US Army Corps of Engineers
Alaska District

Environmental Assessment and Finding of No Significant Impact

Bethel Harbor Improvements
Bethel, Alaska

February 2012

Prepared
by the
Alaska District, U.S. Army Corps of Engineers

Finding of No Significant Impact

In accordance with the National Environmental Policy Act of 1969, as amended, the The Denali Commission has assessed the environmental effects of the following action:

Harbor Improvements
Bethel, Alaska

The Denali Commission, in partnership with the U.S. Army Corps of Engineers and the City of Bethel, will dredge Bethel harbor, including the mooring basin, the entrance channel, and the maneuvering channel and will place quarried rock, classified fill, geotextile, and geocell to protect adjacent banks from erosion. The Denali Commission also will replace boat ramps in the harbor. This action will restore the project to its authorized depth of -4 feet Mean Lower Low Water, widen the entrance channel to correct a boating safety problem, and stop erosion that threatens project uplands and reduces usability of the harbor shorelines. The harbor and channels will be dredged in the winter by removing the ice, and then dredging. Dredged material will be placed in the 14.1-acre disposal area that has been used for dredged material disposal since the harbor was constructed in the mid 1980's.

The project and reasonable alternatives are addressed in the Bethel Harbor Improvements Environmental Assessment. The assessment describes the affected environment and evaluates consequences of the action. As concluded in the assessment, the action will not substantially affect marine mammals, migratory birds, essential fish habitat, endangered species, or other plants or animals of regional or national concern. The action will not adversely affect cultural, social, or economic resources or disadvantaged populations. The action will not act in association with past, present or anticipated future actions to cause appreciable cumulative impacts. The action is consistent with community planning objectives and with regional coastal management planning.

I find that constructing the Bethel Harbor Improvements project will not cause significant impacts to the human environment and that the substantive requirements of the National Environmental Policy Act (NEPA) have been satisfied. An environmental impact statement is not required for this federal action.

Tessa L. D. DeLong, MPA Director of Programs Denali Commission	Date	Reinhard W. Koenig Colonel, Corps of Engineers Commander	Date

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1.0 Purpose and Need for the Action

Bethel is a community of approximately 6,000 people on the lower Kuskokwim River in western Alaska at N 60.80˚, W 161.161.76˚ (figure 1). Bethel is not connected to the Alaska highway system, and roads from Bethel serve only the immediate area. Transportation to and from Bethel is by jet airliner, light aircraft, open skiff, and commercial barge during the open-water season (generally from early June until late September or October). Aircraft and snow machines are the only mechanical transportation when the rivers are frozen. Barges deliver building materials, fuels, and most other supplies that are not perishable. Much of the local economy depends on personal harvest of fish, game, and other natural resources and on commercial fishing. Bethel Harbor is a key transportation component in those harvest activities.

Bethel Harbor is shown in figure 2. It is an 8-acre harbor designed and maintained for small boats. It is the only protected harbor in the area. Along with support for harvest of natural resources, the harbor is important in Bethel's role as a regional transportation hub. People from Bethel run boats up and down the river from the harbor to hunt, fish, visit, and work throughout the region. People from other communities in the region travel by boat to Bethel to shop, conduct other business, meet scheduled flights, and visit. Bethel Harbor is at the center of this essential water-borne transportation system.

The viability and efficiency of Bethel Harbor is adversely affected by sediments deposited by the silty Kuskokwim River and by erosion of the unprotected banks. Both occurrences reduce the usable area of the harbor and impede movement in the harbor. Siltation also restricts traffic through the narrow 1,270-foot entrance channel. Bank erosion is caused by the freeze-thaw of soils, wave action, and foot traffic to and from boats moored along the shoreline. Erosion along the harbor shoreline impacts surrounding uplands used for transportation and to support harbor activities, creates shoals along the shoreline that restrict boat traffic, and poses safety hazards to harbor users. The Denali Commission proposes to improve harbor usability, protect adjacent facilities, and improve boating safety by dredging the harbor and entrance channel to 5 feet below mean lower low water (-5 feet MLLW), to widen the entrance channel to make it safer for passing boats and reduce maintenance dredging frequency, and to protect banks from erosion. Dredging to -5 feet MLLW would restore the harbor to its -4 MLLW design depth and would remove an additional 1 foot of the bottom sediment to postpone the need for future dredging. The action would allow full-tide access for larger boats using the harbor and would increase the interval until future maintenance dredging is required.

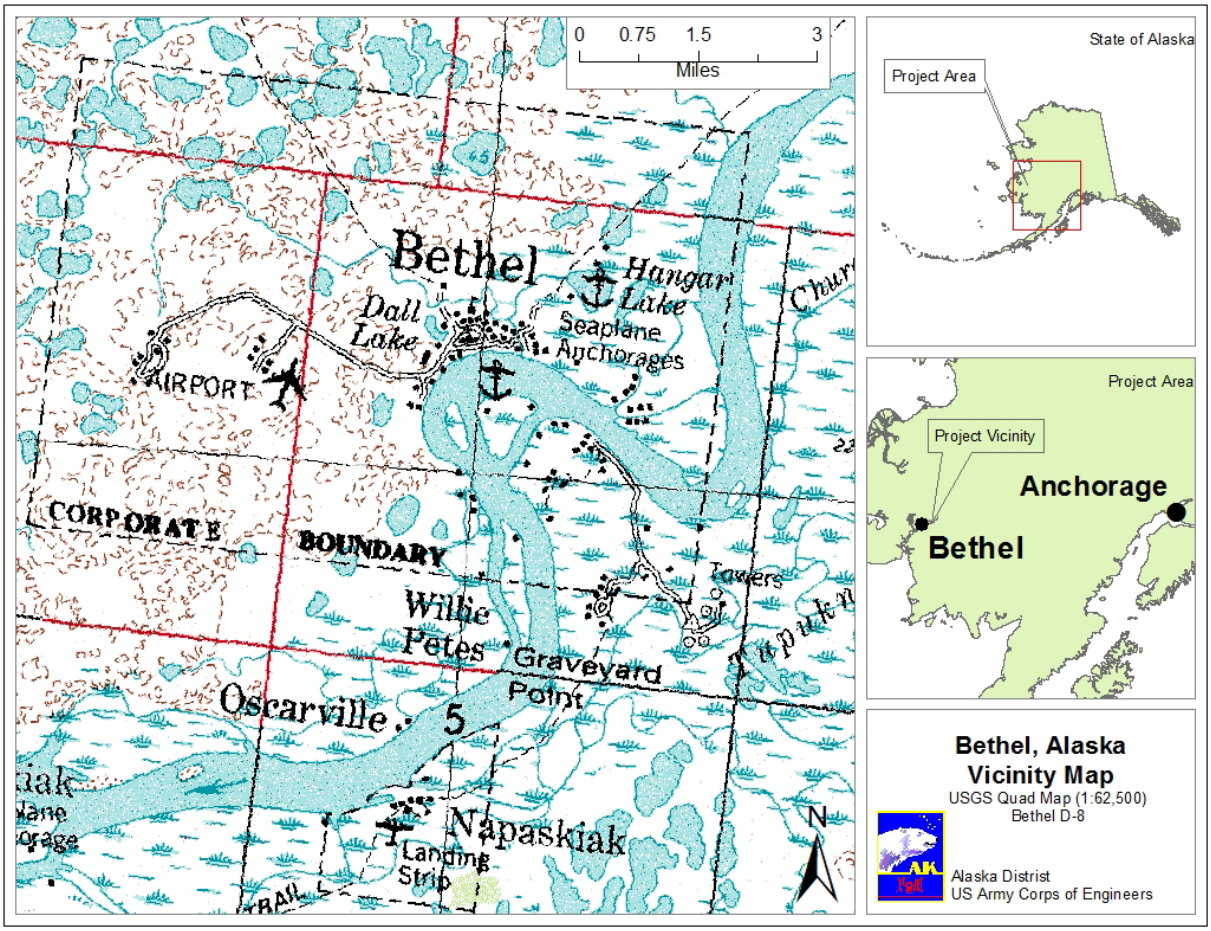


Figure 1. Bethel location map

Figure 2. Aerial view of Bethel Harbor and entrance channel

2.0 Proposed Action and Alternatives

2.1 Proposed Action

An overview showing the footprint of proposed project components is presented in figure 3(see appendix). The proposed action consists of two types of actions, which are as follows:

2.1.1 Dredging to Improve Boat Access

The mooring basin, the maneuvering channel, and the entrance channel would be dredged. Figure 3 (see appendix) shows the areas that would be dredged and the depths of dredging. Project maintenance for Bethel harbor, like most other harbors periodically maintained by the Corps of Engineers, is addressed in three parts because project authorization and funding for the three parts are treated differently. The three parts of Bethel Harbor facilities are the entrance channel, the maneuvering area or channel, and the mooring basin. Those three parts are shown in figure 3. The Corps of Engineers constructed the entrance channel and maneuvering area and has the authority to maintain them when funding is available. The mooring basin, which is the area intended for boats to launch and moor, was constructed with non-Federal funding. It is not eligible for Federal maintenance under existing Corps of Engineers authorities, but can be dredged by the Denali Commission and the city of Bethel.

The proposed action would dredge all three parts of the harbor, including the entrance channel. The authorized depth is -4 feet MLLW. An additional foot will be dredged as advance maintenance dredging to defer future dredging, so contractor will be directed to dredge to a depth of -5 feet MLLW. Because dredging and excavation are not precise, the contractor may dredge

slightly below the design depth and would be paid for material removed down to -6 MLLW (this is sometimes called the “max pay line”). A total of 28,100 cubic yards of material could be dredged: 17,800 from the entrance and maneuvering channels and 10,300 from the mooring basin. Less material would be dredged if funding was insufficient for the entire action.

Dredging in the harbor would be within the existing footprint, which is calculated to be 7.7 acres: 3.4 acres in the maneuvering channel and 4.3 acres in the harbor basin. The existing 31-foot-wide entrance channel would be widened by dredging 10 feet into the bank on each side for the full length of the channel to produce a completed channel 51 feet wide. A total of 2.9 acres would be dredged to return the existing channel to design depth and widen the channel. Side-slopes in the harbor and the entrance channel would be contoured to 1:5 (1 foot vertical to 5 feet horizontal). In the entrance channel, side-slopes would be 1:4. Figures 4 and 5 (see appendix) show cross sections of the areas to be dredged.

The harbor is heavily used throughout the open-water season, but is not used after it freezes in the autumn. The harbor and entrance channel freeze to the bottom by late winter. The proposed action would dredge the harbor and entrance channel during a 2-month period in late winter, which would avoid impact to harbor users.

Maintenance contractors in the past have dredged by excavating the harbor and channel in the winter. They ripped the ice out of the harbor and then removed the frozen harbor bottom beneath it. This same technique would be used for the proposed action. Approximately 28,000 cubic yards of material, primarily silt and fine sand, would be removed from the harbor and channel. Dredging in the harbor would be entirely within the existing harbor footprint. All dredging in the entrance channel would be within the 51-foot-wide footprint of the widened channel.

Dredged material would be transported a short distance by truck to a 14.1-acre disposal site that was used in previous maintenance dredging for this project. Figure 6 (see appendix) shows the disposal site location. The access route to the disposal site may differ from the route used for previous maintenance. Brush would be cleared as required for access and disposal. All clearing would be conducted before or after the nesting season to avoid taking nesting birds or their nests. The access road would be over frozen ground that is relatively flat, so road construction would not be required for disposal. As the disposal area is developed in the future, a short all-weather road and other improvements could be required and would be addressed as a separate action. Dredged material would be deposited in one area of the disposal site, allowed to thaw and settle, and then could be used eventually to construct a storage and staging area at the disposal site. Road and staging area construction, if conducted, would be addressed in a separate design and permit action. The contractor would prepare a storm water pollution prevention plan, which would be in place until the dredged material placement and erosion control measure were completed.

Ice ripped from the harbor before dredging would be stored in the harbor or piled on nearby developed uplands, stored until dredging is completed, and then placed back into the harbor to melt during breakup in the spring.

2.1.2 Construct Bank Protection and Boat Ramps

Bethel Harbor banks and the entrance and maneuvering channels would be contoured and protected from erosion. Classified gravel (gravel sorted to specified size range), stone rubble revetments, geotextile fabric, and a high density polyethylene (HDPE) grid system (geocell) filled with gravel would be used. Rock revetments would be used at points most susceptible to erosion. They are more expensive than geocell, but stand up well to waves in the harbor, foot traffic, and freeze-thaw cycles. Revetments would generally be constructed to a 1:3 (vertical to horizontal) slope. Fabric and geocell filled with gravel would be used in areas subject to foot traffic or other potential erosive activities, but where revetment was not required. Most in-water slope protection would use geocell and fabric construction. Gravel without geocell would be used where less erosion protection was required and as a substrate for shoreline boat mooring. Slopes to be protected with gravel, geotextile fabric, or geocell systems would generally be contoured to 1:4slopes.

Preparation for installation of slope protection would require excavation and contouring at each location. A total of 7,038 cubic yards of earth and other material would be excavated to prepare for slope protection. Some of the material would be used in slope protection; the remainder would be used in local maintenance on developed areas or transported to the disposal site.

Figure 3 shows the areas that would be protected. At the confluence of the entrance channel and the Kuskokwim River, slopes would be contoured and a revetment consisting of gravel and two layers of quarried rock ("A" and "B" layers; see figure 7 in appendix) would be placed for 450 linear feet to protect the eroding river bank and exposed channel. Similar protection, but employing only geotextile, geocell, gravel, and less "B" rock (figure 8, see appendix) would be used to protect approximately 500 linear feet of the south bank and sections of the north bank of the harbor where erosion is a persistent problem. The remainder of the north bank and west bank, approximately 880 linear feet, would be protected with gravel, geotextile fabric, and geocell (figure 8). Similar protection would be placed along 600 linear feet of the east bank (Section D in figure 9, see appendix). Gravel for boat landing would be placed along 520 linear feet of the west bank of the entrance channel (Section C of figure 9). The following slope protection quantities would be placed for this action:

Project feature	Classified fill cu yd	"B" rock cu yd	Geocell sq yd	Geotextile sq yd
Entrance and maneuvering channels	327			
East bank	747		2,493	768
North and west banks	1,790	1,575	5,475	5,475
South bank	112	348		
Culvert outfalls (3 locations)	78	233		504
Launch ramp toes	483			

Boat launch ramps would be replaced at the north and south ends of the harbor. Each would require placement of 136 cubic yards of classified fill and 124 cubic yards of concrete planks. Figure 3 shows boat ramp locations. The toe at each boat ramp would be excavated and a 2-foot-thick layer of gravel would be placed to retard bottom scouring.

Three 48-inch culverts would be replaced at the northwest corner and one 24-inch culvert mid-way along the west bank of the harbor (figure 3). Scour protection aprons would be placed at each culvert as shown in figure 9 (see appendix).

Construction would require one winter and one summer. No new quarry or borrow source would be developed for the action. Rock and gravel for construction would be from commercial sources. Gravel for recent construction at Bethel was barged from Platinum. The contractor might use that source or some other commercial vendor. Construction access, storage, and staging would all use existing developed uplands. Alaska Department of Environmental Conservation standards and guidelines would be observed for fueling, fuel storage, and other activities that could introduce petroleum or other contaminants into the harbor or the Kuskokwim River.

2.2 Alternatives to the Proposed Action

2.2.1 No Action

The no-action alternative would leave the harbor un-dredged and the harbor slopes without protection. Useful function of the harbor and viability as a regional transportation hub would gradually be lost.

2.2.2 Replace or Expand Bethel Harbor

Constructing a new harbor or substantially expanding the existing harbor as an alternative could benefit Bethel, but could not be recommended under existing Federal water resources development authorities and is not a priority in State planning. This alternative cannot be implemented at this time.

2.2.3 Slope Protection Alternatives

Alternative slope protection methods would not offer better protection or environmentally better solutions, and would not offer better value for their cost.

2.2.4 Dredged Material Disposal Alternatives

Dredged material could be used beneficially in local maintenance or as cap material for the city landfill. The material, however, is far more than is needed at the landfill and grain size is too fine to meet most maintenance requirements. Beneficial use for these purposes in not a viable alternative

In-river disposal is used elsewhere in western Alaska, but only when there is no economically and environmentally acceptable site. Placing this quantity of dredged material on the frozen Kuskokwim River would concern local users and would require additional evaluation. This disposal alternative is not being used because the proposed site is economically and environmentally acceptable.

Alternative disposal sites could be developed, but the proposed site is already disturbed, has lost any previous wetlands functions, and can be readily accessed from the project site without undue disturbance to habitat, other natural resources, or surrounding populace.

2.3 Mitigation Measures

Any brush clearing or other activity that would disturb nesting birds would not be conducted during nesting periods and would not take migratory birds. Fuels and fueling, lubricating, and other potentially contaminating activities would be kept away from the harbor and the Kuskokwim River. Material placed at the disposal site would be contained, and run-off would be filtered if required to prevent erosion and to prevent degradation of surrounding waters and wetlands. Employing the previously used disposal site avoids new impacts that would be produced in alternative disposal sites. There are no known cultural resources in the project area. If any potential cultural material was found during construction, work would be halted and the State Historic Preservation Officer (SHPO) would be notified.

3.0 Affected Environment

3.1 Socio-Economics

Bethel (2011 estimated population 6,288) is one of the larger western Alaska communities. Commercial foods and other purchased goods may be a larger component of everyday life there than in smaller communities of the region, but fish, game, plants, and natural materials are essential in the everyday life of most people in Bethel. The harbor at Bethel is the starting and end point for a broad range of hunting, fishing, and gathering activities. Transportation from Bethel Harbor also is essential in maintaining important cultural ties between Bethel and the surrounding communities. Any action that disrupted transportation between Bethel and the smaller communities of the region or with customarily used hunting, fishing, or gathering sites would affect both the material and cultural aspects of subsistence activities in the region.

3.2 Hydrology and Topography

The Kuskokwim River near Bethel is a broad, tidally influenced river, but Bethel is well upstream from any intrusion of marine salinity. Tidal range is approximately 4.5 feet at Bethel, but could be expected to vary substantially with river and wind conditions.

The Kuskokwim River, like most of the larger rivers of the region, receives considerable glacial melt water. This produces relatively heavy bed-loads and substantial turbidity during the open-water season.

Bethel is in the vast Yukon-Kuskokwim Delta. Landform and topography is typical of the delta; about half of the surface is covered by lakes large and small. Almost all the land is wetlands with little topographic relief, although the river bank along Bethel is generally steep. Most of Bethel and the area around it are underlain with permafrost, and as might be expected, most of the soils of the region are wet.

3.3 Contaminants

Potential sources of chemical contamination are limited at Bethel. Fuel spills are the most probable source of contaminants in the river and in the harbor. The most recent sediment evaluations were of collections from 22 September 2011 (Alaska District 2011). Those samples

were tested for fuels including gasoline, diesel, and residual range organics (GRO's, DRO's, RRO's); volatile organic compounds (VOC's); polychlorinated biphenyls (PBC's); heavy metals; polynuclear aromatic hydrocarbons (PAH's); and total organic carbon (TOC's). Results were compared with the most conservative Alaska Department of Environmental Conservation (ADEC) soil cleanup criteria to determine suitability for upland disposal.

A full range of fuel organics (GRO's, DRO's, and RRO's) were detected, but in concentrations well below ADEC cleanup levels. Trace amounts of VOC's and small amounts of PAH's were detected, but again, at well below ADEC limits. PCB compounds were not detected in any sample. Rich organic material was reported as TOC in all the samples, but hydrocarbons may derive from a variety of natural sources, do not equate to contamination, and do not require cleanup.

Arsenic exceeded ADEC cleanup levels in all samples. The maximum concentration detected was 56 mg/kg, far above the 3.7 mg/kg cleanup level. Arsenic is naturally occurring in this region, and there is no indication that it was introduced into the sediment by human activities. It therefore is not considered to be a contaminant. Chromium was present at a maximum of 49 kg/mg, which would exceed cleanup limits if it were the more toxic hexavalent form produced as industrial waste. Industrial processes that would produce hexavalent chromium are not employed at Bethel, so the chromium in those samples would be the much less toxic trivalent form, and it is present in amounts that do not exceed cleanup limits for trivalent chromium.

The analysis indicates that dredged material from Bethel Harbor and from the harbor entrance channel can be safely placed in the proposed upland disposal site. Results from this sampling effort are generally consistent with results of earlier investigations.

3.4 Vegetation and Wetlands

Vegetation at Bethel is typical of the Yukon-Kuskokwim Delta and is predominantly sedges, mosses, lichens, and other moist and wet tundra plants adapted to wet conditions and long, harsh winters. Recumbent dwarf birch and willow grow in drier areas of the tundra. Larger woody vegetation is largely limited to alders and willows along river banks and on comparatively well-drained soils. Vegetation is affected by development and human activity around the harbor. In that area, it is sparse and of little habitat value. Soil drainage along the entrance has created limited areas of less saturated soil and more diverse vegetation, but boat launching and mooring and attendant human activity have generally degraded vegetation there.

Almost all of the undeveloped land of the region is wetlands. Jurisdictional waters of the United States, including wetlands, in the project area include the open waters of Kuskokwim River, ponds and lakes scattered throughout the area, and wetlands including moist tundra, wet tundra, and shrub/scrub wooded assemblages.

3.5 Fish

The lower Kuskokwim River is a major fish passage corridor. The Alaska Anadromous Waters Catalogue (ADF&G 2011) lists the Kuskokwim River as 335-10-16600. The catalogue notes the presence of five species of Pacific salmon, humpback whitefish, other whitefish, Pacific and Arctic lamprey, least cisco, and sheefish. It also notes spawning by whitefish in that section of

the river. The listing of “present” indicates that the listed species spawn and rear elsewhere or that specific life history information is not known for this reach of the river. Brown’s Slough, a small tributary that enters the Kuskokwim a short distance upstream from Bethel Harbor, is Catalogue number 335-10-16600-2621. Brown’s Slough is listed as having sheefish present and whitefish rearing. Bethel Harbor and the entrance channel are not listed as anadromous, although whitefish, lampreys, and other fish may use that habitat occasionally. The harbor and entrance channel do not appear to have any unique or rare habitat attributes that would make them especially important as fish habitat. Both water bodies freeze to the bottom every winter, and so would not offer wintering habitat.

3.6 Mammals

Seals inhabit Bristol Bay at the mouth of the Kuskokwim but are not notably present at Bethel. Beluga whales occasionally travel far up the Kuskokwim but would not be associated with Bethel Harbor. A variety of mammals are distributed through the region, and moose occasionally range through the area, as do fox and other furbearers. Their use of habitat around the harbor is limited by noise and presence of people and their dogs.

3.7 Birds

The Yukon-Kuskokwim Delta is one of the most important waterfowl breeding and nesting areas in North America. Ducks, geese, swans, and cranes, along with gulls, terns, and other water birds are abundant in the region from the time ice begins to melt in the spring until freeze-up in the autumn. While water and wetlands range throughout the area, they are not commonly associated with the existing harbor or the proposed project area. Passerine birds nest in the alders and willow along the Kuskokwim River, the brush along the entrance channel, and in the stunted trees of the proposed disposal area. Swallows nest in the steep river banks all along the Kuskokwim, but not in the entrance channel or harbor at Bethel.

3.8 Endangered Species

The Anchorage U.S. Fish and Wildlife Field Office endangered species consultation guide (Alaska.fws.gov/fisheries/endangered/pdf/Consultation_guide_31010.pdf) lists several endangered or threatened species in the region, but none in the vicinity of Bethel.

3.9 Cultural Resources

No sites or properties in or near the project are listed in the National Register of Historic Places. Records of the SHPO do not list any cultural resources at the project site.

4.0 Environmental Consequences

4.1 Socio-Economics

Maintaining and improving the harbor and entrance channel at Bethel would not appreciably affect economic or subsistence opportunities at Bethel. All work would be conducted during the winter, when there is little activity around the project area. Ice stored after dredging would block access to some areas around the harbor, but this would leave ample area for the limited winter activities at the harbor. The ice would melt before the busy preparation activity that precedes

commercial fishing openings and the advent of summer subsistence activities. The project area is away from residences and other public facilities that might be affected by noise or activity. The project site is not near a school or other area used disproportionately by children. Construction and operation of the project would not cause undue risk to children.

4.2 Contamination

Dredging would not affect water quality in the harbor or the entrance channel. All dredging would be completed in the winter, so no material would be suspended in water. Bottom material disturbed during winter dredging could be suspended during breakup, but with the flooding and turbidity associated with breakups, those minor contributions would be unimportant.

Bottom material at Bethel was tested for contamination in 2010 and 2011. Results indicated that the material was suitable for disposal in the city landfill as capping material or in the proposed disposal site. Dredging would not increase contamination in the harbor or entrance channel to more than background levels and would not expose people or biological resources to more than background levels of naturally occurring heavy metals. Disposing dredged material on the nearby proposed disposal site would not lead to contamination of human or natural resources.

4.3 Aquatic Habitat

Bank protection would substantially modify 3,150 feet of shoreline in the harbor and at the junction of the entrance channel and the Kuskokwim River. The existing shoreline is predominantly eroding sandy silt with very sparse vegetation and almost no hard substrate for macro invertebrates except on existing bank protection areas. The shoreline freezes solid each winter, which further limits habitat development. The proposed bank protection would destroy the low-value soft habitat at that location and would replace it with harder and more permanent substrates. The new substrates could provide hard surfaces that would be used by insect larvae and algae and that could add diversity for fish. Turbidity, suspended sediments, and annual freezing would limit benefits to aquatic biota from the bank protection improvements. The banks of Bethel Harbor and the shoreline of the entrance channel are relatively poor habitat for aquatic organisms now. Habitat improvements form bank protection could cause minor habitat improvements, but those improvements would not likely be important to biota of concern.

4.4 Fish

Fish at the project site and immediately downstream could be temporarily displaced by construction activity and turbidity. The Kuskokwim River at Bethel transports huge amounts of silt, fine sand, and other material as bed load and suspended solids. Additional material introduced during dredging would be similar in grain size. Excess material would fall out as sediment, but most would be rapidly mixed as it was transported downstream. Fish living in and migrating through the lower Kuskokwim are well adapted to suspended material in the water column and would not likely encounter damaging levels of turbidity or suspended solids.

4.5 Mammals, Birds, and Endangered Species

Birds, mammals, and their habitats are poorly represented in the project area and would not be affected to any meaningful extent. Dredging would be completed in the winter when there would be little effect on biota at the project or at the discharge site. Bank placement would be by

equipment working from the banks. Work would be completed after breakup but would be in areas already disturbed and with little habitat value. Placing bank protection could temporarily displace fish and other organisms but would not cause meaningful effects to fish or wildlife.

No marine mammals or endangered species would be adversely affected by the action.

4.6 Cultural Resources

Cultural resources would not be affected by the action.

4.7 Coastal Management Resources

Alaska's coastal zone management program expired on July 31, 2011. Project proponents are no longer required to evaluate projects for consistency with enforceable standards of coastal management plans. Those plans do, however, offer useful criteria for evaluating projects in the coastal zone. Bethel is in the Ceñaliulriit coastal district. The project would be constructed on land owned by the City of Bethel. Ceñaliulriit District enforceable standards are listed in table 1. The proposed action is consistent with the district's enforceable policies.

- The proposed action is water and coastal dependant and provides for multiple uses and avoids duplicative facilities.
- The project would maintain and improve public access to the Kuskokwim River.
- The proposed action is in a natural hazard area, but viability of the project will not be affected by the natural hazards (permafrost and river flooding).
- The project would be adjacent to an area customarily used for subsistence but would not impede those uses, wildlife passage, or traditional access.
- The project would affect wetland and river habitats, but the minimum areas necessary would be used and important functions would not be appreciably affected.

Table 1. Ceñaliulriit CRSA Coastal Management Plan Enforceable Policies
(Nomenclature is excerpted from the regional coastal management plan)

C. Coastal Development

C-1. Multiple Use

a. Project applicants shall site, design, construct, and operate structures or dredged of fill material placed in coastal waters to minimize the need for duplicative coastal facilities.
b. This policy applies to uses and activities areas covered by the Coastal Development standard (11 AAC 112.200).

C-2. Optimum Shoreline Use

a. The following water dependent uses shall be given priority consideration for waterfront use in the following order: Subsistence fishing sites, commercial fishing sites, and fishing gear storage.
b. This policy applies to uses and activities covered by the statewide Coastal Development standard (11 AAC.112.200).

D. Natural Hazards

D-1. Ice Hazards

a. Project facilities shall not be located in areas subject to ice hazards unless there is no practicable alternative.
b. This policy applies to all areas designated for natural ice hazards under 11 AAC 114.250(b) as described in Section 4.5.2.

G. Sand and Gravel Extraction

G-2. Sand and Gravel Priority Siting

a. Sand and gravel operations shall be located in areas using the following order of priority:
1) Sand and gravel from already disturbed areas where existing development has been abandoned
2) Existing sand and gravel sources unless alternate sites would result in less impacts to habitat and subsistence uses
3) New upland pits
4) Rivers, streams and lakes that do not support fish
5) Shoreline and offshore gravel sources
6) Floodplain gravel sources

Designated Areas

Natural Hazard Areas

The CRSA designates three types of natural hazard areas under 11 AAC 114.250 for all non-Federal lands within the district's coastal zone:

- Permafrost: All land based areas above high tide a natural hazard area for permafrost
- Ice Hazards: All offshore areas for ice hazards.

Uses and activities that could be proposed for areas designated as natural hazard areas include: subsistence harvests, hunting and fishing, cultural uses, commercial fishing, independent backcountry recreation, commercial recreation, tourism, development of transportation and utility routes and facilities, sand and gravel extraction, onshore and offshore mining, onshore and offshore oil and gas exploration and development, housing and subdivisions, remote camps, and off-road travel.

5.0 Literature Cited

Alaska Department of Fish Game (ADF&G). 2011. www.adfg.alaska.gov/sf/SAAR/AWC

Alaska District, U.S. Army Corps of Engineers. 2011. Chemical Data Report, Bethel Small Boat Harbor Sediment Study, Bethel, Alaska.

Appendix

Figures

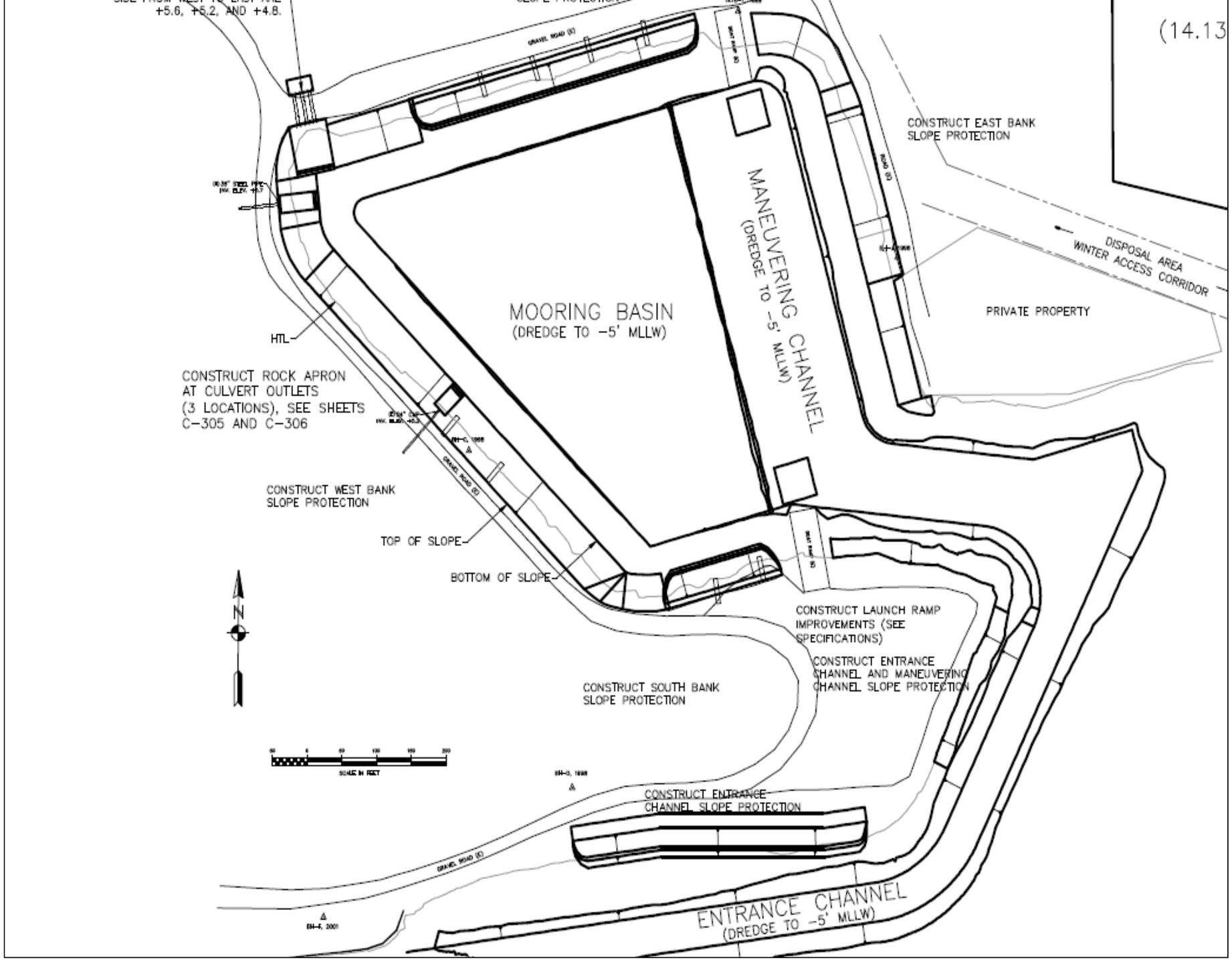


Figure 3 Overview of project features

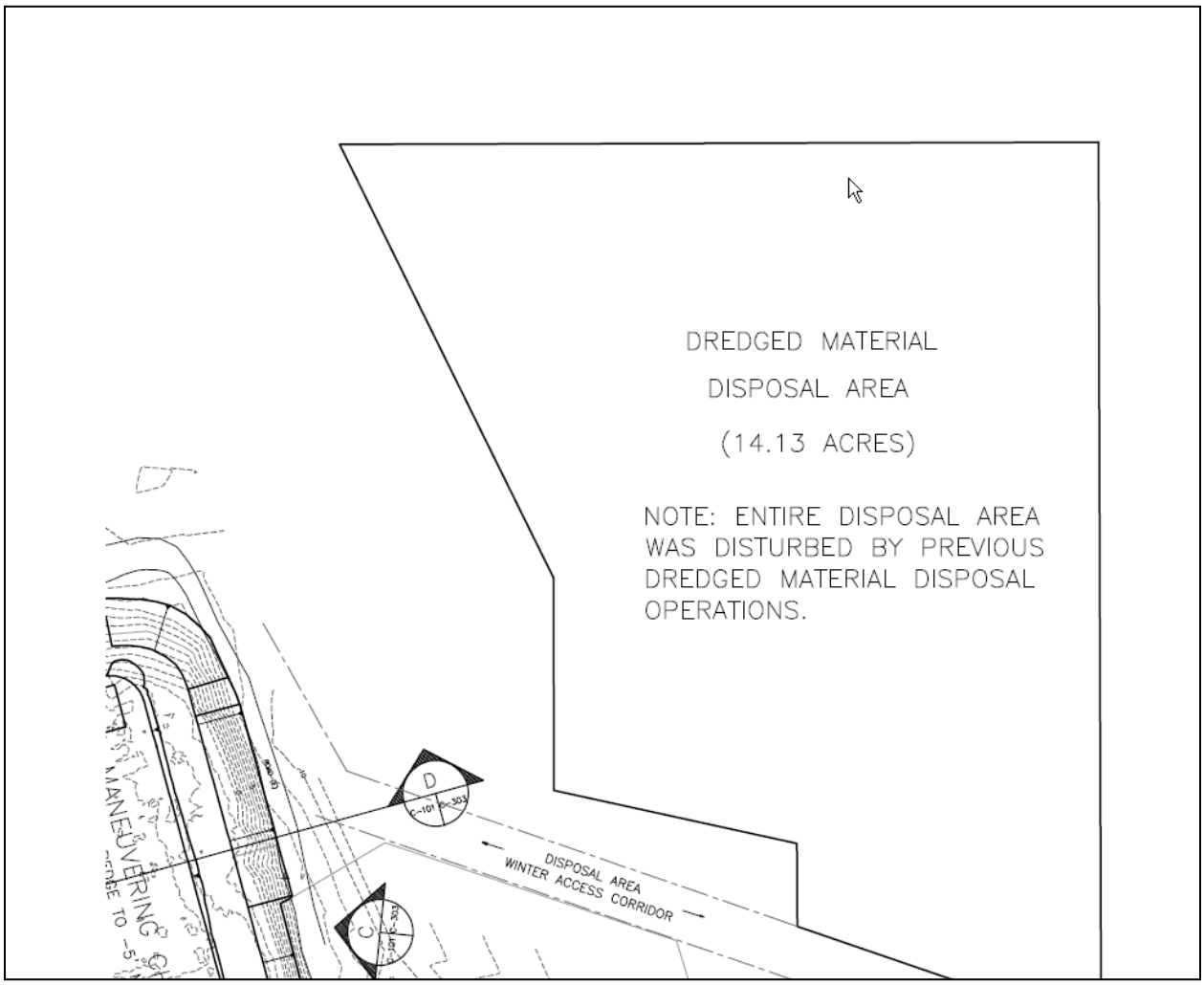


Figure 6 Bethel harbor dredged material disposal area

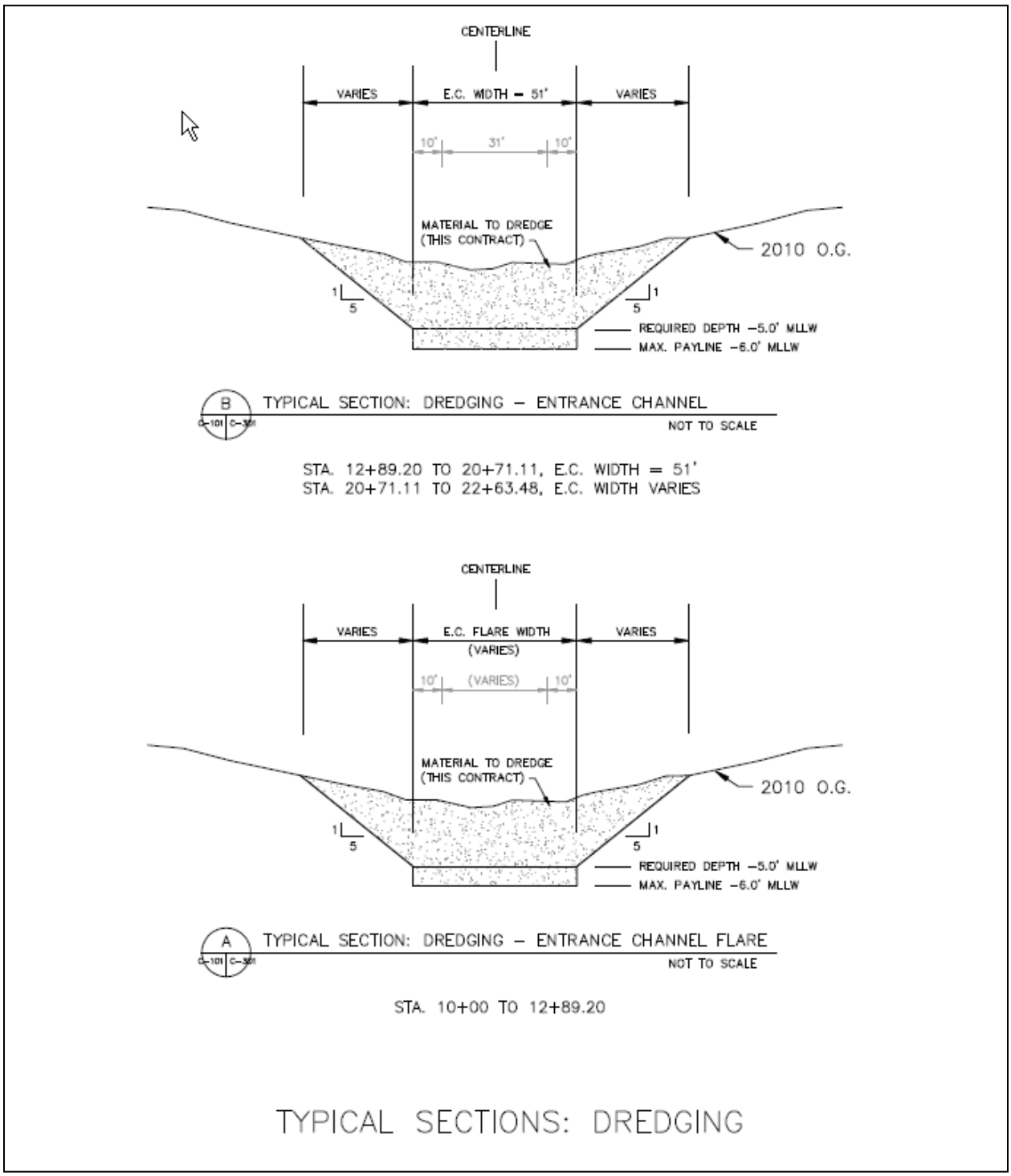


Figure 5 Cross sections of areas to be dredged in the Bethel harbor and entrance channel

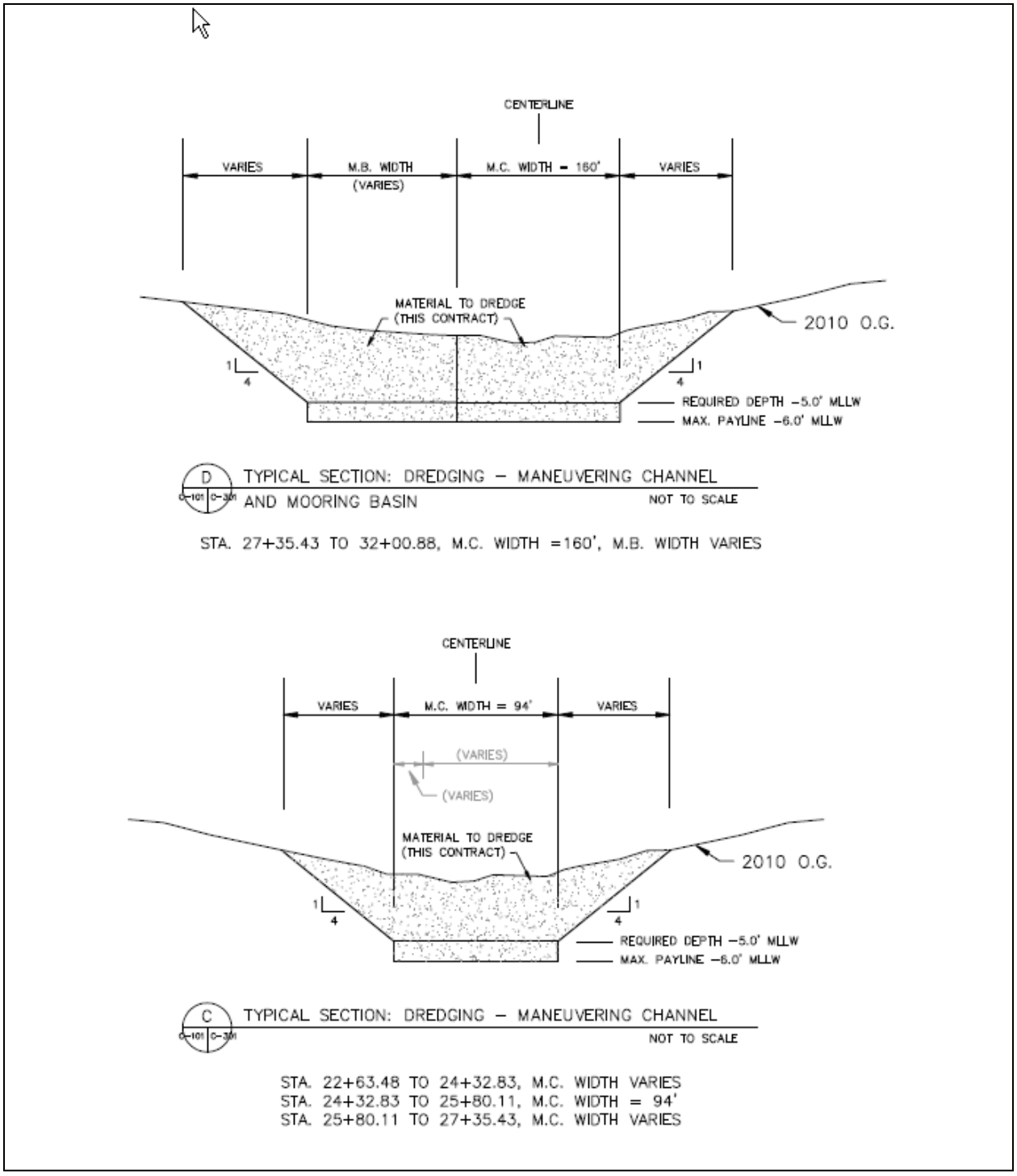


Figure 4 Cross sections of areas to be dredged in the Bethel harbor and maneuvering channel

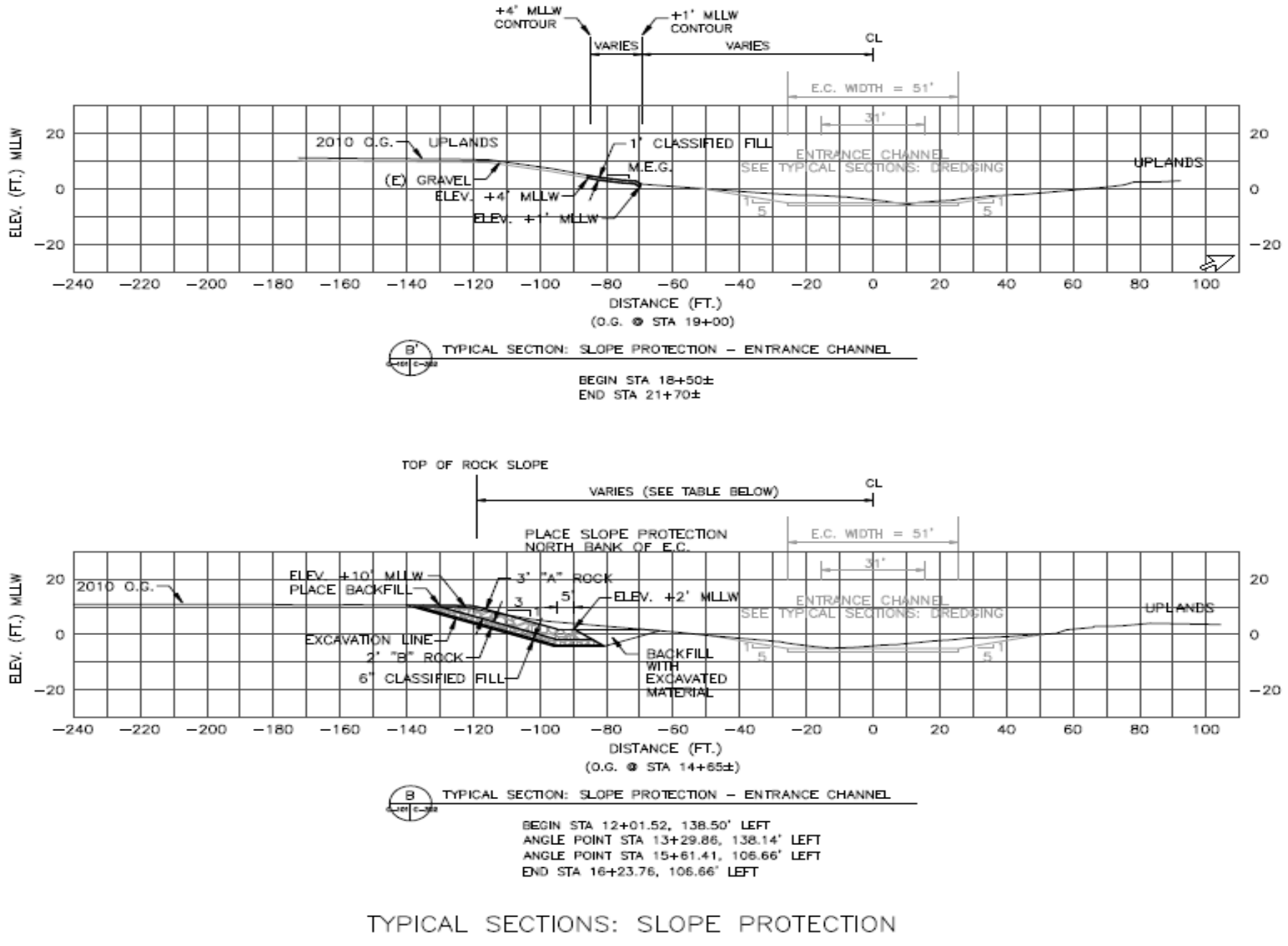
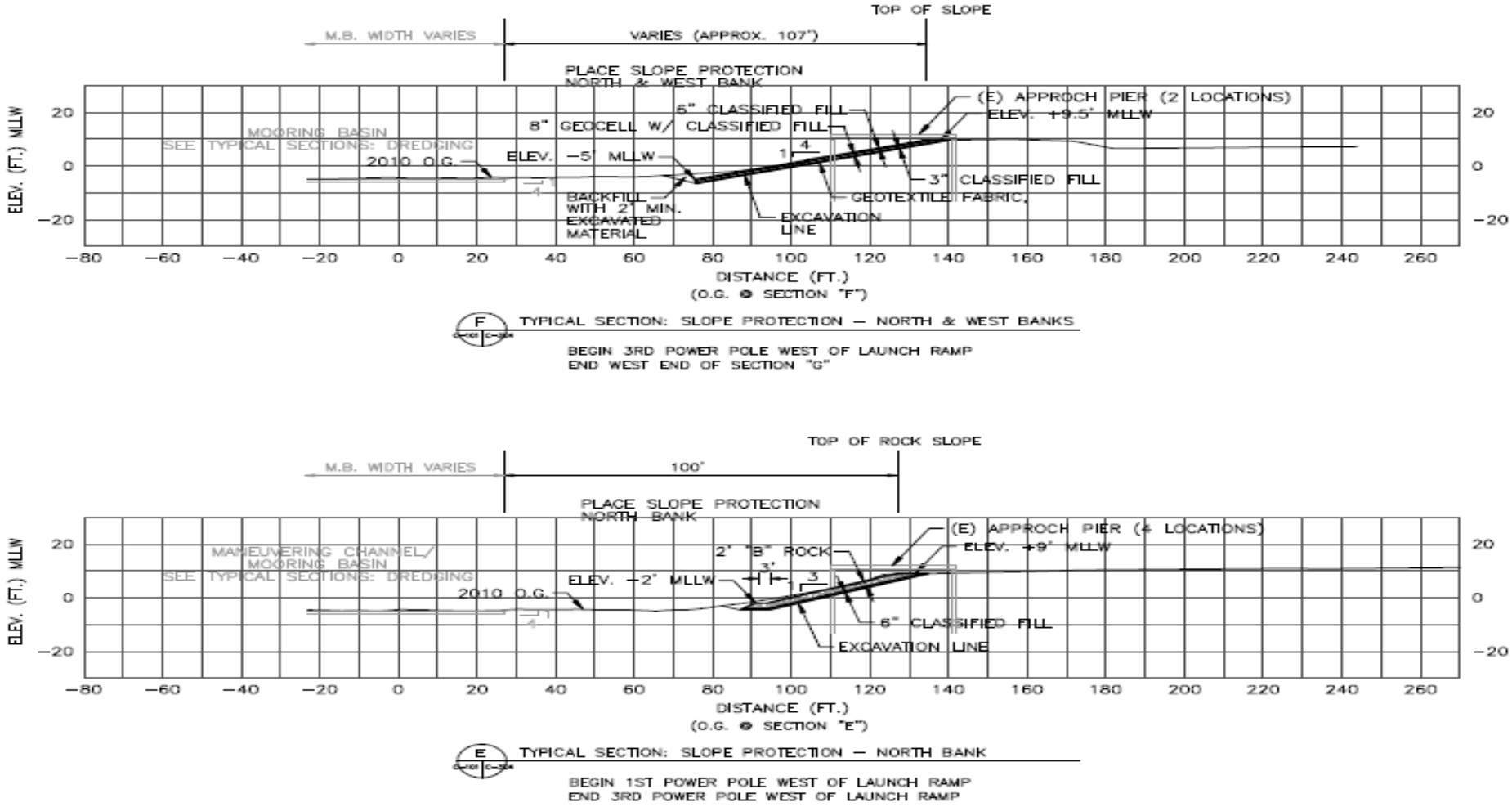


Figure 7 Typical slope protection profiles, entrance channel, Bethel harbor.



TYPICAL SECTIONS: SLOPE PROTECTION

Figure 8 Slope protection profiles, north and west banks of Bethel harbor

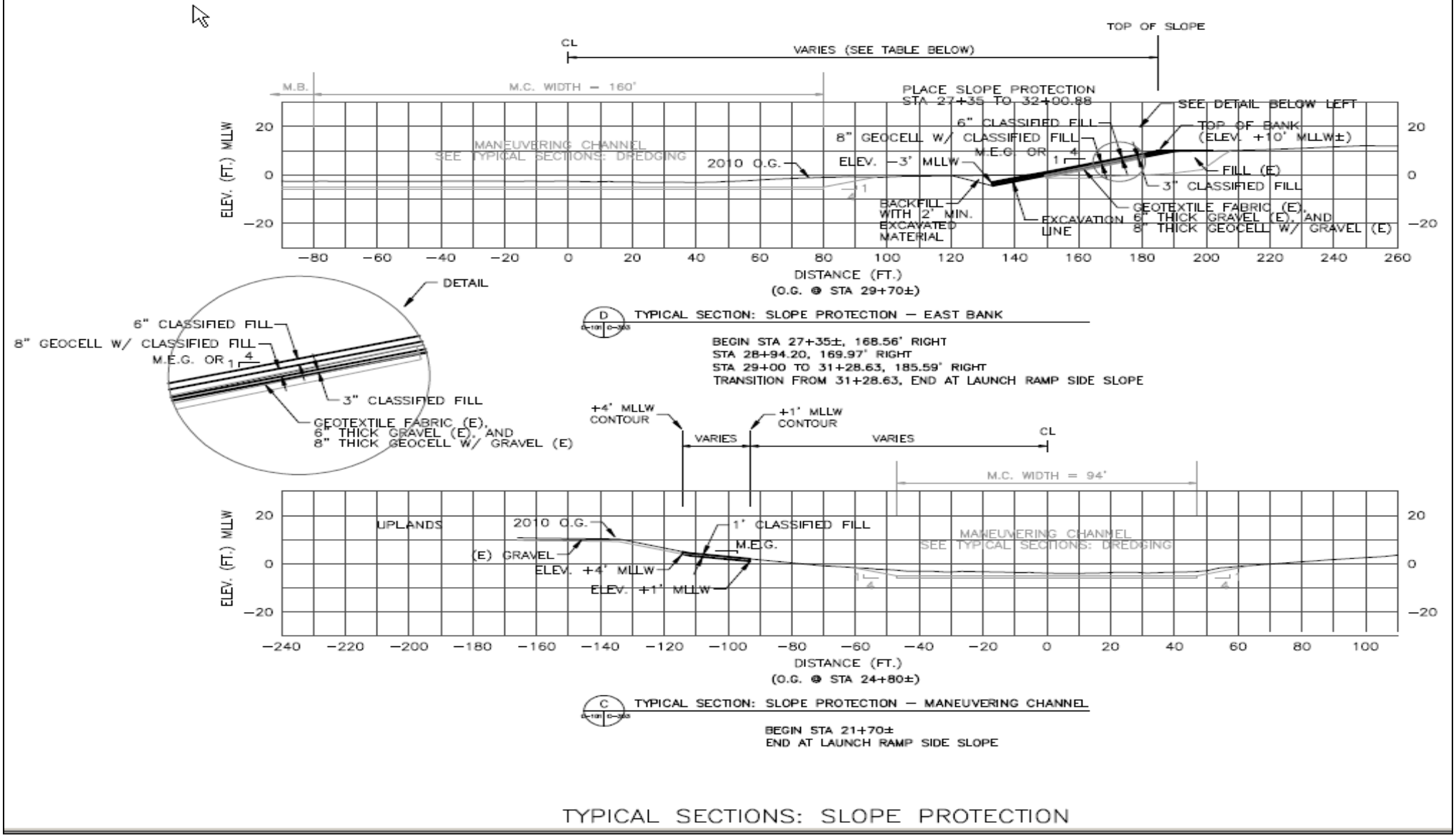


Figure 9 Typical slope protection profiles, east bank and maneuvering channel bank, Bethel harbor.

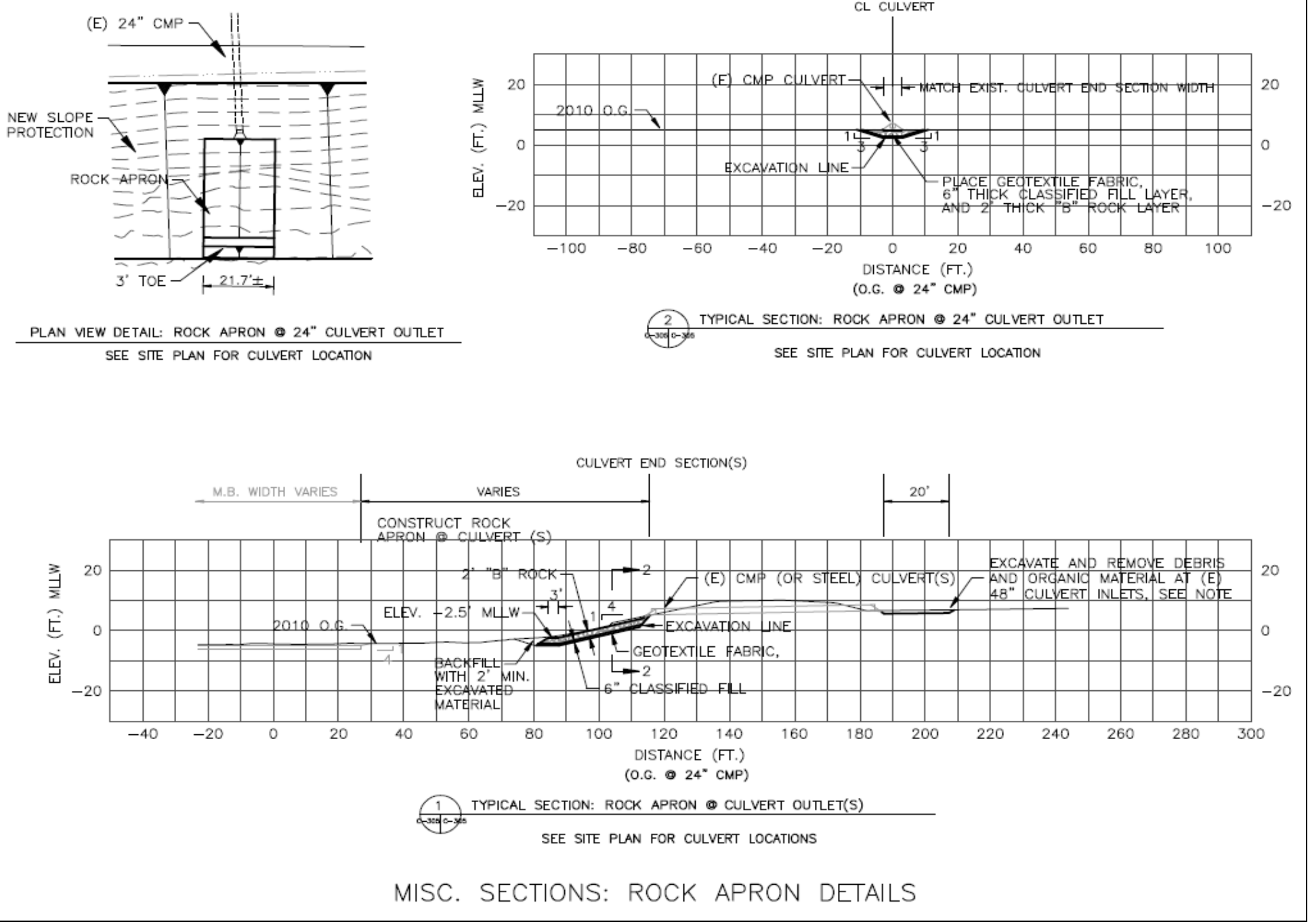


Figure 10 Culvert and apron construction detail, 24-inch culvert

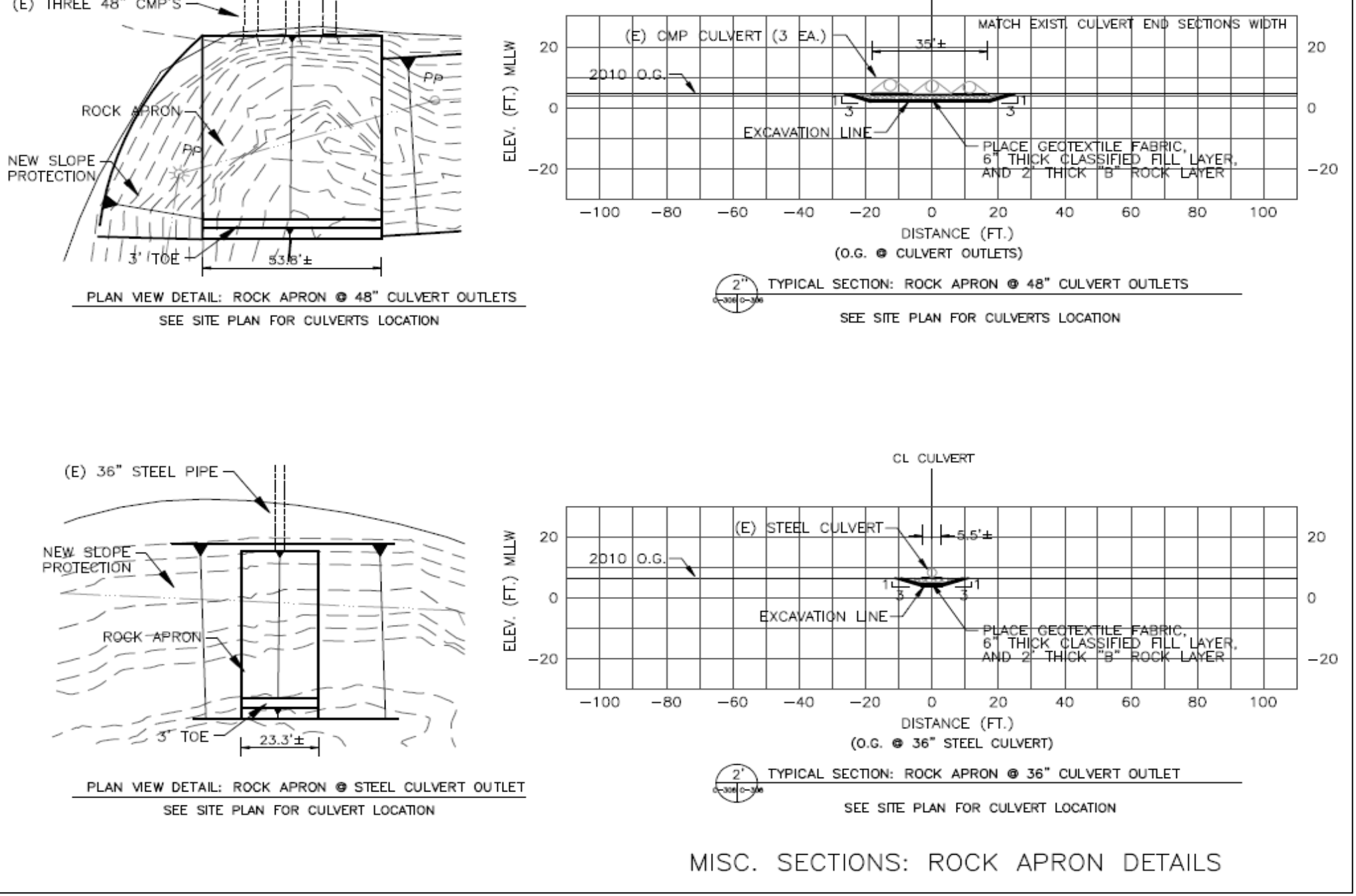


Figure 11 Culvert and apron construction detail, 48-inch culvert