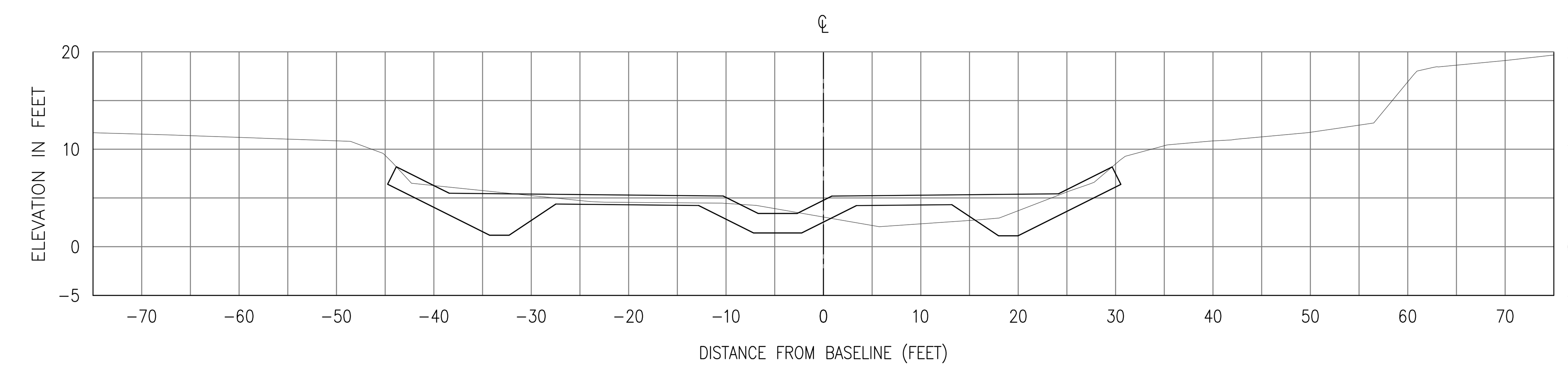
STA. 9+50



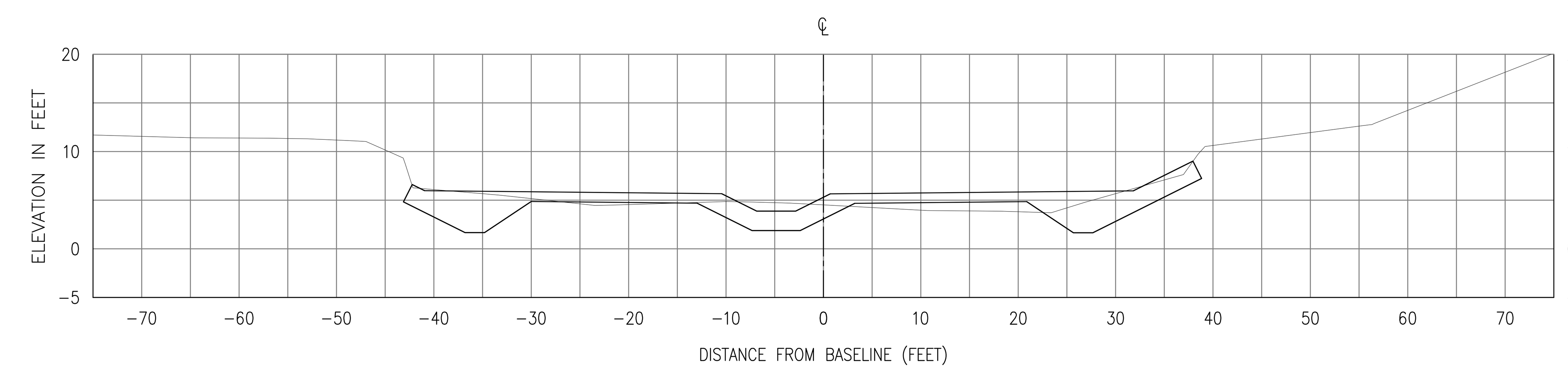
STA. 9+00



STA. 8+50



STA. 8+00



STA. 7+50

H 10 0 10 20
V 10 0 10 20
SCALE IN FEET

US Army Corps of Engineers
Philadelphia District

MARK	ACTION	DESCRIPTION	DATE	BY
	-	-	-	-
	-	-	-	-
	-	-	-	-
	-	-	-	-
	-	-	-	-
	-	-	-	-
	-	-	-	-

MARK	ACTION	DESCRIPTION	DATE	BY
	-	-	-	-
	-	-	-	-
	-	-	-	-
	-	-	-	-
	-	-	-	-
	-	-	-	-
	-	-	-	-

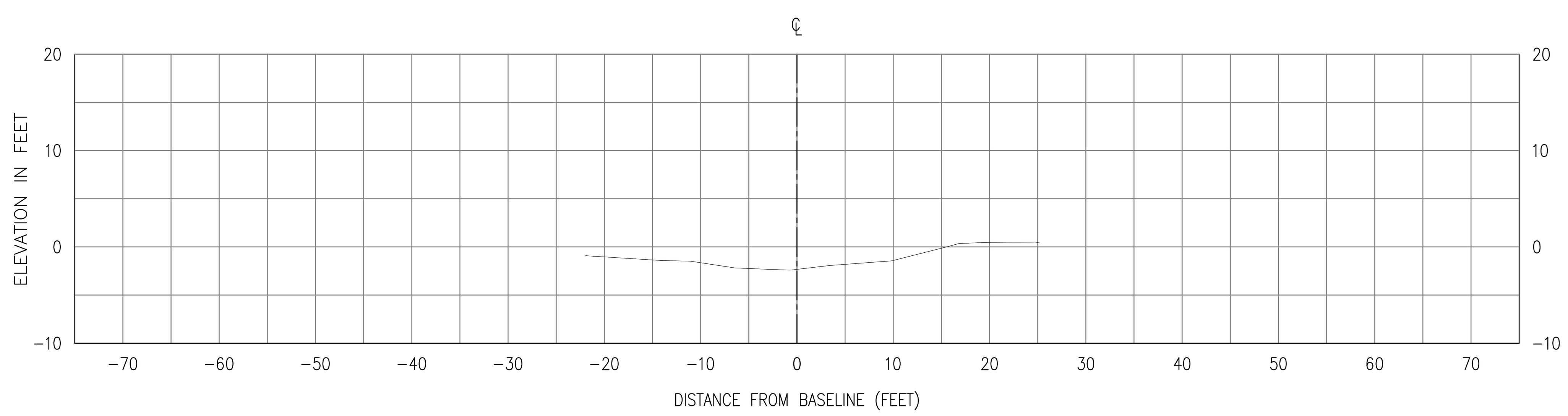
U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390
www.nap.usace.army.mil

DWN BY: DTB	DESIGNED BY: DTB	ISSUE/RELEASE DATE: 19 JAN 2016
CKD BY: DAN	REVIEWED BY: TEH	PROJ. NUMBER: -
		SOLICITATION NUMBER: IFB W912BU-16-B-00XX
DWG SCALE: AS SHOWN		CONTRACT NUMBER: ----
DWG. SIZE: 30"x42" Arch E1	FILE NAME: C-302 CROSS SECTIONS - STA. 5+00 TO STA. 9+50.dwg	

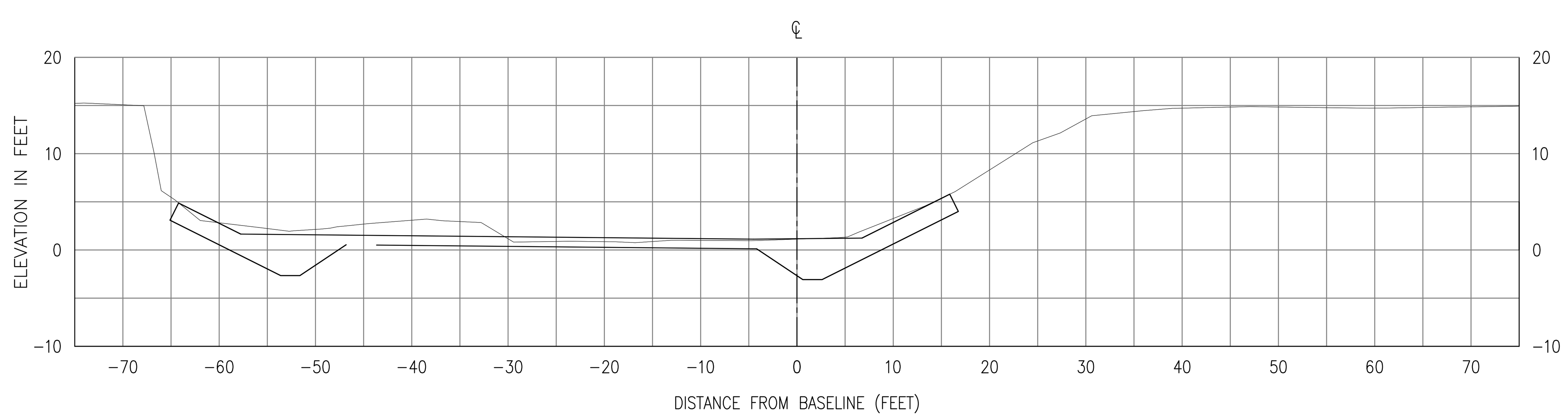
PHILADELPHIA COUNTY, PENNSYLVANIA

COBBS CREEK FISH
PASSAGE - WOODLAND DAM REMOVAL
CROSS SECTIONS - STA. 5+00 TO STA. 9+50
-

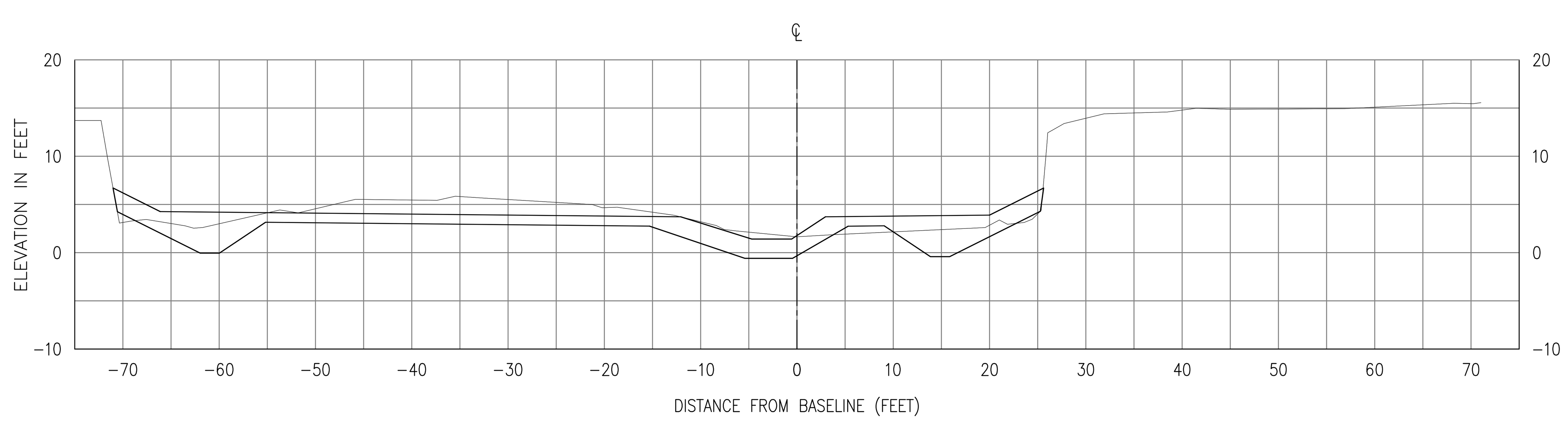
SHEET NUMBER
C-303



STA. 11+00



STA. 10+50



STA. 10+00

H 10 0 10 20
V 10 0 10 20
SCALE IN FEET

US Army Corps of Engineers
Philadelphia District

MARK	ACTION	DESCRIPTION	DATE	BY
-	-		-	-

MARK	ACTION	DESCRIPTION	DATE	BY
-	-		-	-

U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390
www.nap.usace.army.mil

DWN BY: DTB	DESIGNED BY: DTB	ISSUE/RELEASE DATE: 19 JAN 2016
CKD BY: DAN	REVIEWED BY: TEH	PROJ. NUMBER: -
		SOLICITATION NUMBER: IFB W912BU-16-B-00XX
DWG SCALE: AS SHOWN		CONTRACT NUMBER: ----
DWG. SIZE: 30"x42" Arch E1	FILE NAME: C-303 CROSS SECTIONS - STA. 10+00 TO STA. 11+00.dwg	

PHILADELPHIA COUNTY, PENNSYLVANIA

COBBS CREEK FISH
PASSAGE - WOODLAND DAM REMOVAL
CROSS SECTIONS - STA. 10+00 TO STA. 11+00
-

SHEET NUMBER
C-304

EROSION AND SEDIMENT CONTROL GENERAL NOTES:

1. ALL EARTH DISTURBANCES, INCLUDING CLEARING AND GRUBBING AS WELL AS CUTS AND FILLS SHALL BE DONE IN ACCORDANCE WITH THE APPROVED E&S PLAN. A COPY OF THE APPROVED DRAWINGS (STAMPED, SIGNED, AND DATED BY THE REVIEWING AGENCY) MUST BE AVAILABLE AT THE PROJECT SITE AT ALL TIMES. THE REVIEWING AGENCY SHALL BE NOTIFIED OF ANY CHANGES TO THE APPROVED PLAN PRIOR TO IMPLEMENTATION OF THOSE CHANGES. THE REVIEWING AGENCY MAY REQUIRE A WRITTEN SUBMITTAL OF THOSE CHANGES FOR REVIEW AND APPROVAL AT ITS DISCRETION.
2. AT LEAST 7 DAYS PRIOR TO STARTING ANY EARTH DISTURBANCE ACTIVITIES, INCLUDING CLEARING AND GRUBBING, THE OWNER AND/OR OPERATOR SHALL INVITE ALL CONTRACTORS, THE LANDOWNER, APPROPRIATE MUNICIPAL OFFICIALS, THE E&S PLAN PREPARER, THE PCSM PLAN PREPARER, THE LICENSED PROFESSIONAL RESPONSIBLE FOR OVERSIGHT OF CRITICAL STAGES OF IMPLEMENTATION OF THE PCSM PLAN, AND A REPRESENTATIVE FROM PWD AND PADEP TO AN ON-SITE PRECONSTRUCTION MEETING.
3. AT LEAST 3 DAYS PRIOR TO STARTING ANY EARTH DISTURBING ACTIVITIES, OR EXPANDING INTO AN AREA PREVIOUSLY UNMARKED, THE PENNSYLVANIA ONE CALL SYSTEM INC. SHALL BE NOTIFIED AT 1-800-242-1776 FOR THE LOCATION OF EXISTING UNDERGROUND UTILITIES.
4. ALL EARTH DISTURBANCE ACTIVITIES SHALL PROCEED IN ACCORDANCE WITH THE SEQUENCE PROVIDED ON THE PLAN DRAWINGS. DEVIATION FROM THAT SEQUENCE MUST BE APPROVED IN WRITING FROM PWD AND PADEP OR BY THE DEPARTMENT PRIOR TO IMPLEMENTATION.
5. AREAS TO BE FILLED ARE TO BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL TO REMOVE TREES, VEGETATION, ROOTS, AND OTHER OBJECTIONABLE MATERIAL.
6. CLEARING, GRUBBING, AND TOPSOIL STRIPPING SHALL BE LIMITED TO THOSE AREAS DESCRIBED IN EACH STAGE OF THE CONSTRUCTION SEQUENCE. GENERAL SITE CLEARING, GRUBBING, AND TOPSOIL STRIPPING MAY NOT COMMENCE IN ANY STAGE OR PHASEOF THE PROJECT UNTIL THE E&S BMPS SPECIFIED BY THE BMP SEQUENCE FOR THAT STAGE OR PHASE HAVE BEEN INSTALLED AND ARE FUNCTIONING AS DESCRIBED IN THIS E&S PLAN.
7. AT NO TIME SHALL CONSTRUCTION VEHICLES BE ALLOWED TO ENTER AREAS OUTSIDE THE LIMIT OF DISTURBANCE BOUNDARIES SHOWN ON THE PLAN MAPS. THESE AREAS MUST BE CLEARLY MARKED AND FENCED OFF BEFORE CLEARING AND GRUBBING OPERATIONS BEGIN.
8. TOPSOIL REQUIRED FOR THE ESTABLISHMENT OF VEGETATION SHALL BE STOCKPILED AT THE LOCATION(S) SHOWN ON THE PLAN MAP(S) IN THE AMOUNT NECESSARY TO COMPLETE THE FINISH GRADING OF ALL EXPOSED AREAS THAT ARE TO BE STABILIZED BY VEGETATION. EACH STOCKPILE SHALL BE PROTECTED IN THE MANNER SHOWN ON THE PLAN DRAWINGS. STOCKPILE HEIGHTS SHALL NOT EXCEED 35 FEET. STOCKPILE SLOPES SHALL BE 2H:1V OR FLATTER.
9. IMMEDIATELY UPON DISCOVERING UNFORSEEN CIRCUMSTANCES POSING THE POTENTIAL FOR ACCELERATED EROSION AND/OR SEDIMENT POLLUTION, THE OPERATOR SHALL IMPLEMENT APPROPRIATE BEST MANAGEMENT PRACTICES TO MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENT POLLUTION AND NOTIFY THE LOCAL CONSERVATION DISTRICT AND/OR THE REGIONAL OFFICE OF THE DEPARTMENT.
10. ALL BUILDING MATERIALS AND WASTES SHALL BE REMOVED FROM THE SITE AND RECYCLED OR DISPOSED OF IN ACCORDANCE WITH THE DEPARTMENTS' SOLID WASTE MANAGEMENT REGULATIONS AT 25 PA. CODE 260.1 ET. SEQ. 271.1 AND 287.1 ET. SEQ. NO BUILDING MATERIALS OR WASTES OR UNUSED BUILDING MATERIALS SHALL BE BURNED, BURIED, DUMPED, OR DISCHARGED AT THE SITE.
11. ALL OFF-SITE WASTE AND BORROW AREAS MUST HAVE AN E&S PLAN APPROVED BY PWD AND PADEP OR THE DEPARTMENT FULLY IMPLEMENTED PRIOR TO BE BEING ACTIVATED.
12. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ANY MATERIAL BROUGHT ONTO THE SITE IS CLEAN FILL. FORM FP-001 MUST BE RETAINED BY THE PROPERTY OWNER FOR ANY FILL MATERIAL AFFECTED BY A SPILL OR RELEASE OF A REGULATED SUBSTANCE BUY QUALIFYING AS CLEAN FILL DUE TO ANALYTICAL TESTING.
13. ALL PUMPING OF WATER FROM ANY WORK AREA SHALL BE DONE ACCORDING TO THE PROCEDURE DESCRIBED IN THIS PLAN, OVER UNDISTURBED VEGETATED AREAS.
14. VEHICLE AND EQUIPMENT MAY ONLY ENTER AND EXIT FRO THE WOODLAND AVENUE ENTRANCE NEAR THE INTERSECTION OF WOODLAND AVENUE WITH COBBS CREEK PARKWAY.
15. UNTIL THE SITE IS STABILIZED, ALL EROSION AND SEDIMENT BMPS SHALL BE MAINTAINED PROPERLY. MAINTENANCE SHALL INCLUDE INSPECTIONS OF ALL EROSION AND SEDIMENT BMPS AFTER EACH RUNOFF EVENT AND ON A WEEKLY BASIS. ALL PREVENTATIVE AND REMEDIAL MAINTENANCE WORK, INCLUDING CLEAN OUT, REPAIR, REPLACEMENT, REGRADING, RESEEDING, REMULCHING, AND RENETTING MUST BE PERFORMED IMMEDIATELY. IF THE THE E&S BMPS FAIL TO PERFORM AS EXPECTED, REPLACEMENT BMPS, OR MODIFICATIONS OF THOSE INSTALLED WILL BE REQUIRED.
16. A LOG SHOWING DATES THAT E&S BMPS WERE INSPECTED AS WELL AS ANY DEFICIENCIES FOUND AND THE DATE THEY WERE CORRECTED SHALL BE MAINTAINED ON THE SITE AND BE MADE AVAILABLE TO REGULATORY AGENCY OFFICIALS AT THE TIME OF INSPECTION.
17. SEDIMENT TRACKED ONTO ANY PUBLIC ROADWAY OR SIDEWALK SHALL BE RETURNED TO THE CONSTRUCTION SITE BY THE END OF EACH WORK DAY AND DISPOSED IN THE MANNER DESCRIBED IN THIS PLAN. IN NO CASE SHALL THE SEDIMENT BE WASHED, SHOVELED, OR SWEPT INTO ANY ROADSIDE DITCH, STORM SEWER, OR SURFACE WATER.
18. ALL SEDIMENT REMOVED FROM BMPS SHALL BE DISPOSED OF IN THE MANNER DESCRIBED ON THE PLAN DRAWINGS.
19. AREA WHICH ARE TO BE TOPSOILED SHALL BE SCARIFIED TO A MINIMUM DEPTH OF 3 TO 5 INCHES.
20. ALL FILLS SHALL BE COMPACTED AS REQUIRED TO REDUCE EROSION, SLIPPAGE, SETTLEMENT, SUBSIDENCE OR OTHER RELATED PROBLEMS. FILL INTENDED TO SUPPORT BUILDINGS, STRUCTURES, AND CONDUITS, ETC. SHALL BE COMPACTED IN ACCORDANCE WITH LOCAL REQUIREMENTS OR CODES.
21. ALL EARTHEN FILLS SHALL BE PLACED IN COMPACTED LAYERS NOT TO EXCEED 9 INCHES IN THICKNESS.
22. FILL MATERIALS SHALL BE FREE OF FROZEN PARTICLES, BRUSH, ROOTS, SOD, OR OTHER FOREIGN OR OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS.
23. FROZEN MATERIALS OR SOFT, MUCKY, OR HIGHLY COMPRESSIBLE MATERIALS SHALL NOT BE INCORPORATED INTO FILLS.
24. FILL SHALL NOT BE PLACED ON SATURATED OR FROZEN SURFACES.
25. SEEPS OR SPRINGS ENCOUNTERED DURING CONSTRUCTION SHALL BE HANDLED IN ACCORDANCE WITH THE STANDARD AND SPECIFICATION FOR SUBSURFACE DRAIN OR OTHER APPROVED METHOD.
26. ALL GRADED AREAS SHALL BE PERMANENTLY STABILIZED IMMEDIATELY UPON REACHING FINISHED GRADE. CUT SLOPES IN COMPETENT BEDROCK AND ROCK FILLS NEED NOT BE VEGETATED. SEEDED AREAS WITHIN 50 FEET OF A SURFACE WATER, OR AS OTHERWISE SHOWN ON THE PLAN DRAWINGS, SHALL BE BLANKETED ACCORDING TO THE STANDARDS OF THIS PLAN.
27. IMMEDIATELY AFTER EARTH DISTURBANCE ACTIVITIES CEASE IN ANY AREA OR SUBAREA OF THE PROJECT, THE OPERATOR SHALL STABILIZE ALL DISTURBED AREAS. DURING NON-GERMINATING MONTHS, MULCH OR PROTECTIVE BLANKETING SHALL BE APPLIED AS DESCRIBED IN THE PLAN. AREAS NOT AT FINISHED GRADE, WHICH WILL BE REACTIVATED WITHIN ONE YEAR, MAY BE STABILIZED IN ACCORDANCE WITH THE TEMPORARY STABILIZATION SPECIFICATIONS. THOSE AREAS WHICH WILL NOT BE REACTIVATED WITHIN ONE YEAR SHALL BE STABILIZED IN ACCORDANCE WITH THE PERMANENT STABILIZATION SPECIFICATIONS.
28. PERMANENT STABILIZATION IS DEFINED AS A MINIMUM UNIFORM, PERENNIAL 70% VEGETATIVE COVER OR OTHER PERMANENT NON-VEGETATIVE COVER WITH A DENSITY SUFFICIENT TO RESIST ACCELERATED EROSION. CUT AND FILL SLOPES SHALL BE CAPABLE OF RESISTING FAILURE DUE TO SLUMPING, SLIDING, OR OTHER MOVEMENTS.
29. E&S BMPS SHALL REMAIN FUNCTIONAL AS SUCH UNTIL ALL AREAS TRIBUTARY TO THEM ARE PERMANENTLY STABILIZED OR UNTIL THEY ARE REPLACED BY ANOTHER BMP APPROVED BY PWD AND PADEP.
30. UPON COMPLETION OF ALL EARTH DISTURBANCE ACTIVITIES AND PERMANENT STABILIZATION OF ALL DISTURBED AREAS, THE OWNER AND/OR OPERATOR SHALL CONTACT PWD AND PADEP FOR AN INSPECTION PRIOR TO REMOVAL/CONVERSION OF THE E&S BMPS.
31. AFTER FINAL SITE STABILIZATION HAS BEEN ACHIEVED, TEMPORARY EROSION AND SEDIMENT BMPS MUST BE REMOVED OR CONVERTED TO PERMANENT POST CONSTRUCTION STORMWATER MANAGEMENT BMPS. AREAS DISTURBED DURING REMOVAL OR CONVERSION OF THE BMPS SHALL BE STABILIZED IMMEDIATELY. IN ORDER TO ENSURE RAPID REVEGETATION OF DISTURBED AREAS, SUCH REMOVAL/CONVERSIONS ARE TO BE DONE ONLY DURING THE GERMINATING SEASON.
32. UPON COMPLETION OF ALL EARTH DISTURBANCE ACTIVITIES AND PERMANENT STABILIZATION OF ALL DISTURBED AREAS, THE OWNER AND/OR OPERATOR SHALL CONTACT PWD AND PADEP TO SCHEDULE A FINAL INSPECTION.
33. FAILURE TO CORRECTLY INSTALL E&S BMPS, FAILURE TO PREVENT SEDIMENT-LADEN RUNOFF FROM LEAVING THE CONSTRUCTION SITE, OR FAILURE TO TAKE IMMEDIATE CORRECTIVE ACTION TO RESOLVE FAILURE OF E&S BMPS MAY RESULT IN ADMINISTRATIVE, CIVIL, AND/OR CRIMINAL PENALTIES BEING INSTITUTED BY THE DEPARTMENT AS DEFINED IN SECTION 602 OF THE PENNSYLVANIA CLEAN STREAMS LAW. THE CLEAN STREAMS LAW PROVIDES FOR UP TO $10,000 PER DAY IN CIVIL PENALTIES, UP TO $10,000 IN SUMMARY CRIMINAL PENALTIES, AND UP TO $25,000 IN MISDEMEANOR CRIMINAL PENALTIES FOR EACH VIOLATION.
34. ALL CHANNELS SHALL BE KEPT FREE OF OBSTRUCTIONS INCLUDING BUT NOT LIMITED TO FILL, ROCKS, LEAVES, WOODY DEBRIS, ACCUMULATED SEDIMENT, EXCESS VEGETATION, AND CONSTRUCTION MATERIAL/WASTES.
35. UNDERGROUND UTILITIES CUTTING THROUGH ANY ACTIVE CHANNEL SHALL BE IMMEDIATELY BACKFILLED AND THE CHANNEL RESTORED TO ITS ORIGINAL CROSS-SECTION AND PROTECTIVE LINING. ANY BASE FLOW WITHIN THE CHANNEL SHALL BE CONVEYED PAST THE WORK AREA IN THE MANNER DESCRIBED IN THIS PLAN UNTIL SUCH A RESTORATION IS COMPLETE.
36. CHANNELS HAVING RIPRAP, RENO MATTRESS, OR GABION LININGS MUST BE SUFFICIENTLY OVER-EXCAVATED SOT HAT THE DESIGN DIMENSIONS WILL BE PROVIDED AFTER PLACEMENT OF THE PROTECTIVE LINING.

GENERAL CONSTRUCTION SEQUENCE:

MOBILIZATION, CONSTRUCTION ACCESS AND STAGING:

1. THE PARKING LOT OF THE HISTORIC BLUE BELL INN WILL BE TEMPORARILY RE-CONSTRUCTED TO THE DIMENSIONS AND LOCATION AS SHOWN ON SHEET C-107 FOR THE EXTENT OF THE CONTRACT. A PORTION OF THE EXISTING PARKING LOT WILL BE MADE AVAILABLE TO THE CONTRACTOR AS A STAGING AREA AND PRIMARY POINT OF ACCESS TO THE SITE. ACCESS TO THE SITE WILL BE FROM PHILADELPHIA COUNTY SIDE ONLY.
2. INSTALL ROCK CONSTRUCTION ENTRANCE (RCE) AT THE WOODLAND AVE ENTRANCE TO THE PARKING LOT NEAR THE INTERSECTION OF WOODLAND AVE WITH COBBS CREEK PARKWAY. MOBILIZE EQUIPMENT AND MATERIAL TO THE SITE. THE CONSTRUCTION ENTRANCE MUST BE SEALED OFF AT THE END OF EACH WORKDAY
3. PRIOR TO CLEARING AND GRUBBING, CONSTRUCTION ACCESS LIMITS SHALL BE FLAGGED AND APPROVED BY THE CONTRACTING OFFICER'S REPRESENTATIVE TO MINIMIZE IMPACTS TO EXISTING VEGETATION. ORANGE CONSTRUCTION FENCE SHALL BE INSTALLED AROUND DESIGNATED AREAS AS SHOWN ON THE PLANS INCLUDING TREE SAVE AREAS AND AS DIRECTED BY THE CONTRACTING OFFICER'S REPRESENTATIVE.
4. CONSTRUCTION TRAFFIC MUST STAY WITHIN THE DESIGNATED LIMITS OF DISTURBANCE (LOD). FOR CLEAR IDENTIFICATION OF THE LOD, FIELD MARK THE LOD PRIOR TO ANY EARTH DISTURBANCE. AS SHOWN ON THE PLANS, COVER THE ACCESS PATH ALONG COBBS CREEK WITH A 4INCH LAYER OF WOOD CHIPS AND MAINTAIN AS NEEDED.
5. SETUP STOCKPILE AREAS AND INSTALL SILT FENCE AT LOCATIONS SHOWN ON THE PLANS AND AS APPROVED BY THE CONTRACTING OFFICER'S REPRESENTATIVE.
6. CLEAR ONLY THOSE AREAS WITHIN THE LIMITS OF DISTURBANCE NEEDED FOR SITE ACCESS AND STAGING.

CHANNEL CONSTRUCTION:

REACH UPSTREAM OF WOODLAND DAM

1. DUE TO THE SHORT LENGTH OF STREAM WORK AND BECAUSE EXCESS MATERIAL FROM THE DOWNSTREAM END OF THE REACH WILL BE USED TO RAISE AND SHAPE THE UPSTREAM END OF THE REACH, THIS PROJECT REACH CANNOT BE DIVIDED INTO CONSTRUCTIBLE SEGMENTS.
2. DRAIN THE EXISTING POOL BEHIND THE DAM IN ORDER TO WORK IN THE DRY. IF THE METHOD INVOLVES PHYSICAL MODIFICATION OF THE DAM SUCH AS DRILLING OR NOTCHING IT CAN BE DONE ONLY WITH APPROVAL OF THE CONTRACTING OFFICER'S REPRESENTATIVE. IF THE POOL REESTABLISHES ITSELF AFTER A STORM EVENT IT IS TO BE DRAINED BEFORE CONSTRUCTION CAN CONTINUE.
3. WITH THE POOL DRAINED DOWN CARE AND DIVERSION OF WATER IS TO BE MAINTAINED SO EARTHWORK CAN PROCEED IN THE DRY. ANY DAMAGE TO PARTIALLY COMPLETED WORK CAUSED BY FLOOD FLOWS WILL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
4. CONSTRUCT THE TWO ACCESS RAMPS TO THE CREEK AS SHOWN ON THE PLANS. ARMOR THE RAMPS TO PROTECT FROM FLOOD FLOWS AS SHOWN ON THE DETAILS. THE ACCESS RAMP AT STATION 5+75 IS THE APPROXIMATE LOCATION WHERE THE EXISTING AND WITH PROJECT CHANNEL ELEVATION IS UNCHANGED. THE ACCESS RAMP AT STATION 3+50 IS UPSTREAM OF THE HIGH POINT OF THE NEW CHANNEL AND PROVIDES ACCESS FOR A SOURCE OF SAND FOR CHANNEL RE-GRADING IF NEEDED.
5. MAINTAIN THE DAM UNTIL THE CHANNEL BOTTOM UPSTREAM OF IT IS COMPLETELY STABILIZED AND THE SIDE SLOPES ARE COVERED WITH AN EROSION CONTROL MAT. THE DAM WILL SERVE AS A SEDIMENT TRAP DURING CONSTRUCTION. THERE IS A NATURAL SAND RAMP ON THE UPSTREAM FACE OF THE DAM. AS PART OF THE UPSTREAM CHANNEL WORK THIS SAND IS TO BE EXCAVATED FIRST IN ORDER TO INCREASE THE EFFICIENCY OF THE DAM AS A SEDIMENT TRAP. SEDIMENT THAT ACCUMULATES AT THE UPSTREAM FACE OF THE DAM DURING CONSTRUCTION IS TO BE REMOVED PER THE DIRECTION OF THE CONTRACTING OFFICER'S REPRESENTATIVE.

REACH DOWNSTREAM OF WOODLAND DAM

1. AS SHOWN ON THE PLANS, ACCUMULATED SEDIMENT DOWNSTREAM OF THE DAM IS TO BE REMOVED. SINCE THE EXCAVATED MATERIAL IS TO BE USED IN THE UPSTREAM CHANNEL RE-GRADING, IT MUST BE REMOVED BEFORE THE UPSTREAM REACH IS COMPLETED. THE DAM CAN BE USED AS A WORKING PLATFORM FOR AN EXCAVATOR TO REMOVE THE DOWNSTREAM SEDIMENT. THE MOST EFFICIENT COURSE OF ACTION MAYBE THE AUGMENTATION OF THE EXISTING SAND RAMP TO BUILD A STABLE PLATFORM FOR THE EXCAVATOR AND THE EXCAVATION OF THE DOWNSTREAM SEDIMENT BEFORE WORK BEGINS ON THE UPSTREAM CHANNEL. (THE SAND PILED AGAINST THE UPSTREAM FACE OF THE DAM, FROM WHATEVER SOURCE, IS TO BE REMOVED BEFORE CONSTRUCTION OF THE UPSTREAM CHANNEL BEGINS.)
2. A SMALL AREA OF THE DOWNSTREAM EXCAVATION ZONES HAS HISTORICAL SIGNIFICANCE. PROTECTIVE MEASURES OF THIS AREA ARE TO BE AT THE DIRECTION OF THE CONTRACTING OFFICER'S REPRESENTATIVE.

DEMOLITION OF WOODLAND DAM

1. WHEN THE CHANNEL WORK UPSTREAM OF THE DAM IS COMPLETE THE DAM CAN BE DEMOLISHED AND THE UPSTREAM CHANNEL TIED INTO A RE-GRADED CHANNEL DOWNSTREAM OF THE DAM AS SHOWN ON THE PLANS.
2. THE DAM IS TO BE DEMOLISHED IN HORIZONTAL LIFTS IN-ORDER TO MAINTAIN STRUCTURAL CONTINUITY AT ANY HEIGHT.
3. RUBBLE FROM THE DAM IS TO BE DEPOSITED OFF OFFSITE IN AN APPROPRIATE MANNER,

EROSION AND SEDIMENT POLLUTION CONTROL SITE NOTES:

1. THE EROSION AND SEDIMENT CONTROL MEASURES SPECIFIED ON THE PLANS REPRESENT WORKABLE AND EFFECTIVE MEANS FOR CONTROLLING POTENTIAL EROSION AND SEDIMENTATION RESULTING FROM THE PROPOSED WORK. REVISIONS TO THE SPECIFIED EROSION AND SEDIMENT CONTROL MEASURES ARE ALLOWED FOLLOWING APPROVAL BY THE CONTRACTING OFFICER'S REPRESENTATIVE AND THE PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION.
2. THE CONTRACTOR MUST SUBMIT A MAINTENANCE OF STREAM FLOW PLAN THAT INCLUDES SPECIFIC MEASURES TO DIVERT STREAM FLOW AROUND THE WORK AREA AND PROVIDES A SEQUENCE FOR THE INSTALLATION AND REMOVAL OF MAINTENANCE OF STREAM FLOW BMPS. SUBMIT THE PLAN TO THE PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION FOR APPROVAL. PROVIDE A COPY OF THE APPROVAL TO THE CONTRACTING OFFICER'S REPRESENTATIVE PRIOR TO STARTING WORK.
3. FLOW DIVERSION TECHNIQUES CHOSEN BY THE CONTRACTOR, SPECIFIED ON THE CONTRACTOR'S MAINTENANCE OF STREAM FLOW PLAN, AND APPROVED BY THE PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION, WILL BECOME PART OF THIS EROSION AND SEDIMENT POLLUTION CONTROL PLAN.
4. WHENEVER POSSIBLE SCHEDULE WORK FOR LOW FLOW SEASONS. IN STREAM WORK SHALL BE CONDUCTED DURING PERIODS OF DRY WEATHER, TYPICALLY 2 TO 3 DAYS OF CONTINUOUS DRY CONDITIONS AND NORMAL LOW FLOW CONDITIONS.
5. THE CONTRACTOR SHALL FOLLOW FORECASTED WEATHER CONDITIONS AND IS RESPONSIBLE TO STABILIZE ALL EXPOSED AREAS PRIOR TO A STORM EVENT. FOLLOWING WORK ZONE STABILIZATION AND APPROVAL BY THE CONTRACTING OFFICER'S REPRESENTATIVE, STREAM FLOW DIVERSIONS SHALL BE REMOVED PRIOR TO A STORM EVENT.
6. FOR IN-CHANNEL WORK, CONVEY FLOW PAST THE WORK AREA BY MEANS OF A BYPASS CHANNEL, PIPE, PUMP, AND/OR COFFERDAM. FLOW DIVERSIONS MUST BE COMPLETED AND STABILIZED PRIOR TO STREAM CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR BEING ABLE TO CONVEY AT LEAST THE 1-YEAR FREQUENCY STORM FLOW WHERE WORK REQUIRING DRY CONDITIONS WILL TAKE LONGER THAN 3 DAYS. THE 1-YEAR FREQUENCY STORM FLOW FOR COBBS CREEK AT THE PROJECT SITE IS 1020 CFS. BASE FLOW FOR COBBS CREEK RANGES FROM 7CFS TO 20CFS (11 CFS AVERAGE).
7. SANDBAG COFFERDAMS MAY BE ENTIRELY OR PARTIALLY REMOVED AND STREAM FLOW ALLOWED TO ENTER THE WORK ZONE UPON STABILIZATION OF DISTURBED AREAS AND APPROVAL BY THE CONTRACTING OFFICER'S REPRESENTATIVE.
8. IF REQUIRED, THE PIPE FLUME OR PUMP BYPASS MAY BE MOVED DURING CONSTRUCTION. THE CONTRACTOR WILL ENSURE THAT THE HEADWATER AT THE UPSTREAM SANDBAG COFFERDAM DOES NOT OVERFLOW INTO THE CONSTRUCTION SITE.
9. DISTURBED AREAS WITHIN THE STREAM CHANNEL SHOULD BE COMPLETED AND STABILIZED BEFORE FLOW IS REDIRECTED INTO THE STREAM CHANNEL. DISTURBED AREAS SHALL BE STABILIZED WITHIN 3 DAYS OF INITIAL DISTURBANCE. SUITABLE PROTECTION SHALL BE PROVIDED FOR THE STREAM CHANNEL FROM DISTURBED AREAS THAT HAVE NOT YET ACHIEVED STABILIZATION.
10. EXCAVATED CHANNEL MATERIALS THAT WILL BE SUBSEQUENTLY USED AS BACKFILL SHOULD BE PLACED IN TEMPORARY STOCKPILE AREAS AS DESIGNATED ON THE PLANS OR AS APPROVED BY THE CONTRACTING OFFICER'S REPRESENTATIVE, THAT ARE LOCATED OUTSIDE THE CHANNEL AS FAR AS POSSIBLE FROM THE STREAM BANK, AWAY FROM WETLANDS AND WITHIN THE DESIGNATED LIMIT OF DISTURBANCE. STOCKPILE AREAS OTHER THAN THOSE DESIGNATED ON THE PLANS SHALL BE APPROVED BY THE PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION. BEFORE INSTALLATION STOCKPILE AREA SHALL HAVE EROSION AND SEDIMENT CONTROLS INSTALLED IN ACCORDANCE WITH THE PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION'S EROSION AND SEDIMENT POLLUTION CONTROL PROGRAM MANUAL (MARCH 2012).
11. COBBS CREEK IS CLASSIFIED BY THE PENNSYLVANIA CODE, TITLE 25 CHAPTER 93 AS POSSESSING A PROTECTED WATER USE DESIGNATION OF WARM WATER FISHES (WWF). COBBS CREEK IS ALSO CLASSIFIED BY THE PENNSYLVANIA FISH AND BOAT COMMISSION AS NOT BEING WILD TROUT WATERS. THEREFORE, THERE ARE NO SEASONAL RESTRICTIONS ON IN-STREAM CONSTRUCTION ACTIVITIES.

EROSION AND SEDIMENT POLLUTION CONTROL INSTALLATION AND MAINTENANCE:

1. THE CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION, MAINTENANCE AND DISPOSAL OF EROSION AND SEDIMENT POLLUTION CONTROL FACILITIES. PERFORM THESE ACTIVITIES IN ACCORDANCE WITH CONTRACT SPECIFICATIONS AS INDICATED. UNTIL THE SITE IS STABILIZED ALL EROSION AND SEDIMENT POLLUTION CONTROL DEVICES MUST BE PROPERLY MAINTAINED. MAINTENANCE INCLUDES INSPECTION OF ALL EROSION AND SEDIMENT POLLUTION CONTROL DEVICES DAILY AND AFTER EACH STORM RUNOFF EVENT. MAINTENANCE INCLUDES BUT IS NOT LIMITED TO THE REMOVAL OF DEBRIS FROM DEWATERING FILTERS AND THE RE-GRADING AND RESEEDING OF WASHED OUT AREAS ON THE PROJECT SITE. ALL PREVENTIVE AND REMEDIAL MAINTENANCE WORK, INCLUDING CLEAN OUT, REPAIR AND REPLACEMENT, RE-GRADING, RESEEDING AND RE-MULCHING AND RE-NETTING MUST BE PERFORMED IMMEDIATELY. IF EROSION AND SEDIMENT POLLUTION CONTROL BMPS FAIL TO PERFORM AS EXPECTED, REPLACEMENT BMPS OR MODIFICATIONS OF THOSE INSTALLED WILL BE REQUIRED.
2. SEEDING AND MULCHING

   MAINTAIN SEEDING AND MULCHING IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS. REAPPLY SOIL SUPPLEMENTS AND RESEED IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS. REAPPLY MULCH MATERIALS AND REPLACE IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS.
3. ROCK CONSTRUCTION ENTRANCES

   MAINTAIN THE ROCK CONSTRUCTION ENTRANCE THICKNESS TO THE SPECIFIED DIMENSION BY ADDING ROCK. MAINTAIN A STOCKPILE OF ROCKY MATERIAL ON SITE FOR THIS PURPOSE. AT THE END OF EACH CONSTRUCTION DAY, REMOVE SEDIMENT DEPOSITED ON PUBLIC ROADWAYS AND RETURN TO THE CONSTRUCTION SITE. WASHING OF THE ROADWAY WITH WATER IS NOT PERMITTED.
4. SEDIMENT AND FILTER BAG

   INSPECT SEDIMENT FILTER BAGS DAILY. IF ANY PROBLEM IS DETECTED, REPLACE DAMAGED BAG WITH NEW BAG IMMEDIATELY. REPLACE SEDIMENT FILTER BAGS WHEN THEY BECOME ONE HALF (1/2) FULL OR DAMAGED. KEEP REPLACEMENT BAGS AVAILABLE ON SITE.
5. SANDBAG COFFERDAM

   INSPECT SANDBAGS AND POLYETHYLENE LINING DAILY AND AFTER EACH STORM RUNOFF EVENT. INITIATE NEEDED REPAIRS IMMEDIATELY AFTER INSPECTION. REPLACE OR REPAIR DAMAGE SANDBAGS AND POLYETHYLENE LINING.
6. BYPASS CHANNEL, PIPE FLUME, PUMP BYPASS AND/OR DIVERSION

   ENSURE THAT STREAM FLOW DIVERSION DEVICES ARE FUNCTIONING PROPERLY ON A DAILY BASIS. INSPECT THE BYPASS CHANNEL, PIPES, PUMPS AND VELOCITY DISSIPATERS DAILY AND AFTER EACH STORM RUNOFF EVENT. CLEAN OUT SEDIMENT FROM DEVICES AND REPAIR AND REPLACE DAMAGED COMPONENTS IMMEDIATELY FOLLOWING INSPECTION. DURING INSPECTION ENSURE THAT EROSION IS NOT OCCURRING WHERE THE FLOW IS RE-INTRODUCED INTO THE STREAM CHANNEL.
7. SILT BARRIER FENCE

   INSPECT THE SILT BARRIER FENCE DAILY AND ANY AFTER STORM RUNOFF EVENT. AFTER REVIEWING THE RESULTS OF THE INSPECTION WITH THE CONTRACTING OFFICER'S REPRESENTATIVE, IMMEDIATELY CLEAN, REPAIR, OR REPLACE SILT BARRIER FENCE FOUND TO BE IN UNSATISFACTORY CONDITION. ACCUMULATED SEDIMENT SHOULD BE REMOVED WHEN IT REACHES ONE-HALF (1/2) OF THE ABOVE GROUND HEIGHT OF THE FENCE. UNDERCUTTING OR EROSION OF THE TOE ANCHOR SHOULD BE REPAIRED IMMEDIATELY WITH COMPACTED BACKFILL MATERIALS. ADHERE TO MANUFACTURER'S RECOMMENDATIONS FOR REPLACING THE SILT BARRIER FENCE DUE TO WEATHERING.
8. ACCESS PATH

   ADD WOOD CHIPS AS REQUIRED TO MAINTAIN A 4INCH DEPTH OF COVER OF THE ACCESS PATH ALONG THE LEFT BANK OF COBBS CREEK.

MAINTENANCE OF STREAM FLOW AND CHANNEL STABILIZATION:

1. INSTALL THE UPSTREAM SANDBAG COFFERDAM AND BYPASS CHANNEL, PIPE FLUME, PUMP BYPASS, AND/OR DIVERSION SO THAT THE STREAM FLOW DOES NOT OVERTOP THE FINISHED ELEVATION OF THE UPSTREAM SANDBAG COFFERDAM. IF PIPING IS CHOSEN A STABLE VELOCITY DISSIPATER SHOULD BE INSTALLED PRIOR TO INITIATING THE DIVERSION OF WATER AROUND THE WORK AREA. ONCE THE UPSTREAM SANDBAG COFFERDAM HAS BEEN INSTALLED AND THE BYPASS CHANNEL, PIPE FLUME, PUMP BYPASS AND/OR DIVERSION IS FUNCTIONING PROPERLY, INSTALL THE DOWNSTREAM SANDBAG COFFERDAM.
2. DEWATER THE WORK AREA AS NECESSARY USING A SEDIMENT FILTER BAG OR OTHER ACCEPTABLE MEASURE.
3. OBTAIN APPROVAL FROM THE ENGINEER THAT THE WORK HAS BEEN PROPERLY STABILIZED BEFORE REMOVING THE STREAM FLOW DIVERSION DEVICES TO ALLOW STREAM FLOW THROUGH THE RESTORED WORK AREA.
4. THE UPSTREAM AND DOWNSTREAM SANDBAG COFFERDAMS SHOULD BE REMOVED SO THAT THE STREAM FLOW IS REINTRODUCED TO THE STABILIZED WORK AREA INCREMENTALLY.
5. CLEAR AND GRUB ONLY WITHIN THE LIMITS OF GRADING THAT WILL BE COMPLETED AND STABILIZED WITHIN A 3 DAY PERIOD OF PREDICTED DRY WEATHER.
6. PERFORM RESTORATION WORK INCLUDING CHANNEL EXCAVATION, CHANNEL RE-GRADING AND CHANNEL BOTTOM AND BANK STABILIZATION TREATMENTS AS DETAILED IN THE PLANS, DETAILS AND SPECIFICATIONS. SEPARATELY STOCKPILE EXCAVATED ROCK, CHANNEL BED MATERIAL, TOPSOIL AND COMMON EMBANKMENT MATERIAL AT DESIGNATED STOCKPILE AREAS.
7. STABILIZE DISTURBED AREAS WITH SEEDING AND NATURAL FIBER MAT AS PER LANDSCAPE PLANS, DETAILS AND SPECIFICATIONS.
8. LIVE STAKE, SHRUB AND TREE PLANTINGS MAY BE INSTALLED ON PERMANENTLY STABILIZED LOCATIONS DURING APPROPRIATE PLANTING SEASONS AS PER LANDSCAPE PLANS, DETAILS AND SPECIFICATIONS.
9. WHEN STABILIZATION OF A CHANNEL CONSTRUCTION AREA IS COMPLETE AND WITH APPROVAL BY THE CONTRACTING OFFICER'S REPRESENTATIVE, REMOVE ALL APPLICABLE SEDIMENT CONTROL MEASURES. PERMANENTLY STABILIZE THE AREAS DISTURBED BY THE REMOVAL OF THE SEDIMENT CONTROL MEASURES IMMEDIATELY.

SITE STABILIZATION:

1. ANY DISTURBED AREA ON WHICH ACTIVITY HAS CEASED AND WHICH WILL REMAIN EXPOSED MUST BE STABILIZED IMMEDIATELY. DURING NON-GERMINATING PERIODS, MULCH MUST BE APPLIED AT THE RECOMMENDED RATES. DISTURBED AREAS WHICH ARE NOT AT FINISHED GRADE AND WHICH WILL BE RE-DISTURBED WITHIN ONE YEAR WILL BE STABILIZED IN ACCORDANCE WITH TEMPORARY SEEDING AND MULCHING SPECIFICATIONS. PROVIDE SEEDBED PREPARATION, SOIL SUPPLEMENTS, SEEDING AND MULCHING IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS.
2. DISTURBED AREAS THAT EITHER ARE AT FINISHED GRADE OR WILL NOT BE RE-DISTURBED WITHIN ONE YEAR MUST BE STABILIZED IN ACCORDANCE WITH PERMANENT SEEDING SPECIFICATIONS FOR RIPARIAN SEEDING AND NATIVE SEEDING AND MULCHING. PROVIDE SEEDBED PREPARATION, SOIL SUPPLEMENTS, SEEDING AND MULCH IN ACCORDANCE WITH CONTRACT SPECIFICATIONS.
3. IN ALL AREAS OF TEMPORARY ACCESS, STAGING AND STOCKPILE AREAS THE GROUND SHALL BE DE-COMPACTED AND RESTORED TO THE ORIGINAL GRADE PRIOR TO ANY CONSTRUCTION ACTIVITIES.
4. AN AREA SHALL BE CONSIDERED TO HAVE ACHIEVED FINAL STABILIZATION WHEN IT HAS A MINIMUM OF 70% UNIFORM PERENNIAL VEGETATIVE COVER WITH A DENSITY SUFFICIENT TO RESIST ACCELERATED SURFACE EROSION AND SUBSURFACE CHARACTERISTICS SUFFICIENT TO RESIST SLIDING OR OTHER MOVEMENTS. AFTER THE UNIFORM 70% EROSION RESISTANT VEGETATIVE COVER IS ESTABLISHED, CONTACT THE PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION FOR INSPECTION AND SUBSEQUENT APPROVAL.
5. EACH PHASE OF WORK SHALL BE CONSIDERED STABILIZED AFTER COMPLETION OF GRADING, SEEDING, AND INSTALLATION OF EROSION CONTROL MATTING AS APPROVED BY THE CONTRACTING OFFICER'S REPRESENTATIVE.
6. NATURAL FIBER MAT MUST BE INSTALLED ON ALL STREAM BANK SLOPES. FURNISH AND INSTALL IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS.
7. UPON COMPLETION OF RESTORATION WORK REMOVE REMAINING SEDIMENT CONTROL MEASURES INCLUDING ROCK CONSTRUCTION ENTRANCES, CONSTRUCTION ACCESS WAYS AND STAGING AND STOCKPILE AREAS. FINISH GRADE AND PERMANENTLY STABILIZE THESE AREAS IMMEDIATELY AFTER THEY ARE REMOVED. RESTORE DISTURBED PORTIONS OF THE LEFT OVERBANK OF COBBS CREEK BY REMOVING RUTS AND STABILIZE WITH NATIVE SEEDING AND MULCHING AS PER SPECIFICATIONS.
8. AFTER FINAL SITE STABILIZATION HAS BEEN ACHIEVED AND RELEASED BY THE PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION DEMOBILIZE AND PHILADELPHIA PARKS AND RECREATION FROM THE SITE.

PERMANENT MAINTENANCE OPERATIONS:

UPON COMPLETION OF THE PROJECT, THE MAINTENANCE OF THE PERMANENT EROSION AND SEDIMENT POLLUTION CONTROLS BECOME PART OF THE PHILADELPHIA WATER DEPARTMENT'S REGULAR MAINTENANCE PROGRAM. THIS INCLUDES PERIODIC INSPECTIONS (AT LEAST ONCE A YEAR) AND REQUIRED REPAIRS OF FACILITIES.

US Army Corps of Engineers
Philadelphia District

U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390

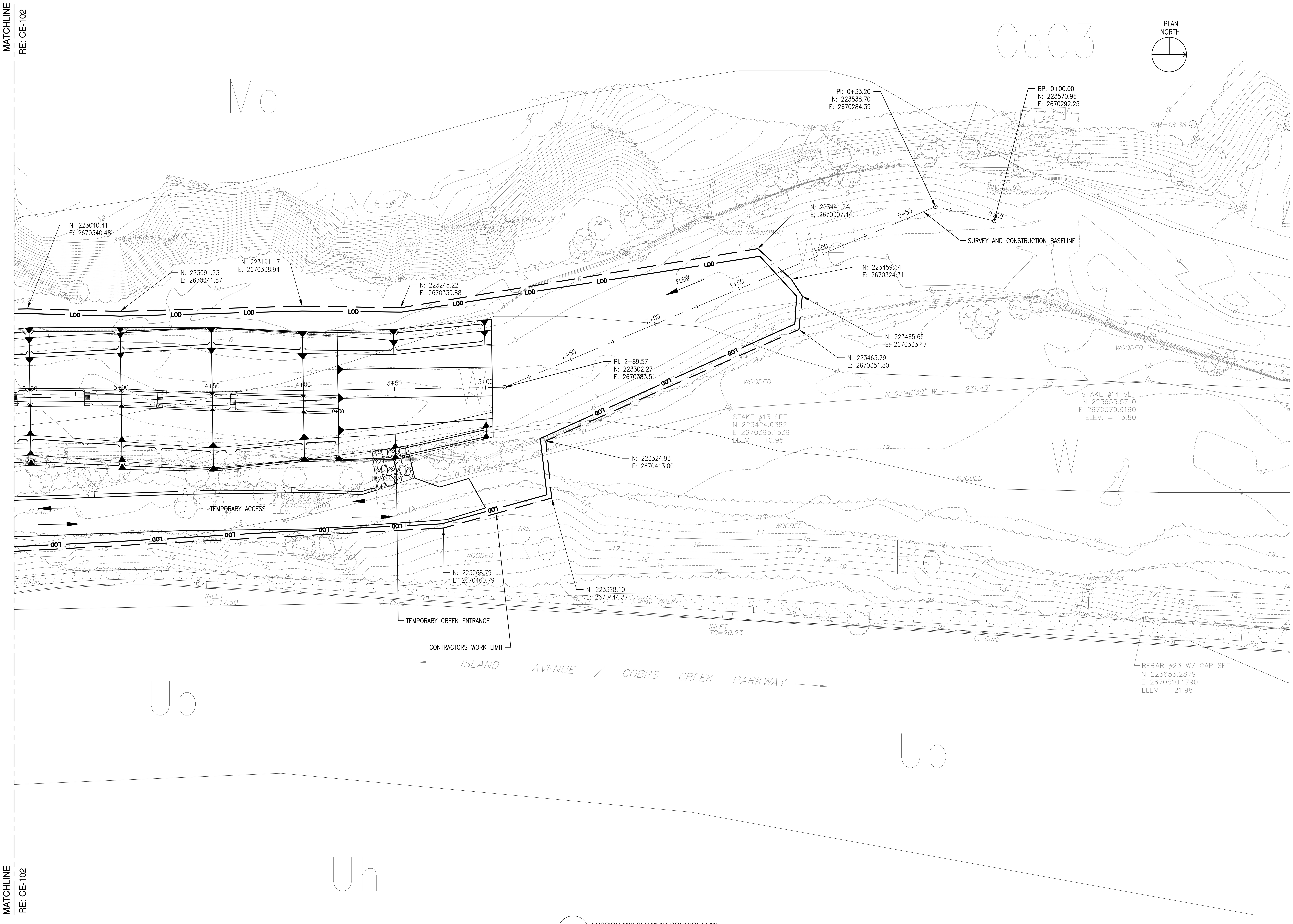
PHILADELPHIA COUNTY, PENNSYLVANIA

COBBS CREEK FISH PASSAGE - WOODLAND DAM REMOVAL

EROSION AND SEDIMENT CONTROL NOTES

SHEET NUMBER

CE-001



1 EROSION AND SEDIMENT CONTROL PLAN
SCALE: AS SHOWN

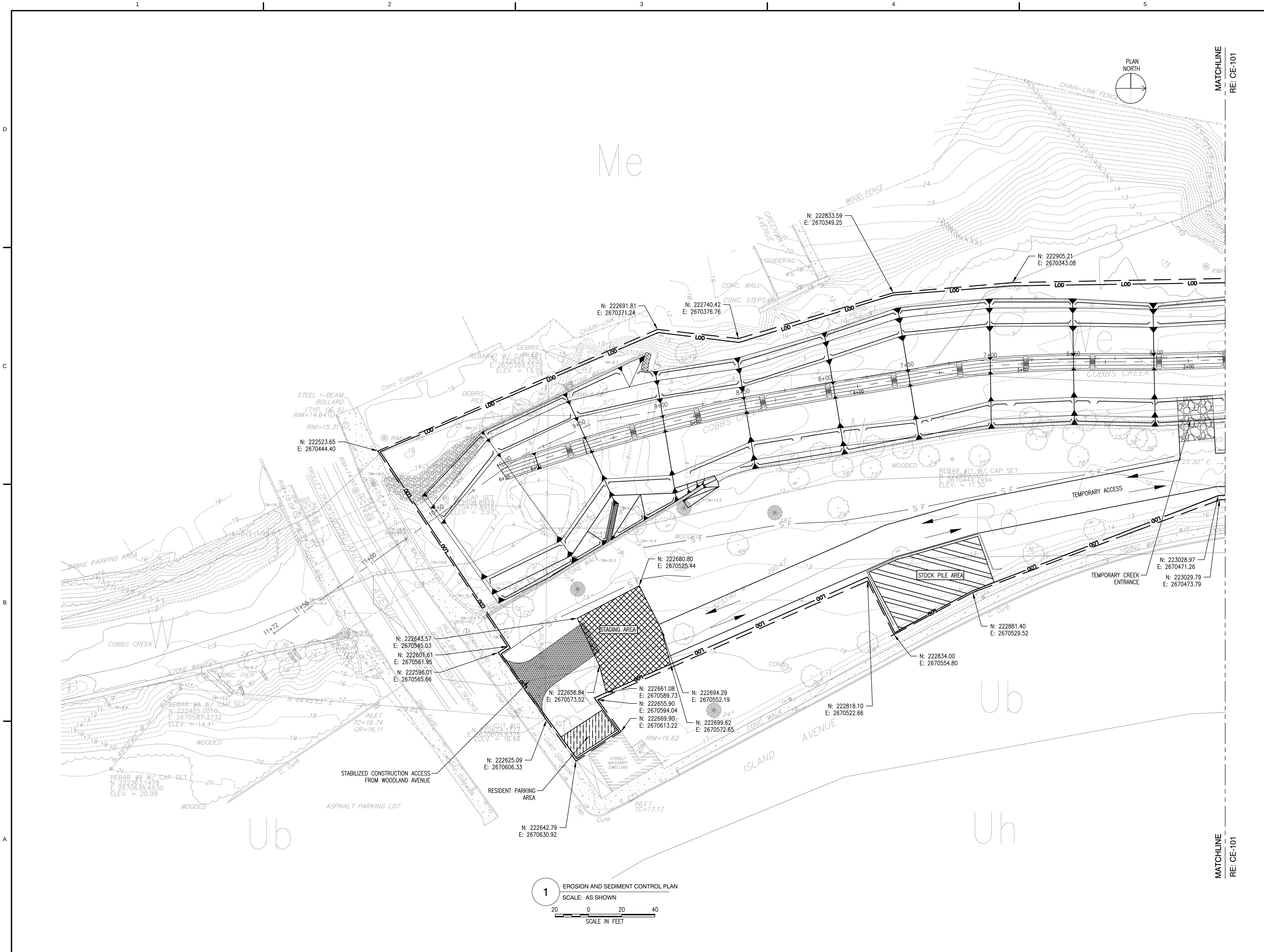
20 0 20 40
SCALE IN FEET

US Army Corps of Engineers
Philadelphia District

U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390
www.nap.usace.army.mil

PHILADELPHIA COUNTY, PENNSYLVANIA
—
COBBS CREEK FISH
PASSAGE - WOODLAND DAM REMOVAL
EROSION AND SEDIMENT CONTROL PLAN

SHEET NUMBER
CE-101



US Army Corps of Engineers Philadelphia District

MARK	ACTION	DESCRIPTION	DATE	BY

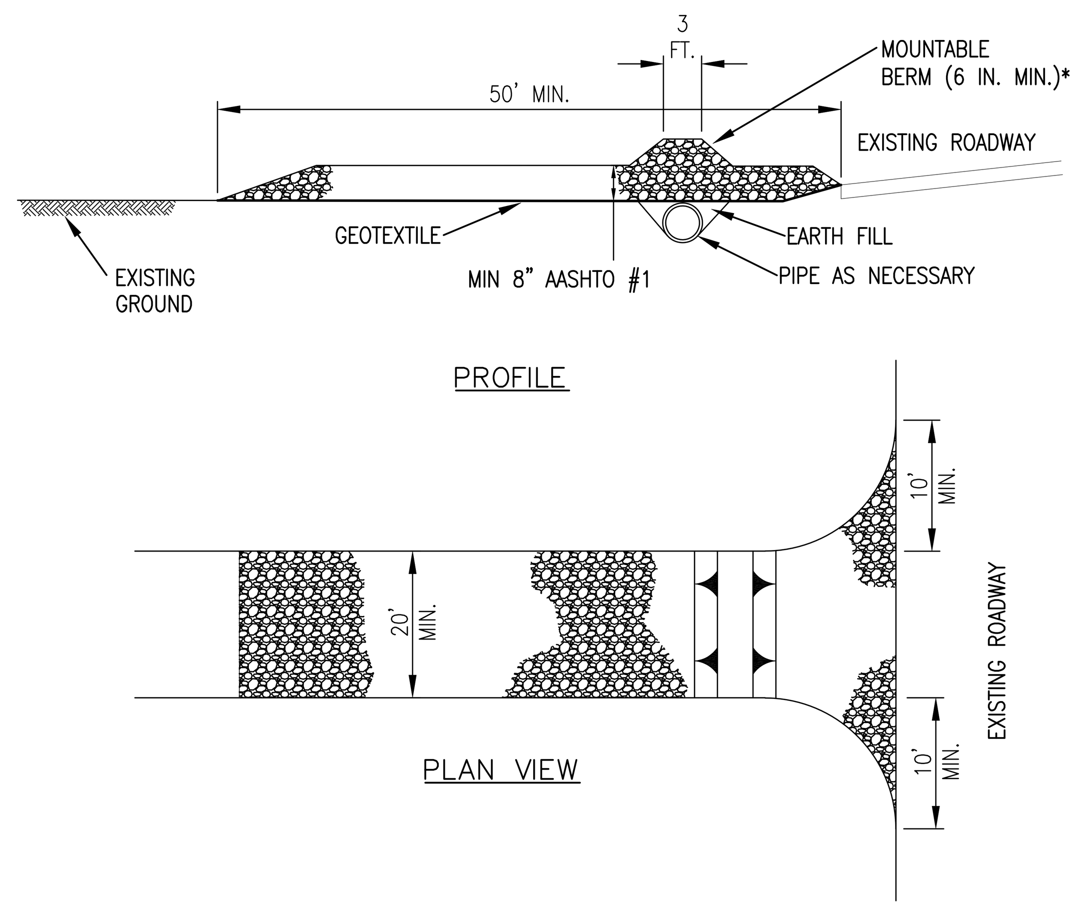
U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390
www.nap.usace.army.mil

DWN BY: DTB	DESIGNED BY: DTB	ISSUE/RELEASE DATE: 19 JAN 2016
CKD BY: DAN	REVIEWED BY: TEH	PROJ. NUMBER: -
		SOLICITATION NUMBER: IFB W912BU-16-B-00XX
DWG SCALE: AS SHOWN		CONTRACT NUMBER: —
DWG. SIZE: 30"x42" Arch E1	FILE NAME: CE-102 EROSION AND SEDIMENT CONTROL PLAN - STA. 5+50 TO 11+72.dwg	

PHILADELPHIA COUNTY, PENNSYLVANIA

COBBS CREEK FISH PASSAGE - WOODLAND DAM REMOVAL
EROSION AND SEDIMENT CONTROL PLAN
-

SHEET NUMBER
CE-102

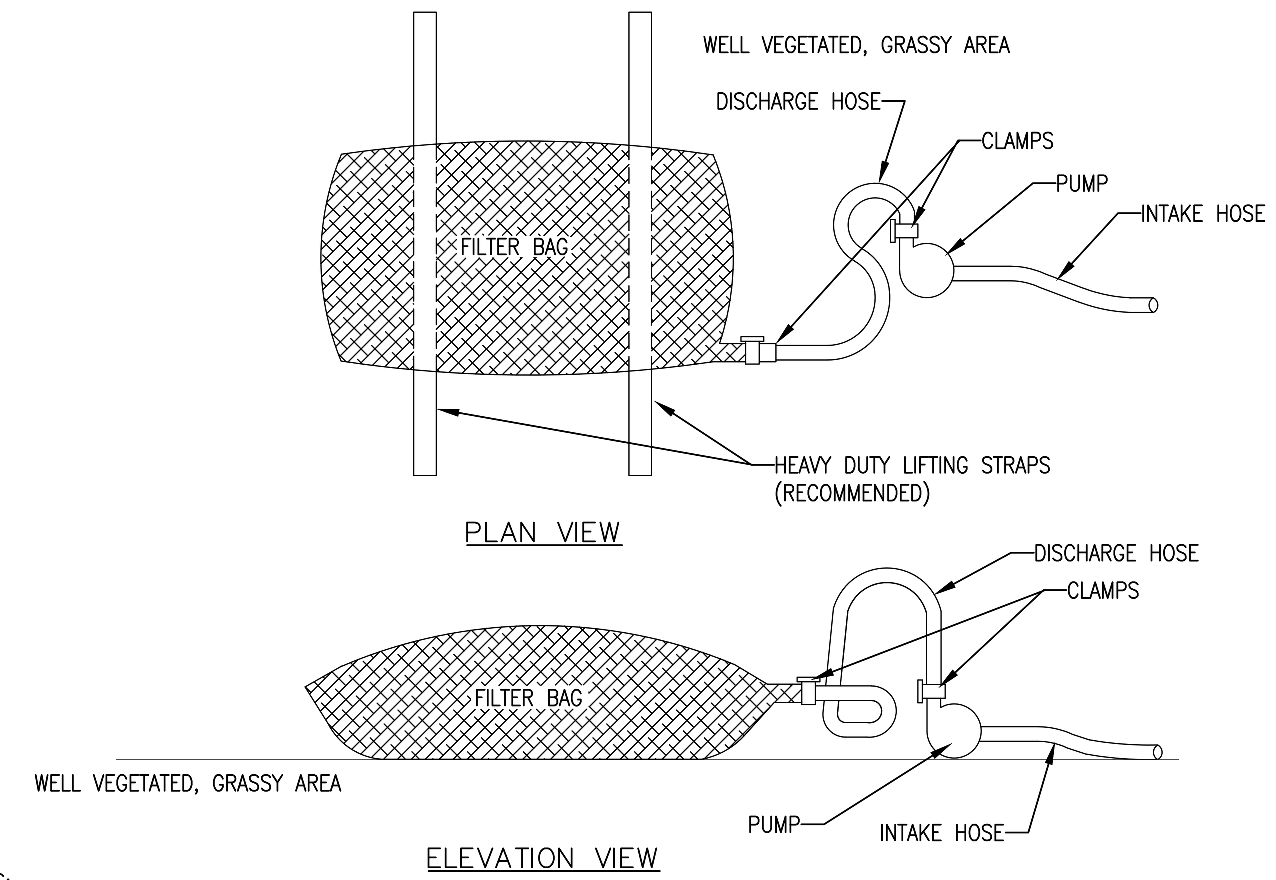


* MOUNTABLE BERM USED TO PROVIDE PROPER COVER FOR PIPE

NOTES:

1. REMOVE TOPSOIL PRIOR TO INSTALLATION OF ROCK CONSTRUCTION ENTRANCE. EXTEND ROCK OVER FULL WIDTH OF ENTRANCE.
2. RUNOFF SHALL BE DIVERTED FROM ROADWAY TO A SUITABLE SEDIMENT REMOVAL BMP PRIOR TO ENTERING ROCK CONSTRUCTION ENTRANCE.
3. MOUNTABLE BERM SHALL BE INSTALLED WHEREVER OPTIONAL CULVERT PIPE IS USED AND PROPER PIPE COVER AS SPECIFIED BY MANUFACTURER IS NOT OTHERWISE PROVIDED. PIPE SHALL BE SIZED APPROPRIATELY FOR SIZE OF DITCH BEING CROSSED.
4. MAINTENANCE: ROCK CONSTRUCTION ENTRANCE THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS BY ADDING ROCK. A STOCKPILE SHALL BE MAINTAINED ON SITE FOR THIS PURPOSE. ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE IMMEDIATELY. IF EXCESSIVE AMOUNTS OF SEDIMENT ARE BEING DEPOSITED ON ROADWAY, EXTEND LENGTH OF ROCK CONSTRUCTION ENTRANCE BY 50 FOOT INCREMENTS UNTIL CONDITION IS ALLEVIATED OR INSTALL WASH RACK. WASHING THE ROADWAY OR SWEEPING THE DEPOSITS INTO ROADWAY DITCHES, SEWERS, CULVERTS, OR OTHER DRAINAGE COURSES IS NOT ACCEPTABLE.

1 DETAIL - ROCK CONSTRUCTION ENTRANCE
SCALE: NOT TO SCALE



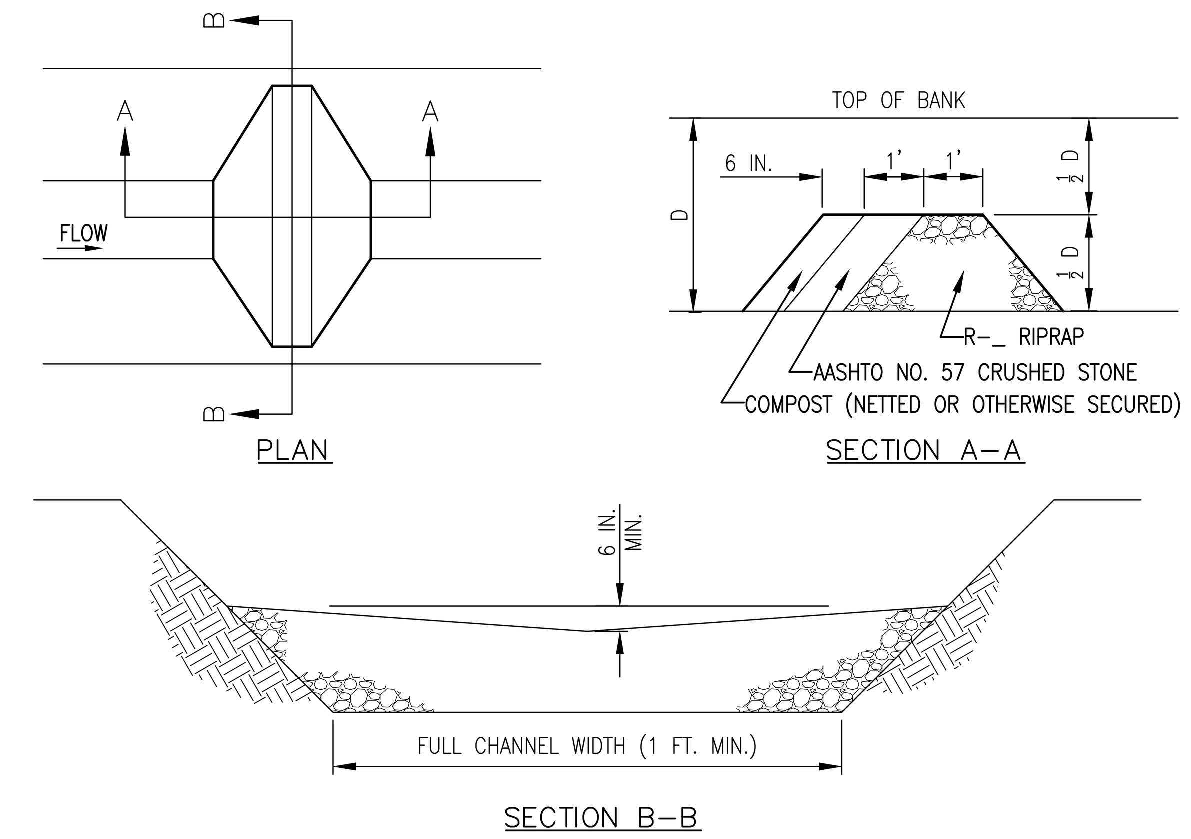
NOTES:

1. LOW VOLUME FILTER BAGS SHALL BE MADE FROM NON-WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH STRENGTH, DOUBLE STITCHED "J" TYPE SEAMS. THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THAN 150 MICRONS. HIGH VOLUME FILTER BAGS SHALL BE MADE FROM WOVEN GEOTEXTILES THAT MEET THE FOLLOWING STANDARDS:

PROPERTY	TEST METHOD	MINIMUM STANDARD
AVG. WIDE WIDTH STRENGTH	ASTM D-4884	60 LB/IN
GRAB TENSILE	ASTM D-4632	205 LB
PUNCTURE	ASTM D-4833	110 LB
MULLEN BURST	ASTM D-3786	350 PSI
UV RESISTANCE	ASTM D-4355	70%
AOS % RETAINED	ASTM D-4751	80 SIEVE

2. A SUITABLE MEANS OF ACCESSING THE BAG WITH MACHINERY REQUIRED FOR DISPOSAL PURPOSES SHALL BE PROVIDED. FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME 1/2 FULL OF SEDIMENT. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FAILED OR ARE FILLED. BAGS SHALL BE PLACED ON STRAPS TO FACILITATE REMOVAL UNLESS BAGS COME WITH LIFTING STRAPS ALREADY ATTACHED.
3. BAGS SHALL BE LOCATED IN WELL-VEGETATED (GRASSY) AREA, AND DISCHARGE ONTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE UNDERLAYMENT AND FLOW PATH SHALL BE PROVIDED. BAGS MAY BE PLACED ON FILTER STONE TO INCREASE DISCHARGE CAPACITY. BAGS SHALL NOT BE PLACED ON SLOPES GREATER THAN 5%. FOR SLOPES EXCEEDING 5%, CLEAN ROCK OR OTHER NON-ERODIBLE AND NON-POLLUTING MATERIAL MAY BE PLACED UNDER THE BAG TO REDUCE SLOPE STEEPNESS.
4. NO DOWNSLOPE SEDIMENT BARRIER IS REQUIRED FOR MOST INSTALLATIONS. COMPOST BERM OR COMPOST FILTER SOCK SHALL BE INSTALLED BELOW BAGS LOCATED IN HQ OR EV WATERSHEDS, WITHIN 50 FEET OF ANY RECEIVING SURFACE WATER OR WHERE GRASSY AREA IS NOT AVAILABLE.
5. THE PUMP DISCHARGE HOSE SHALL BE INSERTED INTO THE BAGS IN THE MANNER SPECIFIED BY THE MANUFACTURER AND SECURELY CLAMPED. A PIECE OF PVC PIPE IS RECOMMENDED FOR THIS PURPOSE.
6. THE PUMPING RATE SHALL BE NO GREATER THAN 750 GPM OR 1/2 THE MAXIMUM SPECIFIED BY THE MANUFACTURER, WHICHEVER IS LESS. PUMP INTAKES SHALL BE FLOATING AND SCREENED.
7. FILTER BAGS SHALL BE INSPECTED DAILY. IF ANY PROBLEM IS DETECTED, PUMPING SHALL CEASE IMMEDIATELY AND NOT RESUME UNTIL THE PROBLEM IS CORRECTED.

2 DETAIL - PUMPED WATER FILTER BAG
SCALE: NOT TO SCALE



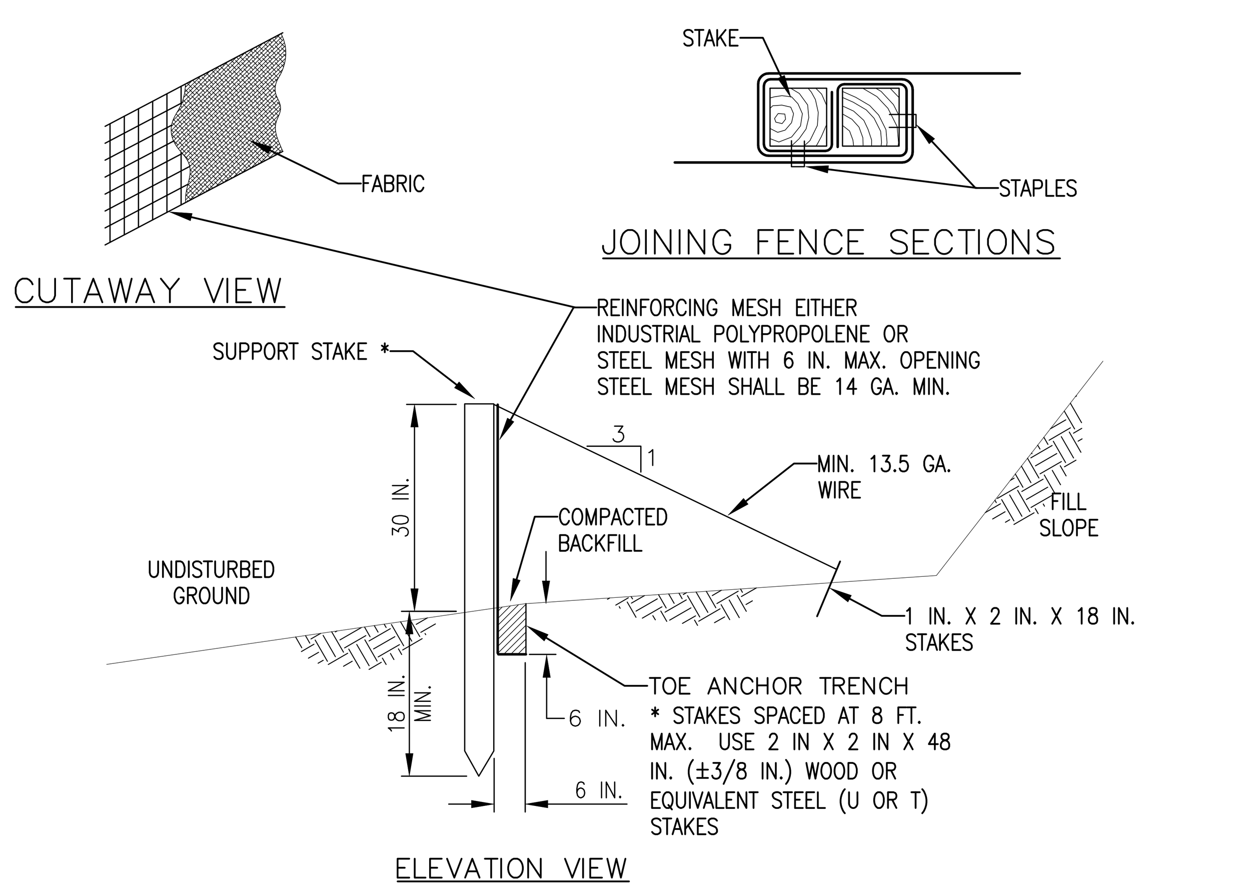
ROCK FILTER NO.	LOCATION	D (FT)	RIPRAP SIZE (R-_)
88	1234567890	88	8

FOR D ≥ 3 FT. - USE R-4
FOR D ≥ 2 FT. TO D < 3 FT. - USE R-3
NOT APPLICABLE FOR D < 2 FT.

NOTES:

1. SEDIMENT MUST BE REMOVED WHEN ACCUMULATIONS REACH 1/2 THE HEIGHT OF THE FILTERS.
2. IMMEDIATELY UPON STABILIZATION OF EACH CHANNEL, REMOVE ACCUMULATED SEDIMENT, REMOVE ROCK FILTER, AND STABILIZE DISTURBED AREAS.

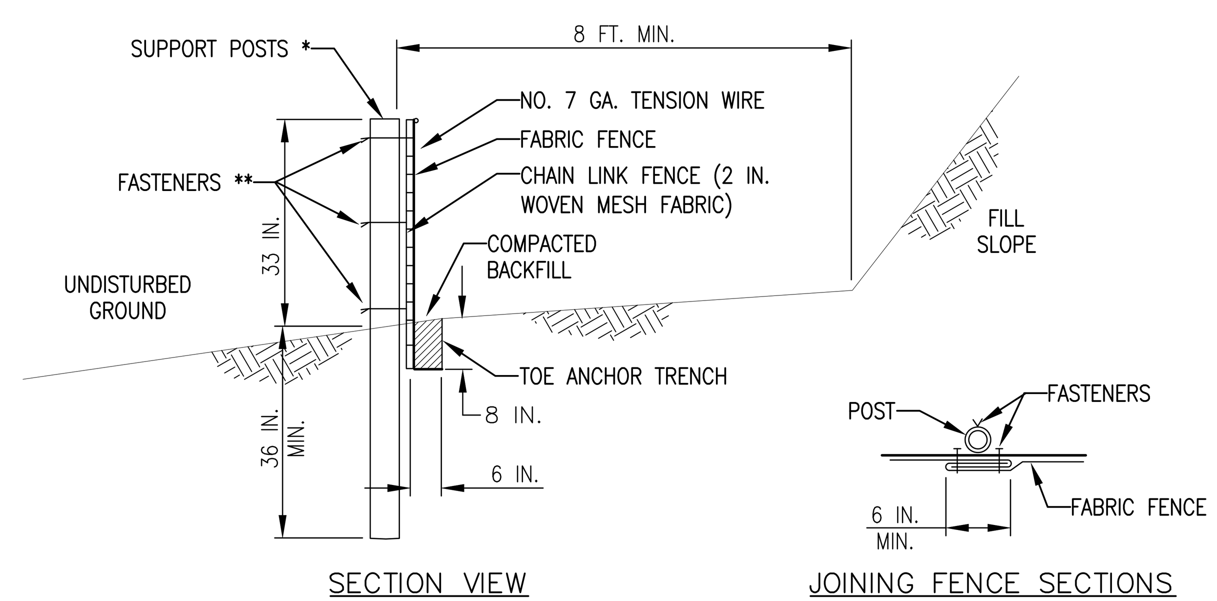
3 DETAIL - ROCK FILTER
SCALE: NOT TO SCALE



NOTES:

1. FABRIC SHALL HAVE THE MINIMUM PROPERTIES AS SHOWN IN TABLE 4.3 OF THE PA DEP EROSION CONTROL MANUAL.
2. FABRIC WIDTH SHALL BE 42 IN. MINIMUM. STAKES SHALL BE HARDWOOD OR EQUIVALENT STEEL (U OR T) STAKES. AN 18 IN. SUPPORT STAKE SHALL BE DRIVEN 12 IN. MINIMUM INTO UNDISTURBED GROUND.
3. SILT FENCE SHALL BE PLACED AT LEVEL EXISTING GRADE. BOTH ENDS OF THE FENCE SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT.
4. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH HALF THE ABOVE GROUND HEIGHT OF THE FENCE.
5. ANY SECTION OF SILT FENCE WHICH HAS BEEN UNDERMINED OR TOPPED SHALL BE IMMEDIATELY REPLACED WITH A ROCK FILTER OUTLET (STANDARD CONSTRUCTION DETAIL # 4-6).
6. FENCE SHALL BE REMOVED AND PROPERLY DISPOSED OF WHEN TRIBUTARY AREA IS PERMANENTLY STABILIZED.

4 DETAIL - REINFORCED SILT FENCE
SCALE: NOT TO SCALE



* POSTS SPACED AT 10 FT. MAX. USE 2-1/2 IN. DIA HEAVY DUTY GALVANIZED OR ALUMINUM POSTS.

** CHAIN LINK TO POST FASTENERS SPACED AT 14 IN. MAX. USE NO. 9 GA. ALUMINUM WIRE OR NO. 9 GALVANIZED STEEL WIRE. FABRIC TO SHAIN FASTENERS SPACED AT 24 IN. MAX. ON CENTER.

NOTES:

1. FABRIC SHALL HAVE THE MINIMUM PROPERTIES AS SHOWN IN TABLE 4.3 OF THE PA DEP EROSION CONTROL MANUAL.
2. FABRIC WIDTH SHALL BE 42 IN. MINIMUM.
3. POSTS SHALL BE INSTALLED USING A POSTHOLE DRILL.
4. CHAIN LINK SHALL BE GALVANIZED NO. 11.5 GA. STEEL WIRE WITH 2-1/4 IN. OPENING, NO. 11 GA. ALUMINUM COATED STEEL WIRE IN ACCORDANCE WITH ASTM-A-491, OR GALVANIZED NO. 9 GA. STEEL WIRE TOP AND BOTTOM WITH GALVANIZED NO. 11 GA. STEEL INTERMEDIATE WIRES. NO. 7 GAGE TENSION WIRE TO BE INSTALLED HORIZONTALLY THROUGH HOLES AT TOP AND BOTTOM OF CHAIN-LINK FENCE OR ATTACHED WITH HOG RINGS AT 5 FT MAX. CENTERS.
5. SILT FENCE SHALL BE PLACED AT LEVEL EXISTING GRADE. BOTH ENDS OF THE FENCE SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT.
6. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH HALF THE ABOVE GROUND HEIGHT OF THE FENCE.
7. FENCE SHALL BE REMOVED AND PROPERLY DISPOSED OF WHEN TRIBUTARY AREA IS PERMANENTLY STABILIZED.

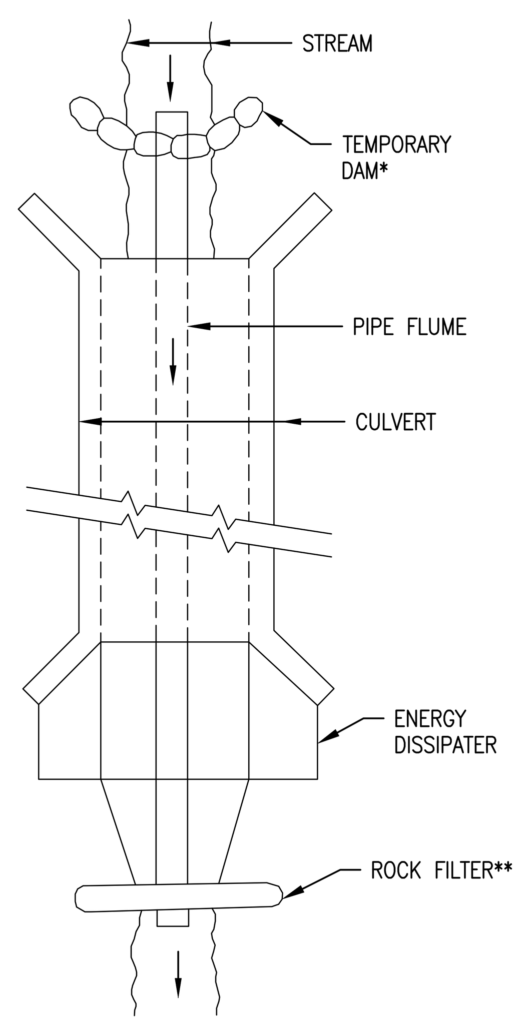
5 DETAIL - SUPER SILT FENCE
SCALE: NOT TO SCALE

US Army Corps of Engineers ® Philadelphia District

U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390
www.nap.usace.army.mil

PHILADELPHIA COUNTY, PENNSYLVANIA
COBBS CREEK FISH PASSAGE - WOODLAND DAM REMOVAL
DETAILS - EROSION AND SEDIMENT CONTROL

SHEET NUMBER
CE-501

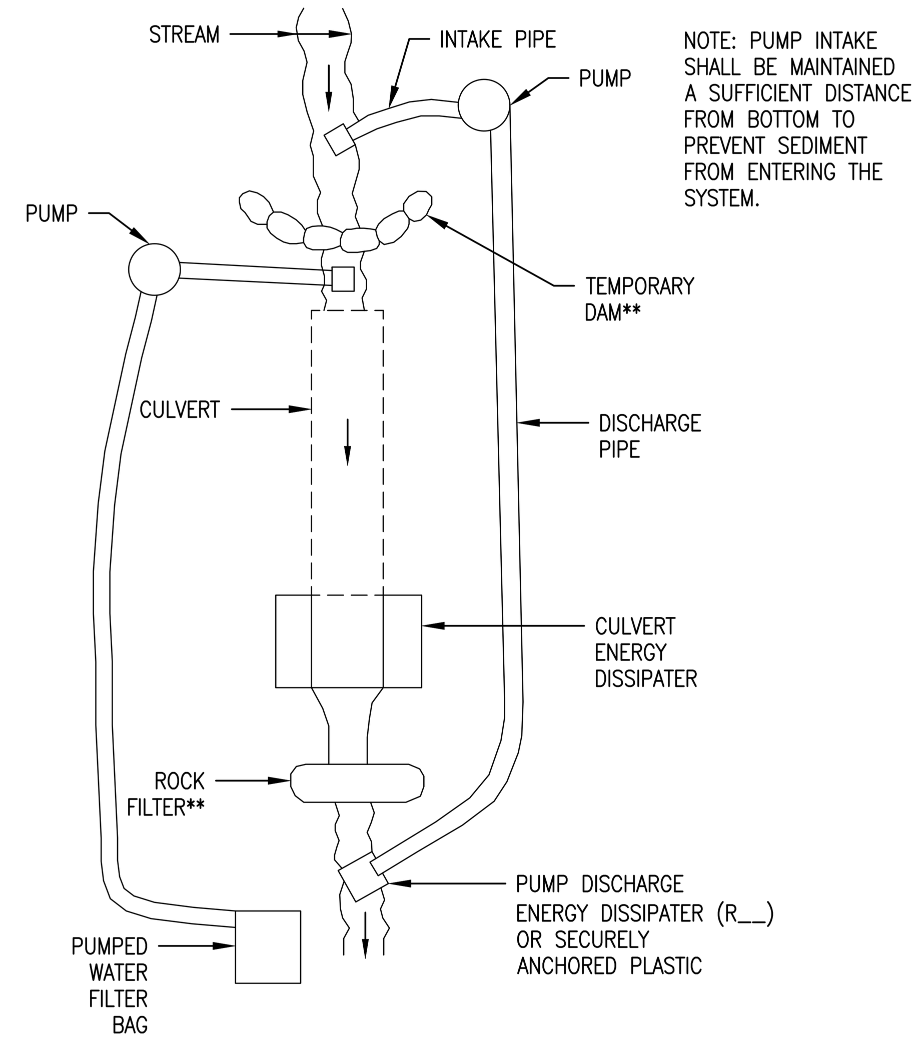


PA DEP

* SANDBAGS (STANDARD CONSTRUCTION DETAIL #3–15), JERSEY BARRIERS (FIGURE 3.13) OR OTHER NON-EROSIVE MATERIAL, NO EARTH FILL.

** SEE STANDARD CONSTRUCTION DETAIL #4–14. FOR LOW GRADIENT CHANNELS, THE ROCK FILTER MAY BE REPLACED BY AN IMPERVIOUS COFFERDAM TO PREVENT BACKFLOW INTO THE WORK AREA.

1 DETAIL - TEMPORARY DAM AND PIPE FLUME
SCALE: NOT TO SCALE

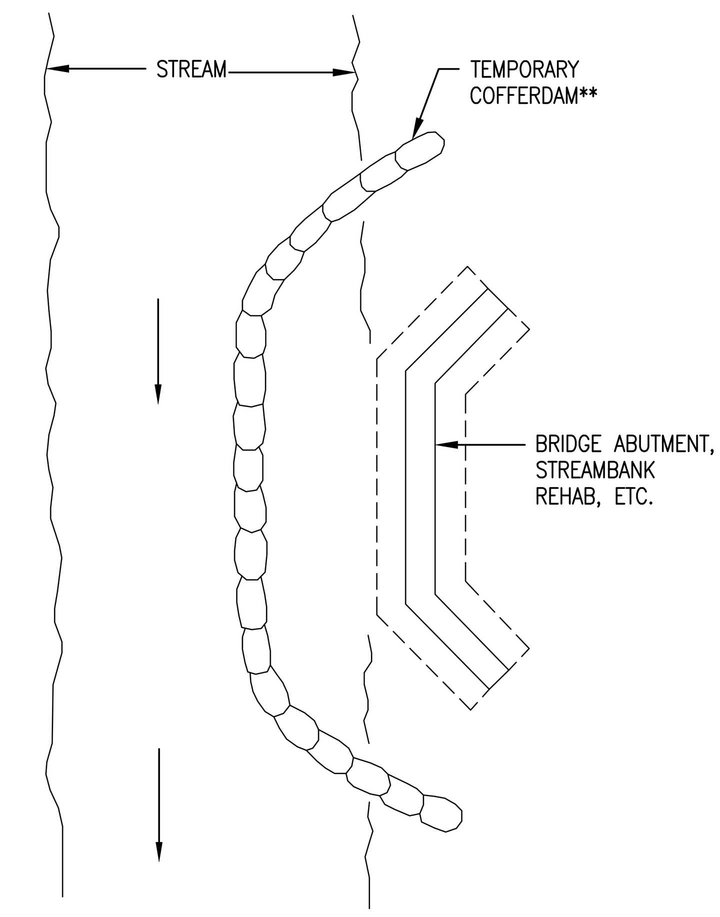


PA DEP

* SANDBAGS (STANDARD CONSTRUCTION DETAIL #3–15), JERSEY BARRIERS (FIGURE 3.13) OR OTHER NON-EROSIVE MATERIAL, NO EARTH FILL.

** SEE STANDARD CONSTRUCTION DETAIL #4–14. FOR LOW GRADIENT CHANNELS, THE ROCK FILTER MAY BE REPLACED BY AN IMPERVIOUS COFFERDAM TO PREVENT BACKFLOW INTO THE WORK AREA.

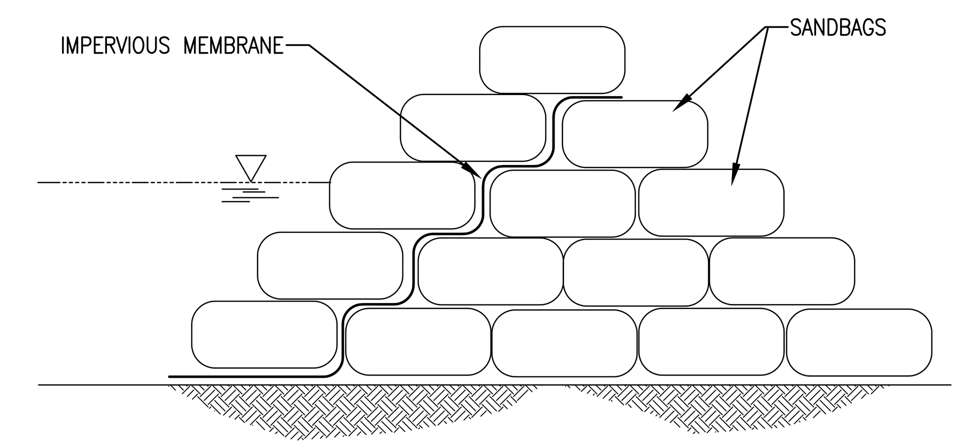
2 DETAIL - TEMPORARY DAM AND DUMP AROUND
SCALE: NOT TO SCALE



PA DEP

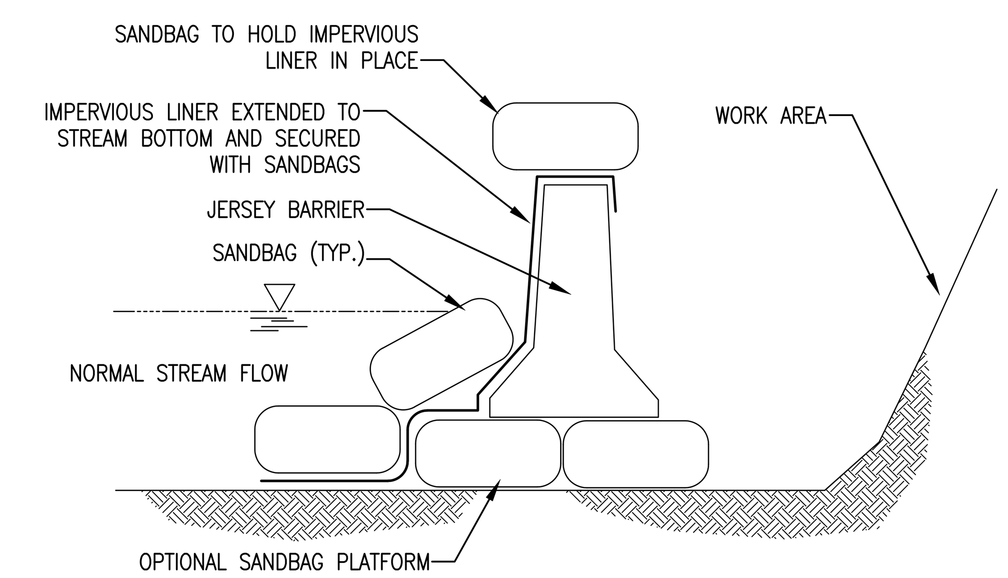
* SANDBAGS (STANDARD CONSTRUCTION DETAIL #3–15), JERSEY BARRIERS (FIGURE 3.13) OR OTHER NON-EROSIVE MATERIAL, NO EARTH FILL.

3 DETAIL - TEMPORARY COFFERDAM
SCALE: NOT TO SCALE



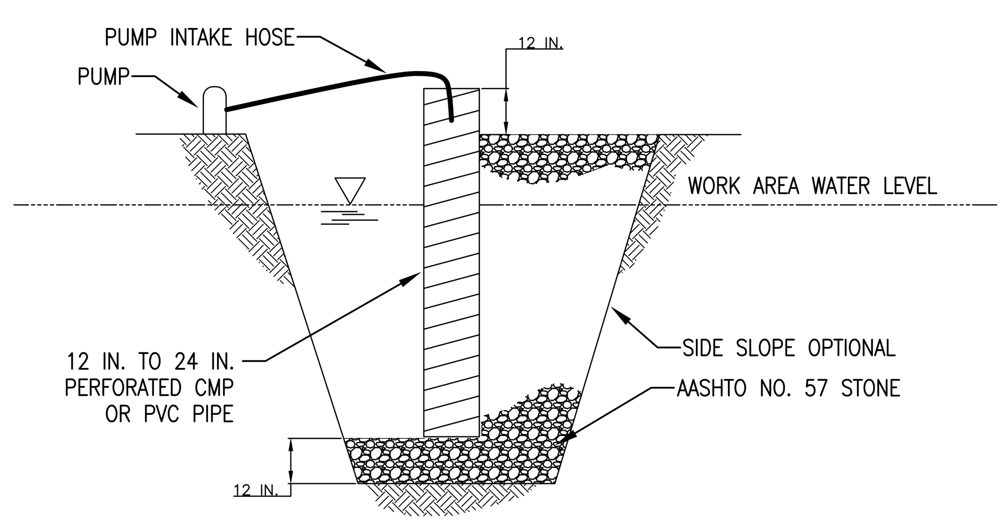
2 BAG MIN. HEIGHT ABOVE NORMAL BASE FLOW

STACKED SANDBAGS OPTION



JERSEY BARRIER OPTION

4 DETAIL - SANDBAG DIVERSION DAM OR COFFERDAM
SCALE: NOT TO SCALE

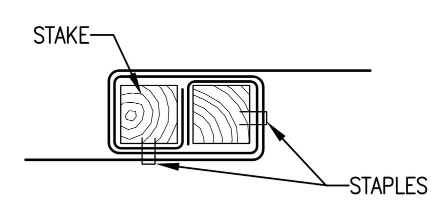


SECTION VIEW

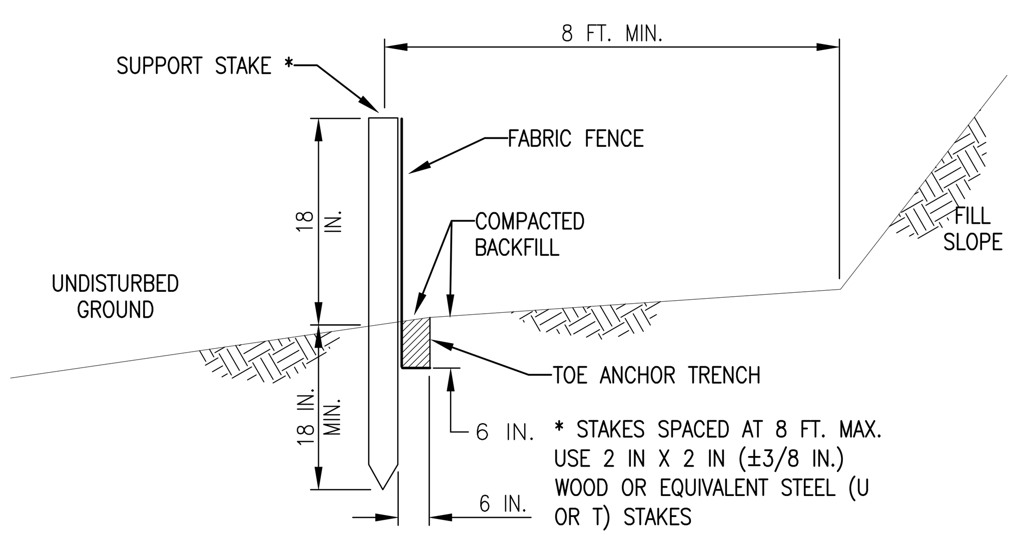
NOTES:

1. LOCATE SUMP AT LOW POINT IN WORK AREA AND OUTSIDE OF CONSTRUCTION ACTIVITY. WHEREVER RUNOFF FROM A WORK AREA FLOWS DIRECTLY TO THE SUMP AREA, A FILTER BAG SHALL BE ATTACHED AT THE DISCHARGE POINT UNLESS PUMPING TO A SEDIMENT BASIN OR SEDIMENT TRAP.
2. MINIMUM DIAMETER OF PIT BOTTOM SHALL BE 24" LARGER THAN PIPE DIAMETER. MINIMUM DEPTH OF PIT SHALL BE 24" BELOW WATER LEVEL IN WORK AREA (INCLUDING THE AASHTO #57 STONE). 12" TO 24" PERFORATED CMP OR PVC PIPE SHALL BE SET ON 12" OF CLEAN AASHTO # 57 STONE.
3. VOID SPACE AROUND PIPE SHALL BE FILLED WITH AASHTO # 57 STONE. PIPE TO EXTEND 12" MIN. ABOVE TOP OF STONE AND/OR WATER BEING PUMPED FROM WORK AREA.
4. SET PUMP INTAKE INSIDE STANDPIPE.
5. DISCHARGE FROM PUMP SHALL BE TO A STABLE AREA BELOW DISTURBANCES FROM THE WORK ZONE.
6. SUMP MAY BE USED IN CONJUNCTION WITH FILTER BAG WHERE ADDITIONAL FILTERING IS NEEDED.

5 DETAIL - SUMP PIT
SCALE: NOT TO SCALE



JOINING FENCE SECTION

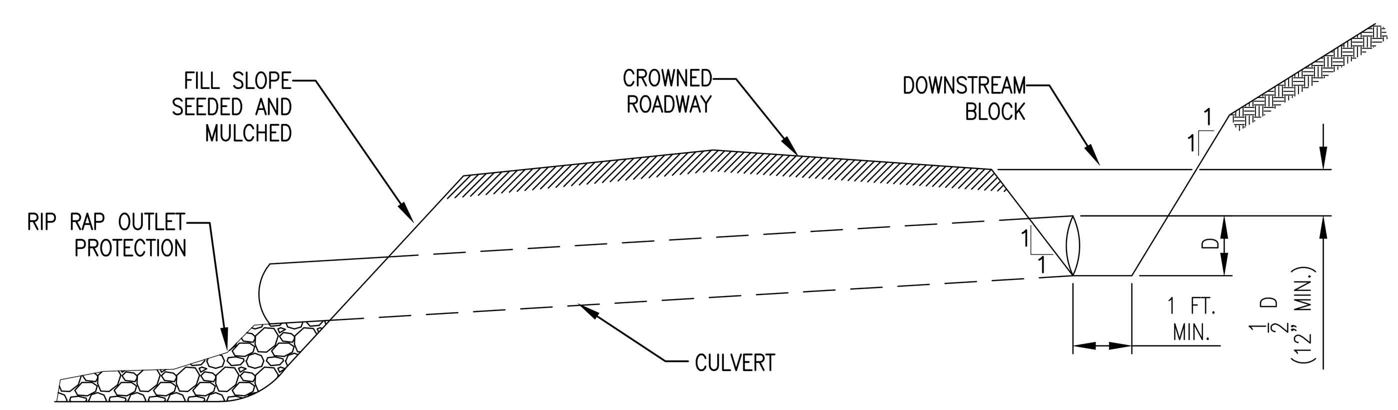


SECTION VIEW

NOTES:

1. FABRIC SHALL HAVE THE MINIMUM PROPERTIES AS SHOWN IN TABLE 4.3 OF THE PA DEP EROSION CONTROL MANUAL.
2. FABRIC WIDTH SHALL BE 30 IN. MINIMUM. STAKES SHALL BE HARDWOOD OR EQUIVALENT STEEL (U OR T) STAKES.
3. SILT FENCE SHALL BE PLACED AT LEVEL EXISTING GRADE. BOTH ENDS OF THE FENCE SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT.
4. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH HALF THE ABOVE GROUND HEIGHT OF THE FENCE.
5. ANY SECTION OF SILT FENCE WHICH HAS BEEN UNDERMINED OR TOPPED SHALL BE IMMEDIATELY REPLACED WITH A ROCK FILTER OUTLET (STANDARD CONSTRUCTION DETAIL # 4–6).
6. FENCE SHALL BE REMOVED AND PROPERLY DISPOSED OF WHEN TRIBUTARY AREA IS PERMANENTLY STABILIZED.

6 DETAIL - STANDARD SILT FENCE
SCALE: NOT TO SCALE



SECTION VIEW

NOTES:

1. CUT AND FILL SLOPES SHALL BE STABILIZED IMMEDIATELY UPON COMPLETION OF ROADWAY GRADING. THESE AREAS SHALL BE BLANKETED WHEREVER THEY ARE LOCATED WITHIN 50 FEET OF A SURFACE WATER OR WITHIN 100 FEET OF AN HQ OR EV SURFACE WATER OR WHERE A SUITABLE VEGETATIVE FILTER STRIP DOES NOT EXIST.
2. A TOP DRESSING COMPOSED OF HARD, DURABLE STONE SHALL BE PROVIDED FOR SOILS HAVING LOW STRENGTH.
3. ROADSIDE DITCHES SHALL BE PROVIDED WITH ADEQUATE PROTECTIVE LINING WHEREVER RUNOFF CANNOT SHEET FLOW AWAY FROM THE ROADWAY.
4. ADEQUATELY SIZED CULVERTS OR OTHER SUITABLE CROSS DRAINS SHALL BE PROVIDED AT ALL SEEPS, SPRINGS, AND DRAINAGE COURSES. DITCH RELIEF CULVERTS OR TURNOUTS SHALL BE PROVIDED AT THE INTERVALS INDICATED ON TABLE 3.3 OR TABLE 3.4 OF THE PA DEP EROSION CONTROL MANUAL FOR ROADSIDE DITCHES. RIPRAP OUTLET PROTECTION TO BE SIZED ACCORDING TO ANTICIPATED DISCHARGE VELOCITY.
5. ROADWAY SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED ROADWAYS, DITCHES, OR CROSS DRAINS SHALL BE REPAIRED IMMEDIATELY.

7 DETAIL - CROWNED ROADWAY
SCALE: NOT TO SCALE

US Army Corps of Engineers ® Philadelphia District

MARK	ACTION	DATE	BY	DESCRIPTION

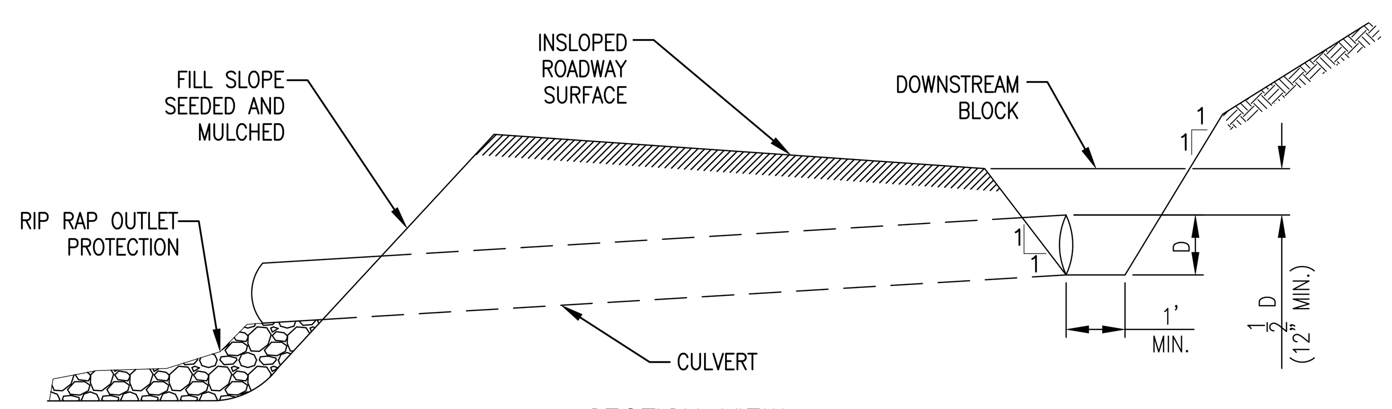
U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390
www.nap.usace.army.mil

DWN BY: DTB/PGS	DESIGNED BY: DTB	ISSUE/RELEASE DATE: 19 JAN 2016
CKD BY: DAN	REVIEWED BY: TEH	PROJ. NUMBER: -
		SOLICITATION NUMBER: IFB W912BU-16-B-00XX
DWG SCALE: NTS		CONTRACT NUMBER: ----
DWG. SIZE: 30"x42" Arch E1	FILE NAME: CE-502 DETAILS.dwg	

PHILADELPHIA COUNTY, PENNSYLVANIA

COBBS CREEK FISH PASSAGE - WOODLAND DAM REMOVAL
DETAILS - EROSION AND SEDIMENT CONTROL
-

SHEET NUMBER
CE-502

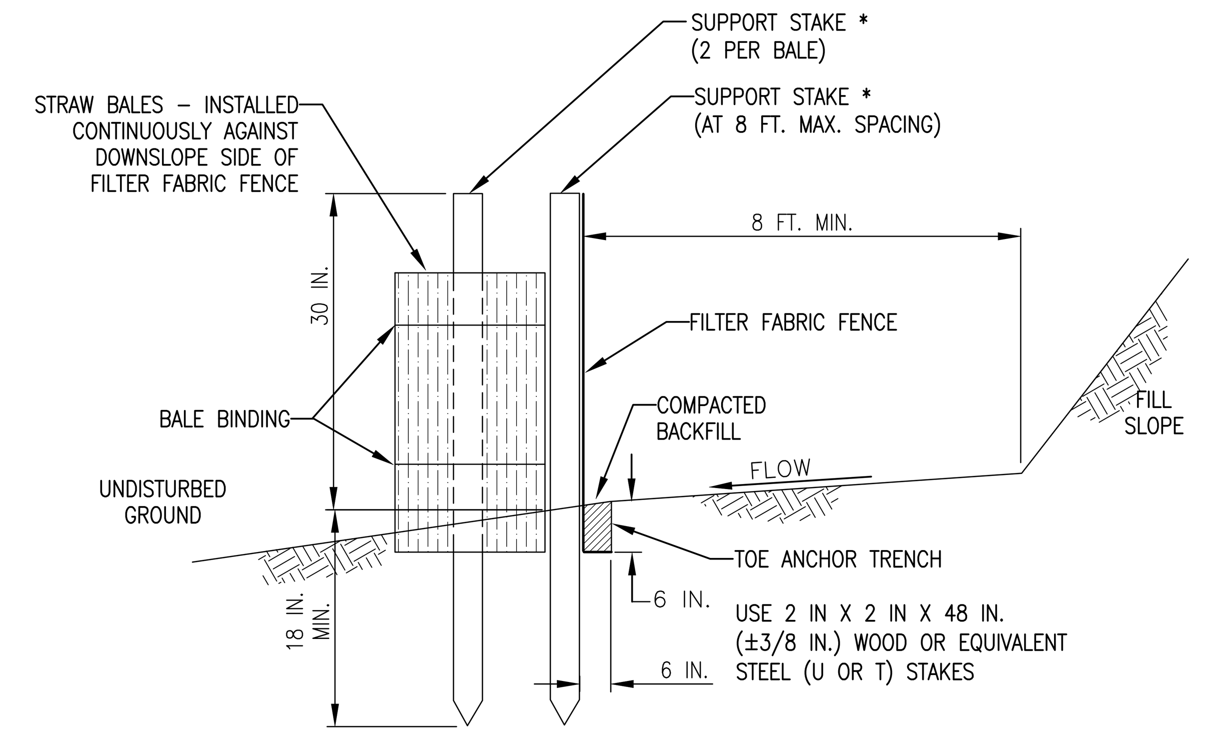


SECTION VIEW

NOTES:

1. CUT AND FILL SLOPES SHALL BE STABILIZED IMMEDIATELY UPON COMPLETION OF ROADWAY GRADING. THESE AREAS SHALL BE BLANKETED WHEREVER THEY ARE LOCATED WITHIN 50 FEET OF A SURFACE WATER OR WITHIN 100 FEET OF AN HQ OR EV SURFACE WATER OR WHERE A SUITABLE VEGETATIVE FILTER STRIP DOES NOT EXIST.
2. A TOP DRESSING COMPOSED OF HARD, DURABLE STONE SHALL BE PROVIDED FOR SOILS HAVING LOW STRENGTH.
3. ROADSIDE DITCHES SHALL BE PROVIDED WITH ADEQUATE PROTECTIVE LINING.
4. ADEQUATELY SIZED CULVERTS OR OTHER SUITABLE CROSS DRAINS SHALL BE PROVIDED AT ALL SEEPS, SPRINGS, AND DRAINAGE COURSES. DITCH RELIEF CULVERTS SHALL BE PROVIDED AT THE INTERVALS INDICATED ON TABLE 3.3 OR TABLE 3.4 OF THE PA DEP EROSION CONTROL MANUAL. RIPRAP OUTLET PROTECTION TO BE SIZED ACCORDING TO ANTICIPATED DISCHARGE VELOCITY.
5. ROADWAY SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED ROADWAYS, DITCHES, OR CROSS DRAINS SHALL BE REPAIRED IMMEDIATELY.

1 DETAIL - INSLOPED ROADWAY
SCALE: NOT TO SCALE

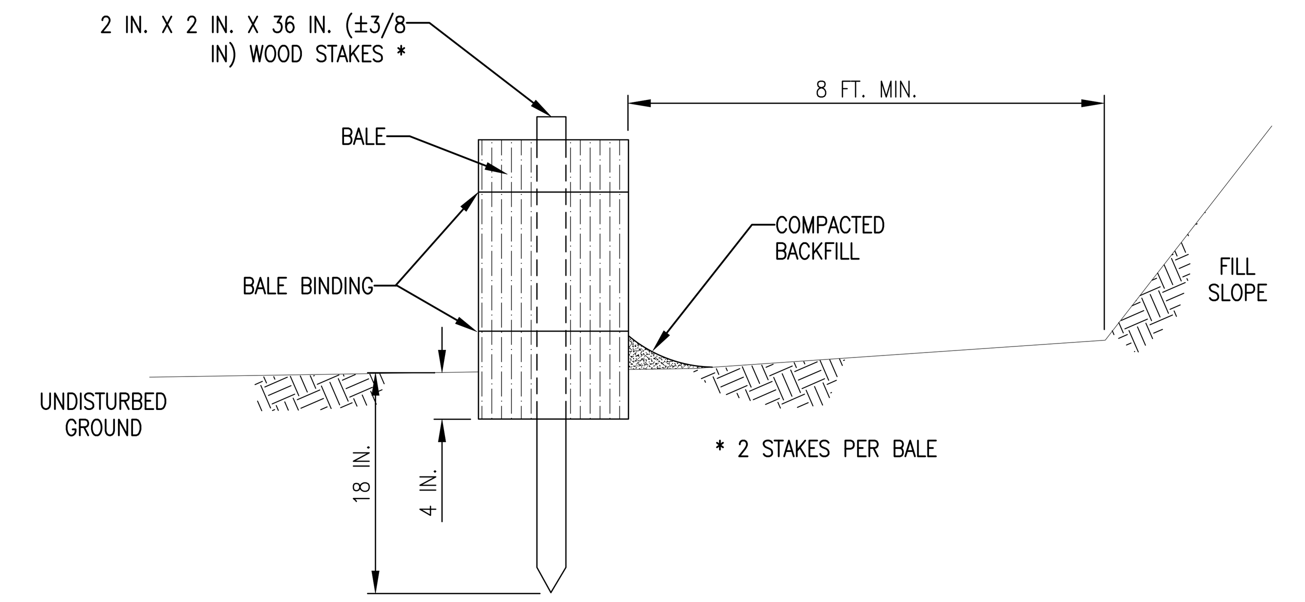


ELEVATION VIEW

NOTES:

1. FABRIC SHALL HAVE THE MINIMUM PROPERTIES AS SHOWN IN TABLE 4.3 OF THE PA DEP EROSION CONTROL MANUAL.
2. THIS BMP IS NOT SUITABLE FOR PROJECTS LASTING LONGER THAN 3 MONTHS UNLESS BALES ARE REPLACED QUARTERLY.
3. FABRIC WIDTH SHALL BE 42 IN. MINIMUM. STAKES SHALL BE HARDWOOD OR EQUIVALENT STEEL (U OR T) STAKES.
4. SILT FENCE SHALL BE PLACED AT LEVEL EXISTING GRADE. BOTH ENDS OF THE FENCE SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT.
5. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH HALF THE ABOVE GROUND HEIGHT OF THE FENCE.
6. ANY SECTION OF SILT FENCE WHICH HAS BEEN UNDERMINED OR TOPPED SHALL BE IMMEDIATELY REPLACED WITH A ROCK FILTER OUTLET (STANDARD CONSTRUCTION DETAIL # 4-6).
7. FENCE SHALL BE REMOVED AND PROPERLY DISPOSED OF WHEN TRIBUTARY AREA IS PERMANENTLY STABILIZED.

2 DETAIL - SILT FENCE REINFORCED BY STAKED STRAW BALES
SCALE: NOT TO SCALE

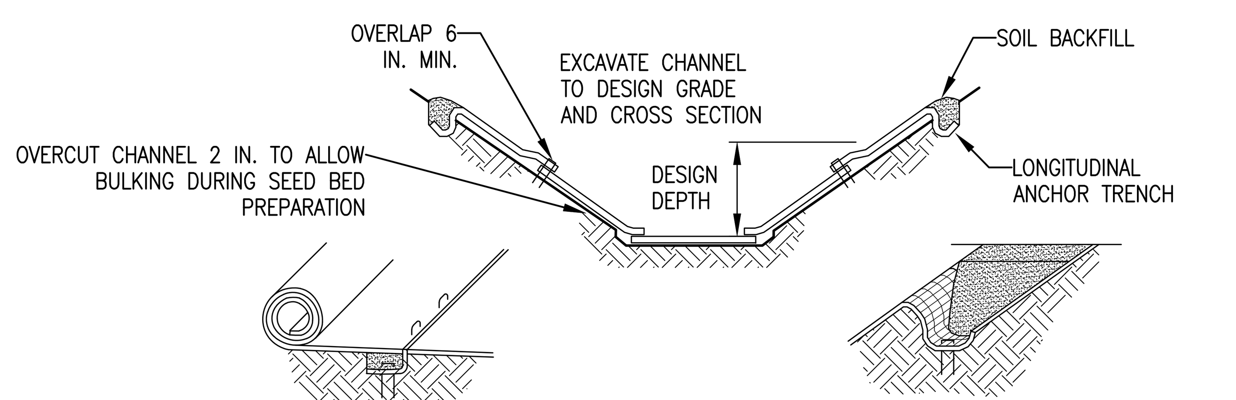


SECTION VIEW

NOTES:

1. STRAW BALE BARRIERS SHALL NOT BE USED FOR PROJECTS EXTENDING MORE THAN 3 MONTHS.
2. STRAW BALE BARRIERS SHALL BE PLACED AT EXISTING LEVEL GRADE WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES. FIRST STAKE OF EACH BALE SHALL BE ANGLED TOWARD ADJACENT BALE TO DRAW BALES TOGETHER. STAKES SHALL BE DRIVEN FLUSH WITH THE TOP OF THE BALE. BOTH ENDS OF THE BARRIER SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN BARRIER ALIGNMENT.
3. COMPACTED BACKFILL SHALL EXTEND APPROXIMATELY 4 IN. ABOVE GROUND LEVEL.
4. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH 1/3 THE ABOVE GROUND HEIGHT OF THE BARRIER. DAMAGED OR DETERIORATED BALES SHALL BE REPLACED IMMEDIATELY UPON INSPECTION.
5. ANY SECTION OF STRAW BALE BARRIER WHICH HAS BEEN UNDERMINED OR TOPPED SHALL BE IMMEDIATELY REPLACED WITH A ROCK FILTER OUTLET (STANDARD CONSTRUCTION DETAIL #4-6).
6. BALES SHALL BE REMOVED WHEN THE TRIBUTARY AREA HAS BEEN PERMANENTLY STABILIZED.

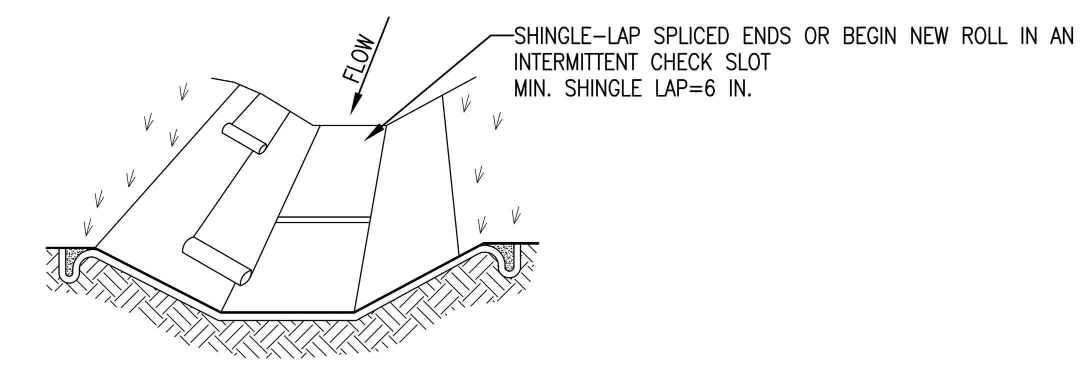
3 DETAIL - STRAW BALE BARRIER
SCALE: NOT TO SCALE



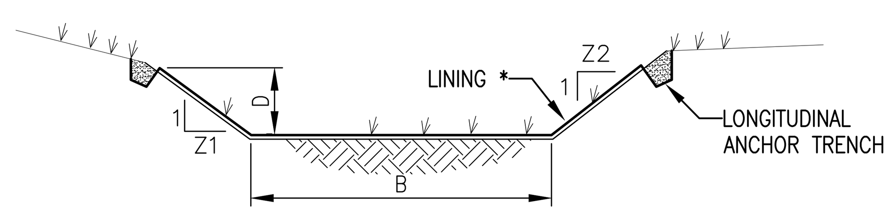
INTERMITTENT CHECK SLOT

LONGITUDINAL ANCHOR TRENCH

PREPARE SOIL AND APPLY SEED BEFORE INSTALLING BLANKETS, MATS, OR OTHER TEMPORARY CHANNEL LINER SYSTEM.



ISOMETRIC VIEW



(LOOKING DOWNSTREAM)

CHANNEL CROSS-SECTION

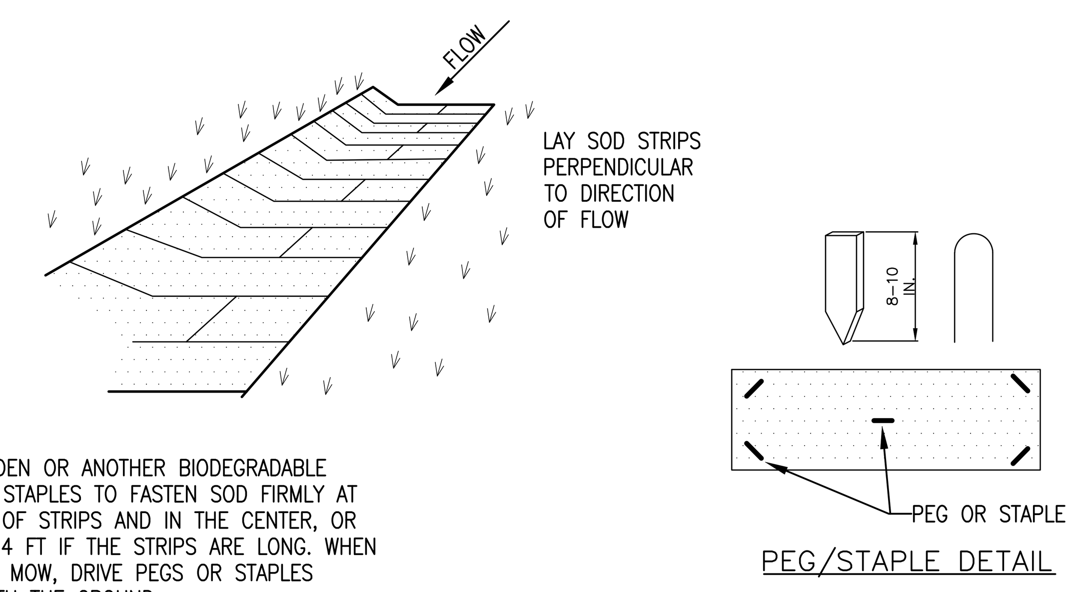
* SEE MANUFACTURER'S LINING INSTALLATION DETAIL FOR STAPLE PATTERNS, VEGETATIVE STABILIZATION FOR SOIL AMENDMENTS, SEED MIXTURES AND MULCHING INFORMATION

CHANNEL NO.	STATIONS	BOTTOM WIDTH B (FT)	DEPTH D (FT)	TOP WIDTH W (FT)	Z1 (FT)	Z2 (FT)	LINING *
88	888+88 – 888+88	88	88	88	88	88	12345678901234567890

NOTES:

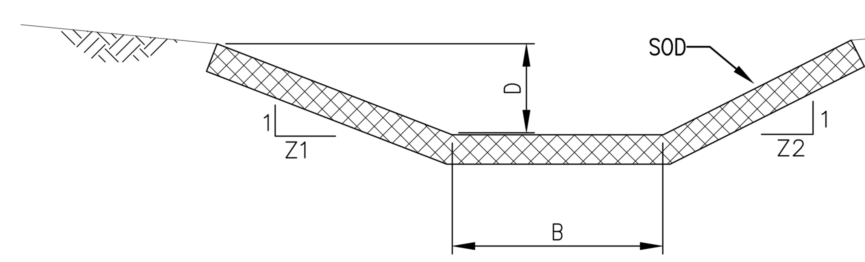
1. ANCHOR TRENCHES SHALL BE INSTALLED AT BEGINNING AND END OF CHANNEL IN THE SAME MANNER AS LONGITUDINAL ANCHOR TRENCHES.
2. CHANNEL DIMENSIONS SHALL BE CONSTANTLY MAINTAINED. CHANNEL SHALL BE CLEANED WHENEVER TOTAL CHANNEL DEPTH IS REDUCED BY 25% AT ANY LOCATION. SEDIMENT DEPOSITS SHALL BE REMOVED WITHIN 24 HOURS OF DISCOVERY OR AS SOON AS SOIL CONDITIONS PERMIT ACCESS TO CHANNEL WITHOUT FURTHER DAMAGE. DAMAGED LINING SHALL BE REPAIRED OR REPLACED WITHIN 48 HOURS OF DISCOVERY.
3. NO MORE THAN ONE THIRD OF THE SHOOT (GRASS LEAF) SHALL BE REMOVED IN ANY MOWING. GRASS HEIGHT SHALL BE MAINTAINED BETWEEN 2 AND 3 INCHES UNLESS OTHERWISE SPECIFIED. EXCESS VEGETATION SHALL BE REMOVED FROM PERMANENT CHANNELS TO ENSURE SUFFICIENT CHANNEL CAPACITY.

4 DETAIL - VEGETATED CHANNEL
SCALE: NOT TO SCALE



PEG/STAPLE DETAIL

SOD NOTES:
1. USE WOODEN OR ANOTHER BIODEGRADABLE PEGS OR STAPLES TO FASTEN SOD FIRMLY AT THE END OF STRIPS AND IN THE CENTER, OR EVERY 3-4 FT IF THE STRIPS ARE LONG. WHEN READY TO MOW, DRIVE PEGS OR STAPLES FLUSH WITH THE GROUND.
2. IN CRITICAL AREAS, SECURE SOD WITH STAPLED NETTING.



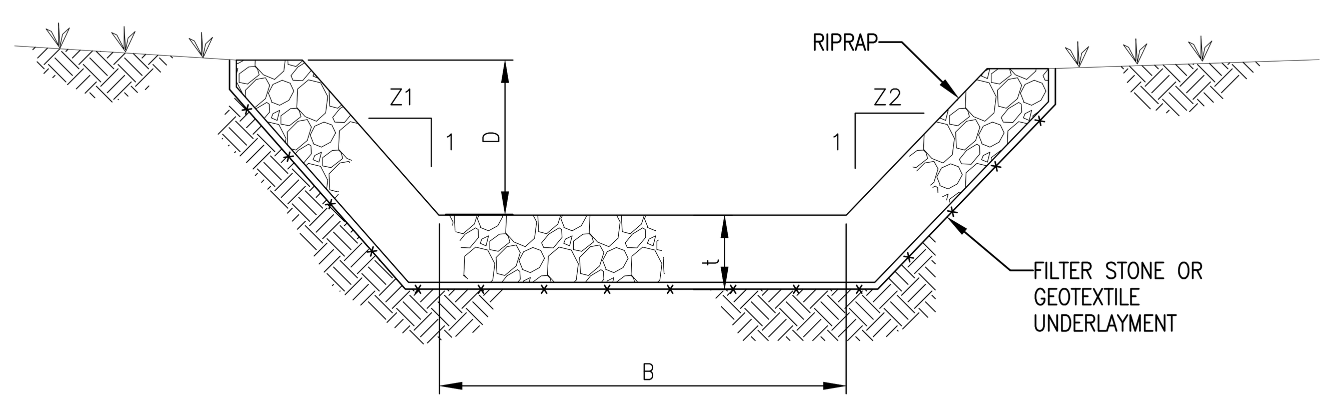
CHANNEL CROSS-SECTION

CHANNEL NO.	STATIONS	BOTTOM WIDTH B (FT)	DEPTH D (FT)	TOP WIDTH W (FT)	Z1 (FT)	Z2 (FT)
888	888+88 – 888+88	88	88	88	8	8

NOTES:

1. CARE SHALL BE TAKEN TO PREPARE THE SOIL ADEQUATELY PRIOR TO SOD PLACEMENT. PLANT SPECIES SHALL BE SUITABLE FOR THE ANTICIPATED PEAK FLOW VELOCITY.
2. DURING 2 TO 3 WEEK ESTABLISHMENT STAGE, SOD SHALL BE WATERED AS NECESSARY TO MAINTAIN ADEQUATE MOISTURE IN THE ROOT ZONE AND PREVENT DORMANCY OF SOD.
3. CHANNEL DIMENSIONS SHALL BE CONSTANTLY MAINTAINED. CHANNEL SHALL BE CLEANED WHENEVER TOTAL CHANNEL DEPTH IS REDUCED BY 25% AT ANY LOCATION. SEDIMENT DEPOSITS SHALL BE REMOVED WITHIN 24 HOURS OF DISCOVERY OR AS SOON AS SOIL CONDITIONS PERMIT ACCESS TO CHANNEL WITHOUT FURTHER DAMAGE. DAMAGED LINING SHALL BE REPAIRED OR REPLACED WITHIN 48 HOURS OF DISCOVERY.
4. NO MORE THAN ONE THIRD OF THE SHOOT (GRASS LEAF) SHALL BE REMOVED IN ANY MOWING. GRASS HEIGHT SHALL BE MAINTAINED BETWEEN 2 AND 3 INCHES UNLESS OTHERWISE SPECIFIED. EXCESS VEGETATION SHALL BE REMOVED FROM PERMANENT CHANNELS TO ENSURE SUFFICIENT CHANNEL CAPACITY.

5 DETAIL - SODDED CHANNEL
SCALE: NOT TO SCALE



(LOOKING DOWNSTREAM)

CHANNEL CROSS-SECTION

CHANNEL NO.	STATIONS	BOTTOM WIDTH B (FT)	DEPTH D (FT)	Z1 (FT)	Z2 (FT)	RIPRAP GRADATION (R-_)	RIPRAP DEPTH t (IN)	UNDERLAYMENT	UNDER-LAYMENT THICKNESS
88	888+88 – 888+88	88	88	8	8	8	88	1234567890	88

NOTES:

1. FILTER STONE UNDERLAYMENT FOR BED SLOPES ≥ 0.10 FT/FT (10 %) SHALL BE USED.
2. CHANNEL DIMENSIONS ARE FOR THE COMPLETED CHANNEL AFTER ROCK PLACEMENT. CHANNEL MUST BE OVER-EXCAVATED A SUFFICIENT AMOUNT TO ALLOW FOR THE VOLUME OF ROCK PLACED WITHIN THE CHANNEL WHILE PROVIDING THE SPECIFIED FINISHED DIMENSIONS.
3. CHANNEL DIMENSIONS SHALL BE CONSTANTLY MAINTAINED. CHANNEL SHALL BE CLEANED WHENEVER TOTAL CHANNEL DEPTH IS REDUCED BY 25% AT ANY LOCATION. SEDIMENT DEPOSITS SHALL BE REMOVED WITHIN 24 HOURS OF DISCOVERY OR AS SOON AS SOIL CONDITIONS PERMIT ACCESS TO CHANNEL WITHOUT FURTHER DAMAGE.
4. DAMAGED LINING SHALL BE REPAIRED OR REPLACED WITHIN 48 HOURS OF DISCOVERY.
5. THE MINIMUM ROCK THICKNESS (t) SHALL BE 1.5 TIMES THE MAX ROCK SIZE.

6 DETAIL - RIPRAP CHANNEL
SCALE: NOT TO SCALE

US Army Corps of Engineers ® Philadelphia District

MARK	ACTION	DATE	BY

MARK	ACTION	DATE	BY	DESCRIPTION

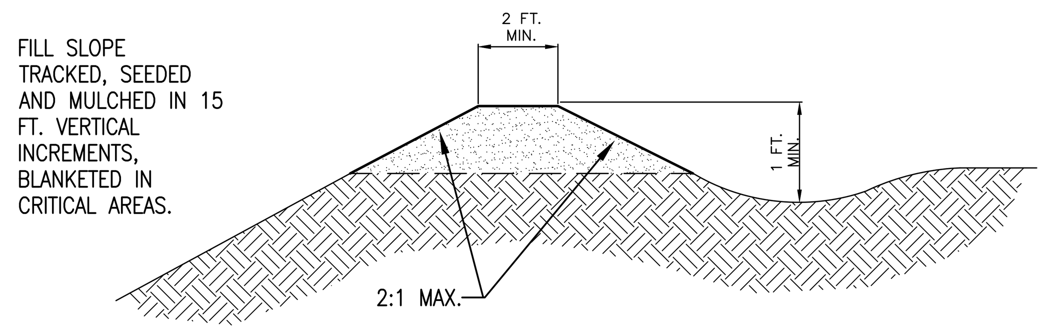
U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390
www.nap.usace.army.mil

DWN BY: DTB/PGS
DESIGNED BY: DTB
ISSUE/RELEASE DATE: 19 JAN 2016
CKD BY: DAN
REVIEWED BY: TEH
PROJ. NUMBER: -
SOLICITATION NUMBER: IFB W912BU-16-B-00XX
DWG SCALE: NTS
CONTRACT NUMBER: ----
DWG. SIZE: 30"x42" Arch E1
FILE NAME: CE-503 DETAILS.dwg

PHILADELPHIA COUNTY, PENNSYLVANIA

COBBS CREEK FISH PASSAGE - WOODLAND DAM REMOVAL
DETAILS - EROSION AND SEDIMENT CONTROL
-

SHEET NUMBER
CE-503



SECTION VIEW

NOTES:

1. TEMPORARY BERMS SHALL BE PLACED, MAINTAINED, AND ADJUSTED CONTINUOUSLY UNTIL 90% VEGETATIVE GROWTH IS ESTABLISHED ON THE EXTERIOR SLOPES WITH PERMANENT STORM DRAINAGE FACILITIES FUNCTIONING.
2. BERMS SHALL OUTLET TO SLOPE PIPES, CHANNELS, OR OTHER APPROVED MEANS OF CONVEYING RUNOFF TO A SEDIMENT TRAP, SEDIMENT BASIN, OR COLLECTOR CHANNEL.
3. CHANNEL BEHIND BERM SHALL HAVE POSITIVE GRADE TO OUTLET AND AN APPROPRIATE PROTECTIVE LINING.
4. BERM SHALL BE ADEQUATELY COMPACTED TO PREVENT FAILURE.
5. AN ACCEPTABLE ALTERNATIVE TO TOP-OF-SLOPE BERM IS TO CONTINUOUSLY GRADE THE TOP OF FILL TO DIRECT RUNOFF AWAY FROM THE FILLSLOPE TO A COLLECTOR CHANNEL, SEDIMENT TRAP, OR SEDIMENT BASIN.

1 DETAIL - TOP OF SLOPE BERM
SCALE: NOT TO SCALE

US Army Corps of Engineers
Philadelphia District

MARK	ACTION	DESCRIPTION	DATE	BY
-	-	-	-	-

MARK	ACTION	DESCRIPTION	DATE	BY
-	-	-	-	-

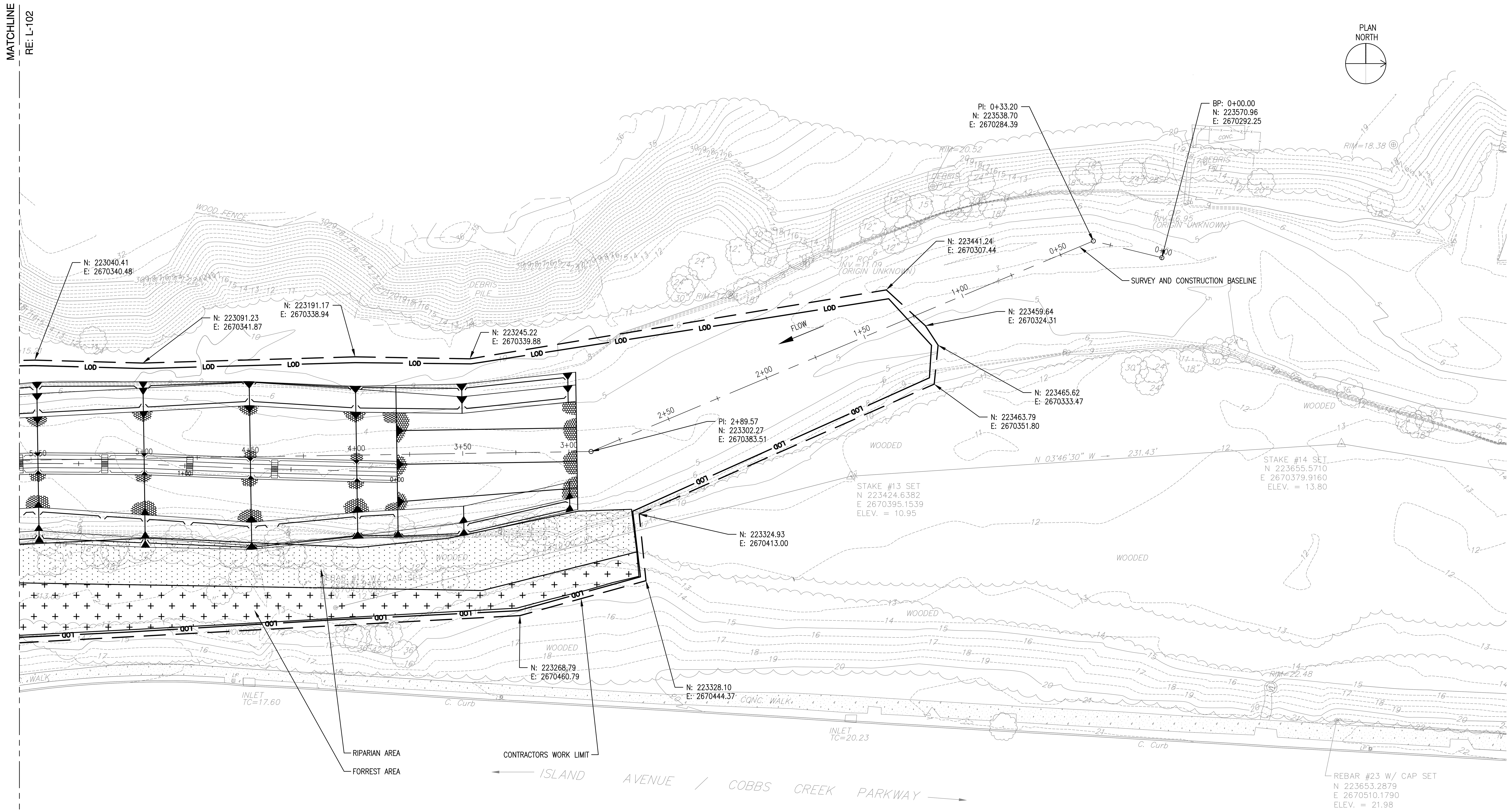
U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390
www.nap.usace.army.mil

DWN BY: DTB/PGS	DESIGNED BY: DTB	ISSUE/RELEASE DATE: 19 JAN 2016
CKD BY: DAN	REVIEWED BY: TEH	PROJ. NUMBER: -
		SOLICITATION NUMBER: IFB W912BU-16-B-00XX
DWG SCALE: NTS		CONTRACT NUMBER: ----
DWG. SIZE: 30"x42" Arch E1	FILE NAME: CE-504 DETAILS.dwg	

PHILADELPHIA COUNTY, PENNSYLVANIA

COBBS CREEK FISH PASSAGE - WOODLAND DAM REMOVAL
DETAILS - EROSION AND SEDIMENT CONTROL
-

SHEET NUMBER
CE-504



1 LANDSCAPE PLAN - STA. 0+00 TO STA. 5+59
SCALE: AS SHOWN
20 0 20 40
SCALE IN FEET

US Army Corps of Engineers
Philadelphia District

MARK	ACTION	DESCRIPTION	DATE	BY

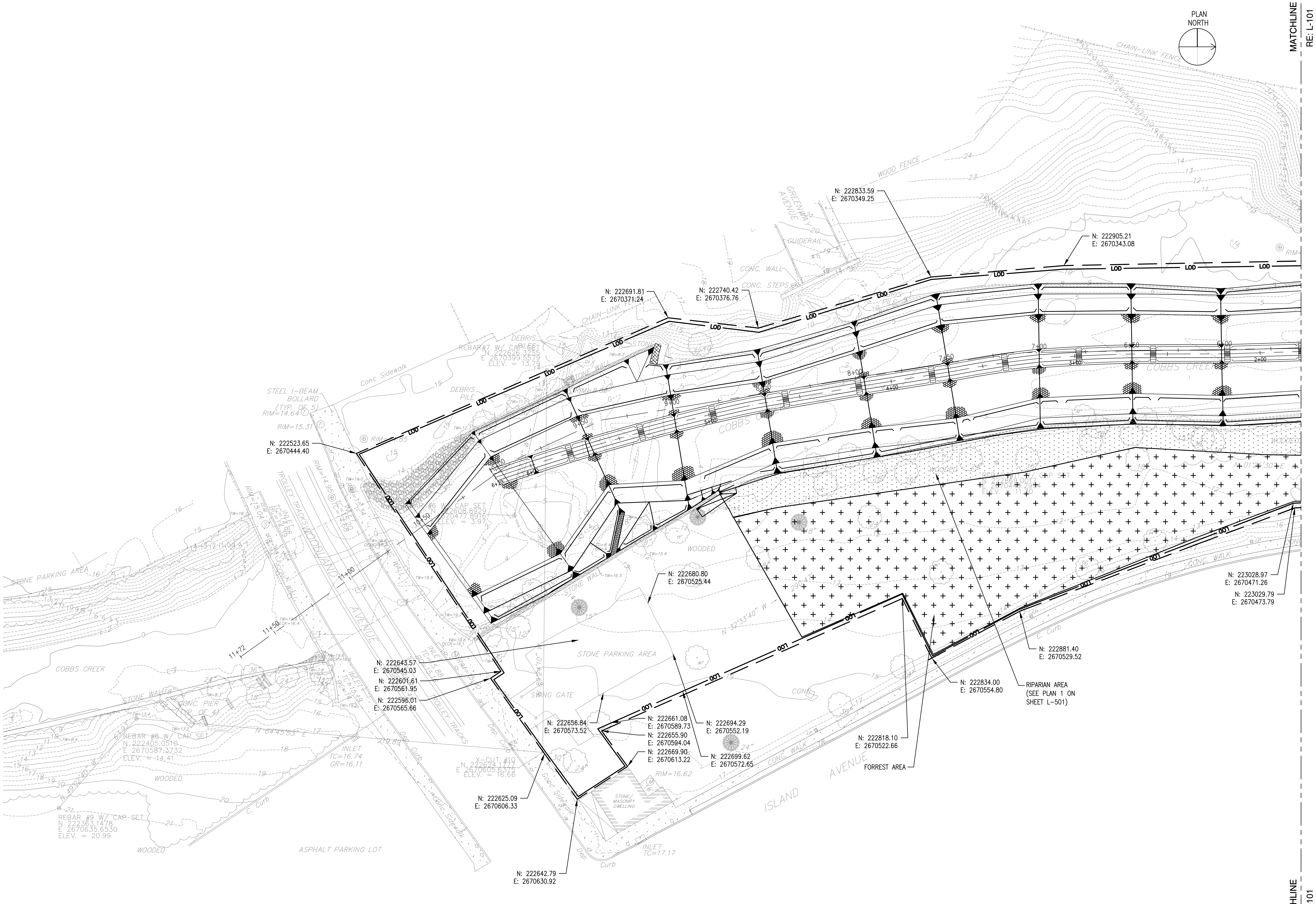
MARK	ACTION	DESCRIPTION	DATE	BY

DSGN BY: DTB
DESIGNED BY: DTB
ISSUE/RELEASE DATE: 15 JAN 2016
CKD BY: DAN
REVIEWED BY: TEH
PROJ. NUMBER:
DWG SCALE: AS SHOWN
SOLICITATION NUMBER:
CONTRACT NUMBER:
DWG. SIZE: 30"x42" (ANSI E)
FILE NAME: L-101 LANDSCAPE PLAN - STA. 0+00 TO STA. 5+59.dwg

U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390
www.nap.usace.army.mil

PHILADELPHIA COUNTY, PENNSYLVANIA
COBBS CREEK FISH PASSAGE - WOODLAND DAM REMOVAL
LANDSCAPE PLAN - STA. 0+00 TO STA. 5+59

SHEET NUMBER
L-101



1 LANDSCAPE PLAN - STA. 5+59 TO STA. 11+72
SCALE: AS SHOWN
20 0 20 40
SCALE IN FEET

US Army Corps of Engineers
Philadelphia District

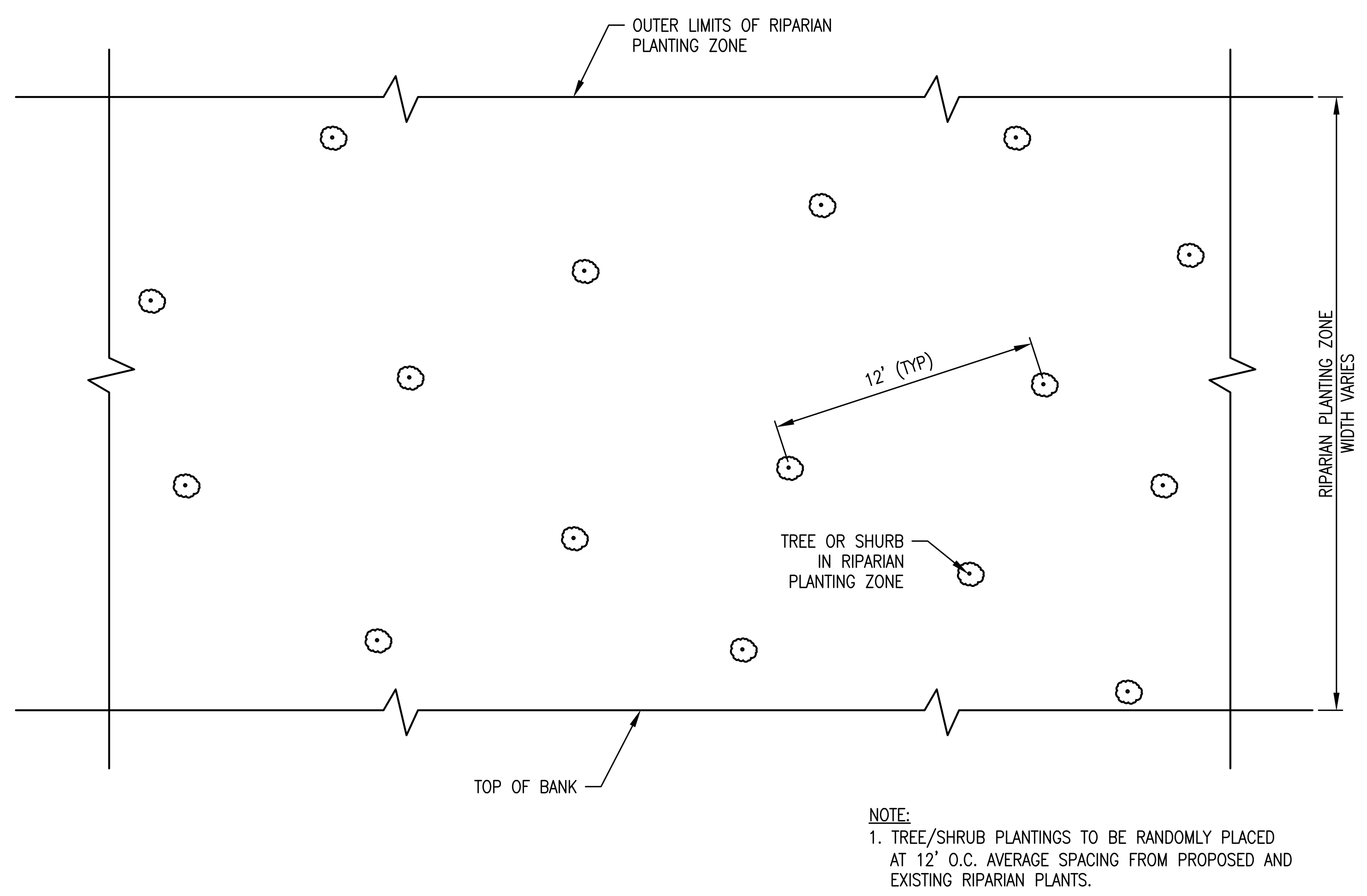
MARK	ACTION	DESCRIPTION	DATE	BY

DESIGNED BY: DTB
DWN BY: DTB
CKD BY: DAN
REVIEWED BY: TEH
DWG. SCALE: AS SHOWN
DWG. SIZE: 30"x42" Arch E1
ISSUE/RELEASE DATE: 19 JAN 2016
PROJ. NUMBER:
SOLICITATION NUMBER:
CONTRACT NUMBER:
FILE NAME:

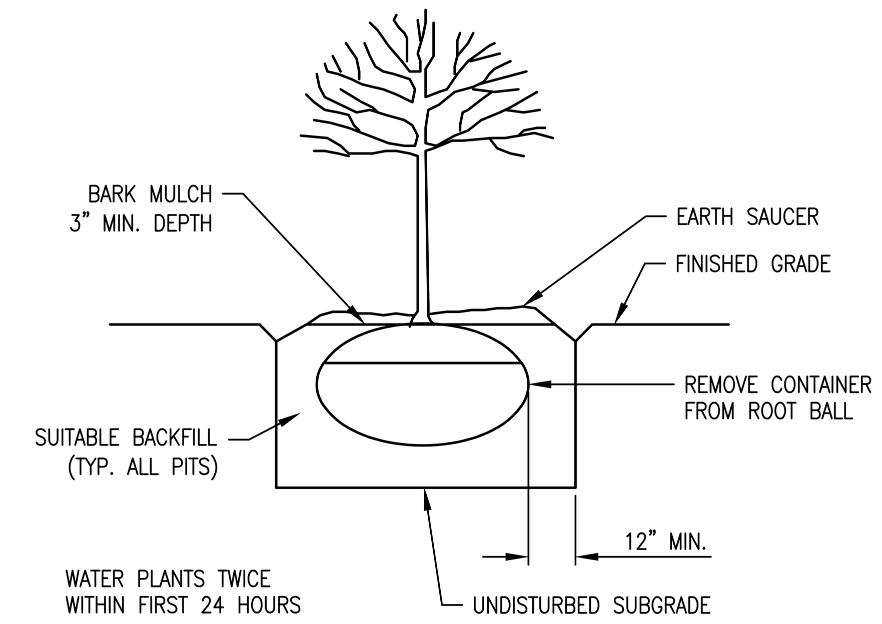
U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA 19107-3390
www.nap.usace.army.mil

PHILADELPHIA COUNTY, PENNSYLVANIA
—
COBBS CREEK FISH
PASSAGE - WOODLAND DAM REMOVAL
LANDSCAPE PLAN - STA. 5+59 TO STA. 11+72

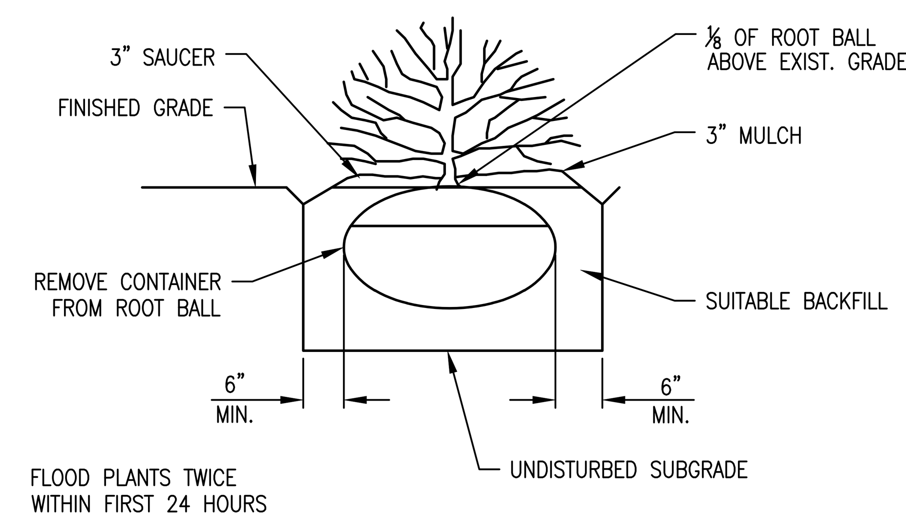
SHEET NUMBER
L-102



1 PLAN - TREE AND SHRUB PLANTINGS
SCALE: NO TO SCALE



2 DETAIL - TREE PLANTING
SCALE: NOT TO SCALE



3 DETAIL - SHRUB PLANTING
SCALE: NOT TO SCALE

PLANTING SCHEDULE

PLANTING ZONE	QUANTITY	COMMON NAME	TYPE	SCIENTIFIC NAME	SPACING/REMARKS
RIPARIAN SEEDING		SEEDING - SEE MIX TABLE			SEE NOTE 2
RIPARIAN TREE	5	AMERICAN SYCAMORE	3'-4' HT., BARE ROOT	PLANTUS OCCIDENTALIS	SEE NOTE 3
RIPARIAN TREE	5	RIVER BIRCH	3'-4' HT., BARE ROOT	BETULA NIGRA	SEE NOTE 3
RIPARIAN TREE	10	AMERICAN SYCAMORE	3'-4' HT., CONTAINER	PLANTUS OCCIDENTALIS	SEE NOTE 3
RIPARIAN TREE	10	RIVER BIRCH	3'-4' HT., CONTAINER	BETULA NIGRA	SEE NOTE 3
RIPARIAN TREE	10	SWEETBAY	3'-4' HT., CONTAINER	MAGNOLIA VIRGINIANA	SEE NOTE 3
RIPARIAN SHRUB	5	RED CHOKEBERRY	18"-24" HT., CONTAINER	ARONIA ARBUTIFOLIA	SEE NOTE 3
RIPARIAN SHRUB	5	SWEET PEPPER BUSH	18"-24" HT., CONTAINER	CLETHRA ALNIFOLIA	SEE NOTE 3
RIPARIAN SHRUB	5	RED OSIER DOGWOOD	18"-24" HT., CONTAINER	CORNUS SERICEA	SEE NOTE 3
RIPARIAN SHRUB	5	WILD HYDRANGEA	18"-24" HT., CONTAINER	HYDRANGEA ARBORESCENS	SEE NOTE 3
RIPARIAN SHRUB	5	WINTERBERRY	18"-24" HT., CONTAINER	ILEX VERTICILLATA	SEE NOTE 3
FORREST SEEDING		SEEDING - SEE MIX TABLE			SEE NOTE 2
FORREST TREE	15	PIN OAK	3'-4' HT., BARE ROOT	QUERCUS PALUSTRIS	SEE NOTE 3
FORREST TREE	15	AMERICAN SYCAMORE	3'-4' HT., BARE ROOT	PLANTUS OCCIDENTALIS	SEE NOTE 3
FORREST TREE	30	PIN OAK	3'-4' HT., CONTAINER	QUERCUS PALUSTRIS	SEE NOTE 3
FORREST TREE	30	AMERICAN SYCAMORE	3'-4' HT., CONTAINER	PLANTUS OCCIDENTALIS	SEE NOTE 3
FORREST TREE	30	SWEETBAY	3'-4' HT., CONTAINER	MAGNOLIA VIRGINIANA	SEE NOTE 3
FORREST SHRUB	20	INKBERRY	18"-24" HT., CONTAINER	ILEX GLABRA	SEE NOTE 3
FORREST SHRUB	20	SERVICEBERRY	18"-24" HT., CONTAINER	AMELANCHIER CANADENSIS	SEE NOTE 3
FORREST SHRUB	20	ARROW-WOOD	18"-24" HT., CONTAINER	VIRBURNUM RECOGNITUM	SEE NOTE 3
FORREST SHRUB	20	SPICEBUSH	18"-24" HT., CONTAINER	LINDERA BENZOIN	SEE NOTE 3
FORREST SHRUB	20	CAROLINA ALLSPICE	18"-24" HT., CONTAINER	CALYCANTHUS FLORIDUS	SEE NOTE 3

PLANTING NOTES:

1. SEE LANDSCAPE PLANS AND SPECIFICATIONS FOR SPECIES DISPERSION WITHIN EACH PLANTING ZONE.
2. SEEDING – RIPARIAN FORMULA TO BE PLACED ON DISTURBED AREAS ONLY WITHIN THE RIPARIAN PLANTING ZONE. FOREST FORMULA TO BE PLACED ON DISTURBED AREAS ONLY WITHIN THE FOREST PLANTING ZONE. (SEE LANDSCAPE PLANS FOR ZONE DELINEATION).
3. TREES AND SHRUBS WILL BE PLANTED AT A RATE OF 200 PLANTS/ACRE IN A RANDOM CLUSTER PATTERN THROUGHOUT THE DESIGNATED PLANTING ZONE. CLUSTERS WILL INCLUDE A MIX SPECIES OF TREES AND SHRUBS.
4. LIVE SHRUB WILLOW STAKES SHALL BE PLANTED ALONG THE STREAM EDGE FOR THE EXTENT OF THE PROJECT LIMITS.

PERMANENT SEEDING: (PURE LIVE SEED - 90%) SEED MIX (BY WEIGHT)

SEEDING ZONE	QUANTITY (%)	COMMON NAME	APPLICATION RATE (LBS/ACRE)	SCIENTIFIC NAME
RIPARIAN	40	FOX SEDGE	20	CAREX VULPINOIDEA
RIPARIAN	10	RIVERBANK WILD-RYE	20	ELYMUS RIPARIUS
RIPARIAN	10	VIRGINIA WILD-RYE	20	ELYMUS VIRGINICUS
RIPARIAN	5	BLUE VERVAIN	20	VERBENA HASTATA
RIPARIAN	5	NEW YORK IRONWEED	20	VERNONIA NOVEBORACENSIS
RIPARIAN	5	GOLDEN ALEXANDER	20	ZIZIA AUREA
RIPARIAN	3	SWAMP MILKWEED	20	ASCLEPIAS INCARNATA
RIPARIAN	2	CARDINAL FLOWER	20	LOBELIA CARDINALIS
FOREST	40	FOX SEDGE	20	CAREX VULPINOIDEA
FOREST	20	PENNSYLVANIA SEDGE	20	CAREX PENNSYLVANICA
FOREST	5	WILD GERANIUM	20	GERANIUM MACULATUM
FOREST	5	JACK-IN-THE-PULPIT	20	ARISAEMA TRIPHYLLUM
FOREST	5	WILD COLUMBINE	20	AQUILEGIA CANADENSIS
FOREST	3	WHITE WOOD ASTER	20	ASTER DIVARICATUS
FOREST	2	GOLDEN RAGWORT	20	PACKERA AUREA

SEEDING NOTES:

1. THE SEED MIX IS FOR ANY DISTURBED AREAS WITHIN THE DESIGNATED PLANTING ZONES.
2. THE TEMPORARY SEEDING SPECIES IS PERENNIAL RYE (PURE LIVE SEED: 98%) WITH AN APPLICATION RATE OF 25 LBS/ACRE.

US Army Corps of Engineers
Philadelphia District

U.S. ARMY CORPS OF ENGINEERS
PHILADELPHIA DISTRICT
PHILADELPHIA, PA

PHILADELPHIA COUNTY, PENNSYLVANIA
—
COBBS CREEK FISH PASSAGE - WOODLAND DAM REMOVAL
DETAILS - TREE AND SHRUB PLANTINGS

SHEET NUMBER
L-501