UPPER DES PLAINES RIVER
ILLINOIS & WISCONSIN WATERSHEDS
FEASIBILITY STUDY II

APPENDIX D
CIVIL DESIGN

AUGUST 2013

UPPER DES PLAINES RIVER
ILLINOIS & WISCONSIN WATERSHEDS
FEASIBILITY STUDY
FEASIBILITY REPORT

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UPPER DES PLAINES RIVER
ILLINOIS & WISCONSIN WATERSHEDS
FEASIBILITY STUDY

APPENDIX D
CIVIL DESIGN ANALYSIS

INTRODUCTION

GENERAL

1. The purpose of this report is to present the engineering analysis for the formation of Phase II FEASIBILITY STUDY plans. This study is a continuation and extension of the phase I Upper Des Plaines River Feasibility Study that was approved November 1999. The phase I study focused primarily on flooding problems along the main stem of the Des Plaines River (upstream of its confluence with Salt Creek), and recommended implementation of six projects to reduce main stem flooding. Study recommendations were authorized in the Water Resources Development Act of 1999 (P.L. 106-53). The phase I study was preceded by a Reconnaissance study that was completed in 1989. The phase II study has three primary objectives: further reduction of main stem flooding; reduction of tributary flooding; and environmental restoration of degraded ecosystems within the basin. Secondary objectives include improving water quality and enhancing recreational opportunities throughout the basin. The study will consider sites located within tributary watersheds and along the main stem for both Flood Damage Reduction (FDR) and Ecosystem Restoration (ER) potential. The affects of FDR sites within tributary watersheds on main stem flooding will also be evaluated.

PURPOSE AND SCOPE

2. The purpose of this section is to: 1) describe design criteria, engineering methods, procedures, and assumptions that were used for layout and perform preliminary design analysis of the alternatives; 2) present the methods used and calculations developed for earthwork quantities 3) present the requirements for the real estate needed; 4) present criteria and requirements for utility interferences; and 5)

discuss the engineering design analysis requirements for the next phase of the project.

PREVIOUS INVESTIGATIONS

3. See paragraph 1.1.5 and Plate 10 of Feasibility Main Report.

EXISTING SURVEY DATA

4. Local GIS data was used for the design of the levees, floodwalls, reservoirs, road raises, other measures, and dam removals and represents conditions existing at that time. The GIS data used includes 2-ft contours, real estate parcels, streets and highways, streams and water bodies. The GIS data was provided by Tele Atlas North America, Northeastern Illinois Planning Commission, IDOT Bureau of Information Processing, and Lake County GIS/Mapping Division.

5. GIS Data Disclaimer: While the United States Army Corps of Engineers, Chicago District (hereinafter referred to USACE) has made a reasonable effort to insure the accuracy of the maps and associated data, it should be explicitly noted that USACE makes no warranty, representation or guarantee, either express or implied, as to the content, sequence, accuracy, timeliness or completeness of any of the data provided herein. The USACE, its officers, agents, employees, or servants shall assume no liability of any nature for any errors, omissions, or inaccuracies in the information provided regardless of how caused. The USACE, its officers, agents, employees or servants shall assume no liability for any decisions made or actions taken or not taken by the user of the maps and associated data in reliance upon any information or data furnished here. By using these maps and associated data the user does so entirely at their own risk and explicitly acknowledges that he/she is aware of and agrees to be bound by this disclaimer and agrees not to present any claim or demand of any nature against the USACE, its officers, agents, employees or servants in any forum whatsoever for any damages of any nature whatsoever that may result from or may be caused in any way by the use of the maps and associated data.

6. The horizontal coordinates referenced the Illinois State Plane Coordinate System, East Zone, North American Datum of 1983 (NAD83) U.S. feet. The elevations used for the reservoir weirs and levee crests all reference North American Vertical Datum (NAVD) 88 in U.S. feet.

7. Baseline utility information is available for the conceptual design of the reservoirs, levees/floodwalls, other measures, and dam removals for this feasibility study. Preliminary utility coordination with utility companies was performed to identify existing utilities in significant conflict with the proposed features. This information was used to amend features to minimize utility conflicts. A detailed survey of all existing utilities within and adjacent to the project site will be required during the design phase for each individual site.

SECTION 1 - RESERVOIRS

RESERVOIR SITE SELECTIONS

8. One hundred forty sites were identified as potential locations for proposed reservoirs. Refer to the Main Report for more information on the initial site selection details. Idealized Reservoir Analyses (Attachment D-1) were performed for the second phase reservoir selections to reduce the alternatives from the one hundred forty sites and to determine optimal reservoir locations. The optimum locations minimized area and costs while maximizing storage.

9. The Idealize Reservoir Assumptions:

a. Levee and reservoir side slope is 1(V): 3(H).
b. Reservoir footprint/area is rectangular with the length 1.5 times greater than the width.
c. Top of levee is 10-foot wide.
d. The existing terrain is flat.
e. The weir is typically 2 feet below the height of levee and 10 feet wide.
f. The reservoir area is considered as the area within the inner toe of the boundary levee.
g. The reservoir area computed represents half of the site. The surplus excavated material will be stored on the other half of the site.

10. For a reservoir storage volume, reservoir areas were calculated based on the reservoir excavation and levee fill requirements. The reservoir excavation depths and levee fill requirements are combination of levee heights and excavation depths. 25, 50, 100, 200, 400, 800, 1200, and 1600 AC-FT were used for the reservoir storage volume. 6 FT, 8 FT, and 10 FT were used for the levee heights, and 5 FT, 10 FT, and 15 FT were used for the reservoir excavation requirements. The weir height was assumed to be 2 FT below the levee height. The reservoir storage is determined based on the weir height above grade and the excavation depth.

11. For each reservoir storage volume, the reservoir area and excavation and levee fill quantities were computed for the levee heights and reservoir excavation depths combinations. Nine alternatives were developed for each reservoir storage volume, and a total of seventy-two alternatives were computed for all the reservoir storages listed above. Other quantities computed for each alternative includes: topsoil stripping, seeding area, topsoil placement, and clearing and grubbing

area. The cost estimate for each alternative was determined and is documented in Appendix F, Cost. For each reservoir, the relationship between the costs and the reservoir storage areas are shown in Attachment D-1. Refer to the main report, for more information on the secondary site selection process using the Idealize Reservoir Analyses.

12. Based on the Idealize Reservoir, Hydrology and Hydraulic analyses, and other parameters as discussed in the main report, the cost-benefit were computed for the sites and the following sites were selected with B/C ratio greater than 1.0: BCRS02, ACRS03, ACRS08, BWRS31, FDRS01, FDRS03, WHRS06, DPRS07, & DPRS23. The reservoirs are name according to its watershed, i.e., Des Plaines, Bull Creek, Feehanville Ditch, McDonald Creek, Aptakisic Creek, etc.

SITE SUITABILITY (GEOTECHNICAL)

13. Geotechnical review was performed on the selected sites listed above to determine the site suitability for a reservoir based on available geotechnical data. See Attachment D-2. The site suitability was determined by utilizing a surficial geology map of the Chicago area, Natural Resources Conservation Service (NRCS) soil maps, and available subsurface boring data. While geologic maps attempt to delineate areas of similar geologic materials and stratigraphic characteristics, they are open to broad interpretation and were used conservatively for design purposes. Boring logs were or are being performed within each project site, to precisely investigate each site for reservoir suitability. For sites where geotechnical data was available redesign was performed. Refer to appendix G for the Geotechnical Analyses.

14. Proposed sites were ranked as “Good”, “Fair”, and “Poor” based on the in situ materials found in the area and the likelihood that the materials would mitigate the issues of seepage and stability. In general, areas likely to contain free draining material such as sand or gravel as well as areas that are comprised mostly of unstable deposits of peat, ‘muck’, or other organic material are less suitable than areas that are more likely to contain finer, more stable sediments (silt, clay, silty clay, etc.). The following guidelines were used to identify the suitability of each site location:

a. Sand & Gravel - poor for seepage, fair for stability;
b. Silt - fair for seepage, poor for stability;
c. Clay - good for seepage, fair to good for stability;
d. Peat/Muck - fair to poor for seepage, poor for stability

15. The proposed sites ACRS08 and MDRS04 lie within the Wadsworth Member of the Wedron Formation according to the map of surficial geology of the Chicago region. The Wadsworth member is a system of glacial moraines and is described as containing, “Mostly gray clayey and silty clayey till, relatively low in content of pebbles, cobbles, and boulders; contains local lenses of silt; commonly mantled with 1-2 ft. of leached silt (loess) and soil.”(Willman and Lineback 1970). Additionally, the surficial soils in these sites have been mapped by the NRCS as containing fine-silty sediments. Due to a higher likelihood of stable, less permeable sediments in these areas, these sites are given a designation of “Good”.

16. Sites FDRS01, DPRS23, DPRS15, and DPRS57 lie partially within the Cahokia alluvium which is described as, “Modern floodplain and stream deposits, mostly poorly sorted silt and sand with local deposits of sandy gravel”. There are ~50 borings located in the Cahokia alluvium within 200-3000 ft of DPRS23 and FDRS01 that confirm the presence of lenses of fine-coarse sand at varying depths up to ~40 ft and thicknesses of 1-3 ft. The likely existence of coarser sediments may result in potential seepage issues that may result in remedial measurements such as the need for drains and/or cutoff walls. Thus, these proposed sites are given a designation of “Fair”. Site specific investigation and analysis would be required to determine the presence and depths of the coarse soil lenses.

17. While BCRS02 lies within the Wedron formation, NRCS soil maps designate this area as being comprised mostly of ‘Houghton muck’, a soil unit that contains mostly peat and poorly drained organic sediments. This soft soil may lead to slope stability concerns that may require relatively flatter slope or the addition of engineered systems to support the required slopes. Thus, it is also given a designation of “Fair”. Site specific investigations and analysis would be required to determine the presence and depths of the soft soil layers.

18. DPRS07 site is located either partially within the Mackinaw member of the Henry formation. The Mackinaw member has been mapped as glacial valley deposits and outwash terraces containing, “Sand and gravel, generally well sorted and evenly bedded.” (Willman and Lineback, 1970). NRCS soil maps also classify these areas as containing sandy material. The sand material at the site locations may result in groundwater control issues which may require remedial measurement implementations such as drains, cut-off walls,

and/or dewatering pumps. Due to the likely presence of permeable sediments in these proposed sites and the potential issues of seepage they are given a designation of “Poor”. Site specific investigations and analysis will be required to identify the presence and depths of sand materials.

PROPOSED RESERVOIRS

General

19. Similar to the Idealized Reservoir, the designed reservoirs will be located within half of the site and the other half of the site will be used to store the excavated material as spoils. The reservoir systems include a levee, inlet structures (weir, storm sewer pipe, etc) and an outlet structure (pump station). The reservoirs have side slopes of 1(V):3(H) and vary in depth. The reservoir’s surface area will be seeded over 6 inches of topsoil. The storage for each reservoir stated below does not include the volume displaced from the placement of 6 inches of topsoil and seeding. The reservoir is surrounded by a levee-spillway, which contributes to the reservoir storage. The levees have a 10 foot wide crest with a side slope of 1(V):3(H) and made of impervious material. An inspection trench will be excavated and backfilled with imperious fill along the levee. The trench is assumed to be 5 feet deep and 3 feet wide. Water flows into the reservoir through a concrete weir or storm sewer pipe. The weirs are reinforced concrete with side slopes of 1(V):3(H) and top elevation below the levee top elevation. The concrete weir is assumed to be 2-foot thick with a minimum of 3-foot key. The river side toe of the weir will be lined with riprap for erosion control and energy dissipation. Pumps will be used to dewater the reservoir. The pumps will be located within a pump station structure. The pump station will include an inlet and outlet pipe. The pump station will be located on the downstream end of the reservoir. The reservoirs are designed for 25 year to 100 year flood events. Based on existing geotechnical information, some of the reservoirs will be partially or entirely enclosed with a cut-off wall for seepage control measures. As discussed above, it is assumed that all excavated material from the reservoir will be managed on site. Some of the material will be used to build the levee, and the surplus material will be stored on the site as spoil.

20. The permanent easement includes the levee/reservoir area, pump station, and spoils areas. The permanent easement for the levee/reservoir is located a minimum of 15 feet from the toe of the outer levee, which will be cleared of trees and shrubs and seeded. The permanent and temporary easement (work

limits) follows the property boundary lines. When the permanent improvements lie within most of the property area, the entire property will be acquired as permanent easement.

Bull Creek Reservoir 02 (BCRS02)

21. BCRS02 is located in the city of Mundelein in Lake County, Illinois. See Plates D1a and D1b. The site is bounded by Lake Street/US 45 and Metra Railroad on the east, Winchester Rd on the north and residential developments on the west and south. The access to the site is through an undeveloped property on the north-east side of the site. An alternate access to the site can be through US 45 south of USG Dr. Observations from an aerial map indicates that there is an access road that crosses the Metra train tracks. Coordination with Metra Railroad should be performed to determine if this access is practical for heavy construction. Traffic flagman is recommended at the access location(s) of the site.

22. The proposed reservoir is designed for a 25-year to 100-year flood event and has a storage volume of 176.7 AC-FT. The top area of the reservoir is 53 AC, and the bottom area is 47.5 AC. The reservoir is 4 feet deep from the toe of the levee with an approximate bottom elevation of 754 (without topsoil and seeding). Storm water flows into the reservoir through a proposed concrete reinforced pipe with inlet elevation of 758.5. The pipe inlet is connected with a series of proposed ditches, which collect overflows from the west surrounding areas. There are no drainage utilities information provided; therefore, further investigations should be perform to determine the appropriate locations and design of the proposed ditches and proposed drainage structures connections with the existing structures as needed. In addition, the new sheet flow as a result of the new improvements (reservoir & spoils) should be managed on site. Water flows out of the reservoir through a proposed concrete weir. The weir is 10 feet wide with a top elevation of 758.0. The proposed weir intercepts an existing ditch. It is assumed that the ditch flows through an existing culvert underneath the existing railroad and road (US45). Improvements to the existing ditch may be needed to accommodate the flows from the reservoir. Further investigations are required to confirm the locations and capacities of the existing ditch and culverts.

23. The levee surrounding the reservoir is approximately 7325 feet long with top elevation of 765.0 (without topsoil and seeding). Impervious material excavated for the reservoir will be used as fill for the levee. The surface area of the

levee along with the permanent easement area will be seeded over 6 inches of topsoil.

24. The surplus material from the reservoir excavation and levee fill will be stored at the south end of the site. The surplus material is determined to be approximately 280,400 CY. The spoil is approximately 13 feet high with side slopes of 1(V):17(H). The spoil surface area will also be seeded over 6 inches of topsoil.

25. As discussed above, according to the surficial geology map and NRSC soil maps, this site is located within the Wedron formation and consists mostly of Houghton muck, a soil unit that contains mostly peat and poorly drained organic sediments. A cutoff wall was included as part of this reservoir. The location of the cut-off wall is estimated to be along the entire west half of the reservoir perimeter. Site specific investigations and analyses were performed to determine the presence and depths of the soft soil layers. A conservative design of the cutoff was decided upon after this data became available. Refer to appendix G for the Geotechnical Analyses and Site Surficial Geology Deposit and NRCS soil maps.

Construction of this reservoir will impact the existing wetland complex at the site. To mitigate for these impacts, 112 acres of former agricultural land at site L22 will be restored (see Plate D1b).

Aptakisic Creek Reservoir 08 (ACRS08)

26. ACRS08 is located in Lake County just north of Aptakisic Creek, a tributary of the Des Plaines River. See Plate 17. The site is bounded by Brandywyn Lane on the north, Buffalo Grove on the west, Aptakisic Road (HWY 33) on the south and Meridian Way/Prairie Rd on the east. An existing tree-lined ditch crosses the site from Brandywyn Lane to Buffalo Grove Rd. Observations from an aerial map indicates that the entire site is an existing farmland and it is mostly cleared of trees. The access to the site, as shown on Plate 17, is from Aptakisic road. The site can also be access from Brandywyn Lane or Meridian Way. Further investigations should be performed to determine the ideal construction access location(s) where construction traffic will provide little or no disruption to the current traffic conditions and nearby residences. The Average Daily Traffic (ADT) of the intercepting road should also be determined. Traffic flagman is recommended at the access location(s) of the site.

27. The proposed reservoir is designed for a 25-year to 100-year flood event and has a storage volume of 550 AC-FT. The top area of the reservoir is 45.4 AC, and the bottom area is 40 AC. The reservoir is 2 feet deep from the toe of the levee with bottom elevations varying from 678 to 684. The bottom elevation does not consider the reservoir seeding over 6 inches of topsoil. Storm water is pumped into the reservoir from Aptakisic Creek with an inflow rate of 200 cfs. Approximately 870 LF of 60-inch reinforced concrete pipe (RCP) will collect storm water from the creek through the pump station and outlet through two 36-inchRCP to the reservoir. Two, 100 CFS pumps are assumed with an additional pump and 36-inch discharge for redundancy. The pumping duration to fill the reservoir is assumed to be 2 days. After an event, the reservoir will be drained through the proposed sluice gate and by pumping. A sluice gate is located at the existing ground level with an approximate invert elevation of 678.5. The sluice gate will allow above grade water to drain into the existing ditch. Remaining water below grade in the reservoir will be pumped out through the pump station and into the existing ditch. One of the 36-inch RCP pipe and pump can be used to drain the reservoir.

28. From observations on an aerial map, it is assumed that the existing ditch is connected to a storm sewer pipe or culvert at Brandywyn Lane upstream and Buffalo Grove Road at the downstream end of the ditch. The Illinois Streamstats program shows that the 100-year peak flow rate of the ditch is 207 CFS. The existing ditch will be relocated approximately 150 feet west of the current location to accommodate the proposed reservoir. The proposed ditch will have a bottom width of 15 feet, 1(V):3(H) side slopes, minimum height of 3 feet, and slope of 0.17%. Ditches along the perimeter of the reservoir and spoil area will be placed. The ditches will have a typical bottom width of 5 feet, 1(V):3(H) side slopes, and a minimum height of 1 foot. There is no drainage utilities information provided. Therefore, further investigations should be perform to determine the appropriate locations and design of the proposed ditches and proposed drainage structures connections with the existing structures as needed. In addition, the new sheet flow as a result of the new improvements (reservoir & spoils) should be managed on site.

29. The levee surrounding the reservoir is approximately 5,660 feet long with top elevation of 693.0 (without topsoil and seeding). Impervious material excavated for the reservoir will be used as fill for the levee. The surface area of the levee along with the permanent easement area will be seeded over 6 inches of topsoil.

30. The surplus material from the reservoir excavation and levee fill will be stored on the site. The total surplus material is determined to be approximately 96,000 CY. The Spoil fill is approximately 10 feet high with vary side slopes of 1(V):20(H) to 1(V):50(H). The spoil surface area will also be seeded over 6 inches of topsoil. Refer to Plate 17 for the ACRS08 site plan.

31. According to the surficial geology map this site is located within the Wadsworth Member of the Wedron Formation and consists mostly of gray clayey and silty clayey till. Due to a higher likelihood of stable, less permeable fine-silty sediments, a cutoff wall is not needed. Site specific investigations and analyses are required to confirm the soil conditions. Refer to Attachment D-2 for the site Surficial Geology Deposit and NRCS soil maps.

Feehanville Ditch Reservoir 01 (FDRS01)

32. FDRS01 is located between Mt. Prospect and Des Plaines on the west and the city of Glenview on east in Cook County, Illinois. See Plate D2. The site is bounded by I-294 on the east and River Rd. on the west, Lake Rd. on the north and Central Rd. on the south. The entire site is located on Cook County Forest Preserve property and is heavily forested. In the eastern middle portion of the site, a small pond exists. Along the entire western edge of the site, the Des Plaines River runs.

33. The site is accessible through Central Rd where an existing small gravel truck lane leads to the top of existing spoil pile. A secondary access point further east on Central Rd. could also provide access, but is not preferable because the road leads to a trail center. From the aerial photos, there seems to be a few gravel truck haul paths that could be utilized during excavation of reservoir as a haul road. Traffic flagman is recommended at the access location of the site due to heavy traffic from surrounding suburban area.

34. The proposed reservoir is designed for a 100-year flood event and has a storage volume of 2140.9 AC-FT. The top area of the reservoir is 322 AC, and the bottom area is 312 AC. The reservoir bottom elevation is around 630 FT (without topsoil and seeding). Storm water flows into the reservoir through a proposed concrete reinforced concrete weir with inlet elevation of 637.3. The weir is 305 feet long and is located in a section of the ring levee in the southwest corner of the property. The proposed weir would intercept

rising flood waters of the Des Plaines River and spill into the reservoir for storage.

35. Water is pumped out of the reservoir by a proposed pump station and corresponding piping. The pump outfalls onto an existing ditch that empties into Des Plaines River. Improvements to the existing ditch may be needed to accommodate the flows from the reservoir such as riprap or other erosion control features.

36. The levee surrounding the reservoir is approximately 15,727 ft long with top elevation of 640.3 (without topsoil and seeding). Impervious material excavated for the reservoir will be used as fill for the levee. The surface area of the levee along with the permanent easement area will be seeded over 6 inches of topsoil.

37. The surplus material from the reservoir excavation and ring levee fill will be stored at the south end of the site in an extension to existing spoil pile. The surplus material is determined to be approximately 3,166,379 CY. The top of the existing spoil pile elevation is approximately 702. The extension of this spoil pile would match existing top elevation and gradually project down to existing ground with side slopes of 1(V):20(H). The spoil surface area will also be seeded over 6 inches of topsoil. Refer to plate D2 for the FDRS01 site plan.

38. There is no drainage utilities information provided. Therefore, further investigations should be perform to determine the appropriate locations of the proposed ditches to drain spoil pile and ring levee surrounding reservoir to properly manage the storm water.

39. According to the surficial geology map and NRSC soil map this site is located within the Cahokia alluvium which is described as, ‘Modern floodplain and stream deposits, mostly poorly sorted silt and sand with local deposits of sandy gravel’. The likely existence of coarser sediments may result in potential seepage issues that may result in remedial measurements such as the need for drains. Additionally due to the only moderate slope stability and seepage issues, a cutoff wall is recommended along the entire perimeter of the reservoir. Site specific investigations and analyses are required to determine the presence and depths of the soft soil layers. Detailed design of the cutoff wall is also required. Refer to Attachment D-2 for the site Surficial Geology Deposit and NRCS soil maps.

Camp Ground Road Reservoir (DPRS15) – Option 1

40. DPRS15 is located between Park Ridge and Des Plaines in Cook County, Illinois. See Plates D3aand D3b. The site is bounded by I-294 on the east and River Rd. on the west, Algonquin Rd. on the north and Oakton St. on the south. The entire site is located on Cook County Forest Preserve property and is heavily forested. An existing recreational trail runs through the entire site, along the entire western edge of the site the Des Plaines River runs.

41. The site is accessible through Camp Ground Rd where an existing paved 2 lane road leads to the top of proposed reservoir. A secondary built access point further south on Oakton could also provide access, but is not preferable because of the road traffic on this 4 lane road. From the aerial photos, there seems to be little but virgin forest. Traffic flagman is recommended at the access location of the site due to heavy traffic from surrounding suburban area.

42. The proposed reservoir is designed to mitigate for impacts of increased flood stages that construction of DPLV09 would have and has a storage volume of 275.39 AC-FT. See Main Report Section 10. The top area of the reservoir is 24 AC, and the bottom area is 19 AC. The reservoir bottom elevation is around 622.7 FT. Storm water flows into the reservoir through a proposed concrete reinforced concrete box culvert with inlet elevation of 630.7. The culvert cuts across the ring levee in the southwest corner of the property. The proposed culvert would intercept rising flood waters of the Des Plaines River and spill into the reservoir for storage..

43. Water is gravity fed out of the reservoir by a proposed reinforced concrete pipe and corresponding flap gate that empties into Des Plaines River. Improvements to the existing bank may be needed to accommodate the flows from the reservoir such as riprap or other erosion control features.

44. The levee surrounding the reservoir is approximately 4800 ft long with top elevation of 635.6. Impervious material excavated for the reservoir will be used as fill for the levee. The surface area of the levee along with the permanent easement area will be seeded over 6 inches of topsoil.

45. The surplus material from the reservoir excavation and ring levee fill will be stored at the east end of the site in a spoil pile. The surplus material is determined to be approximately 406,377 CY. The top of the proposed spoil pile elevation is approximately 644. The spoil pile would gradually project down from the top elevation to existing

ground with side slopes of 1(V):6(H). The spoil surface area will also be seeded over 6 inches of topsoil. Refer to plate D3a for the DPRS15-Option 1 site plan.
46. There is no drainage utilities information provided. Therefore, further investigations should be perform to determine the appropriate locations of the proposed ditches to drain spoil pile and ring levee surrounding reservoir to properly manage the storm water.

47. This site is composed of silty clay. A cutoff wall will not be required. Refer to Attachment D-2 for the site Surficial Geology Deposit and NRCS soil maps.

Camp Ground Road Reservoir (DPRS15) – Option 2

48. The second option for the proposed reservoir will still mitigate for impacts from construction of DPLV09, will be located on the same site as option 1, and has a storage volume of 515.82 acre-feet. See Plate D3b. The area of the reservoir is 55.2 acres, and it covers a majority of the proposed site. The reservoir bottom elevation is around 622.7 FT. Storm water flows into the reservoir through a proposed concrete reinforced box culvert with inlet elevation of 630.7. The culvert cuts across the ring levee in the southwest corner of the property. The proposed culvert would intercept rising flood waters of the Des Plaines River, and spill over into the reservoir for storage.

49. Water is gravity fed out of the reservoir by a proposed reinforced concrete pipe and corresponding flap gate that empties into the Des Plaines River. Improvements to the existing bank may be needed to accommodate the flows from the reservoir such as riprap or other erosion control features.

50. The levee surrounding the reservoir is approximately 6205 FT long with top elevation of 635.6. Impervious material excavated for the reservoir will be used as fill for the levee. The surface area of the levee along with the permanent easement area will be seeded over 6 inches of topsoil.

51. The surplus material from the reservoir excavation and ring levee will be hauled off site to a disposal location. The surplus material is determined to be approximately 1,103,323 CY. Refer to plate D3b for the DPRS15-Option 2 site plan.

VOLUME CALCULATIONS

52. Quantity takeoffs were computed by using Bentley CADD software packages (Microstation and Inroads) and Microsoft

Excel. Digital Terrain Models (DTM) were developed using existing topography from GIS. DTMs of the potential reservoirs were also created. By comparing the two DTMs the volume and fill quantities for the reservoirs where determined though Triangle Volumes in Inroads. Triangle Volumes method projects the triangles from an existing surface onto the design Surface and then compute the volume of each of the resultant prismoids for a total volume. These volumes were then used to compute storage volume for the spoils. Cross-sections for the levees and reservoirs were generated in Inroads. The cross-sections were checked for inconsistencies with the proposed reservoir and existing topography DTMs data. In addition, the Average-End Area (AEA) volumes were generated for the levees and reservoirs. The average-end volumes were used to compare the Triangle Volume as a check.

53. The true and planar surface areas for the levees, reservoirs, and spoil areas were also determined in Inroads. The areas were used to compute the seeding areas and topsoil volumes for the reservoir, levee, and spoil. The topsoil soil will be stripped with the areas proposed for the levees (including the 15 feet permanent easements) and reservoir. It is assumed that 1-foot of topsoil will be stripped at these locations.

54. The clearing and grubbing areas were determined in Microstation and included the spoil, levee (including the 15 feet permanent easements) and reservoir areas.

55. The levee trench depth and width were assumed to be 5 feet and 3 feet respectively. The levee trench excavation/fill volume was determine by the multiplying the length of the levee by the assumed width and depth of the trench.

56. The pump station inlet and outlet pipes were assumed to be 36″ for all reservoirs. Detailed designs of the pump station, including the inlet and outlet pipes, are required during the Plans and Specification Design Phase. In addition, the flow and pumping duration should be determined.

REAL ESTATE

57. The conceptual real estate requirements, including the utility, permanents and temporary easement (PE & TE), for each site are shown and documented on the Real Estate Maps. The permanent and temporary easements were drawn based on the parcel data provided from GIS. Where the proposed improvements covers most area of a parcel, the entire parcel

was considered as permanent easement. The reservoir permanent easement line is located at a minimum of 15 feet from the outer toe of the levee. The pump stations as well as the spoil areas were also considered as permanent easements. The access roads and staging areas where considered as temporary easements.

OPERATION AND MAINTENANCE

58. For the operation and maintenance work for the various projects, historic data from Little Calumet Flood control project was used which included all the major features included in the DPII design. A spreadsheet was created which broke out the individual design projects into separate worksheets. Each worksheet was tailored so that only the appropriate O&M items were included for instance floodwall items were not included in a reservoir project. The individual O&M work was based on quantities from the bid schedule such as square footage of floodwall, length of levee, or number of pump stations.

DEMOLITION

59. Existing features to be demolished are discussed under the project descriptions above.

UTILITY RELOCATIONS

60. Preliminary utility coordination with utility companies was performed to identify existing utilities in significant conflict with the proposed features. This information was used to amend features to minimize utility conflicts. A detailed survey of all existing utilities within and adjacent to the project site will be required during the design phase for each individual site. There are no building relocations required for the projects.

SECTION 2 – LEVEES & FLOODWALLS

GENERAL

61. Five potential sites were considered suitable for a levee/floodwall alignment. The five sites are named DPLV01, DPLV04, DPLV05, DPLV09, and DPLV15. The levee and floodwall alignments were developed utilizing contours, parcels, aerial images, and existing building locations from local GIS data.

62. Several other sites were eliminated from being added to the list of potential sites due to several issues. These issues included having to cross an existing creek, roads, and a railroad with the floodwall/levee alignment and the difficulty of finding high ground to tie the floodwall/levee into for adequate flood protection.

FLOODWALL/LEVEE DESIGN

63. The levees in this study were designed using the following criteria:

a. Side slopes for the levees are 3.0 horizontal to 1.0 vertical.

b. Crest widths for the levees are 10 feet.

c. The top of floodwall and levee crest elevations for each site were determined by the Hydraulics and Hydrology (H&H) Section. The elevations are shown on the plates for each site.

d. The stripping volume included a width that is equal to the footprint of the levee and a depth of one foot.

e. A slit trench was included for all levee segments to explore for unsuitable soils beneath the levee foundation before construction.

f. See Plate D11 attached at the end of this appendix for a typical levee section.

64. The alignments were chosen in consideration of available space and to allow access for maintenance operations and flood fighting purposes. Most of the sites have either homes or businesses adjacent to the river which required the use of

floodwalls. See the Real Estate Requirements section of this appendix for a description of the various easements used.

65. Floodwalls were designed for areas in which there was not enough real estate or physical space available to accommodate a levee. When a floodwall and a levee intersected, the floodwall was assumed to be embedded in the levee section approximately 10 feet. All the floodwalls for each site were designed as I-walls. All the steel sheet pile (SSP) was assumed to be PZ22. A ratio of 3:1 was used to determine the length of the SSP. The ratio is based on the principal that for every one foot of floodwall above the existing ground line then there is three feet of SSP below ground. The wall itself consists of reinforced concrete with a minimum of two foot of SSP embedded at the bottom of the wall below grade. See Plate D11 attached at the end of this appendix for a typical floodwall section. No structural analysis was performed on any of the floodwalls in this study. This analysis will need to be performed in the next phase of this project.

CLOSURE STRUCTURES

66. Closure structures are required to be installed across roads and driveways to form a continuous line of protection. The locations of the closure structures are shown on the plates for each site. The specific type of closure structure assumed for design purposes was a double leaf swing floodgate to block water across the roadways. All of the closure structures were assumed to have steel sheet pile installed under the road bed to cutoff seepage and a 12 inch thick concrete pad across the road which would tie into the ends of the floodwall.

INTERIOR DRAINAGE FEATURES

67. No interior drainage features were specifically designed for this project. Interior drainage analysis will need to be performed in the next phase of this project. For cost purposes interior drainage was based on similar projects within the watershed.

PROPOSED LEVEES & FLOODWALLS

DPLV01

68. Site DPLV01 project features includes road raises at Park Ln, Groveland Ave., and Lincoln Ave. See Plate 22. The road will be raised to elevation 618 with total lengths of 1250 feet. A levee was considered along the north side of Park Ln.

However, a levee would cross multiple private properties without providing flood protection for those properties. As a result, a road raise design was recommended in lieu of the levee. Park Ave. is currently a two-lane road with diagonal parking on the north side and parallel parking on the south side. The proposed road raise will eliminate the diagonal parking and replace with parallel parking. Any driveways that intersect with the raised roads will also need to be raised to match the new road elevations. Groveland Ave. and Lincoln Ave. are both two-lane roads. Maintenance of traffic and traffic safety will be required during the road raise construction. Maintenance of traffic could be temporary lanes, detours and re-routing. Maintenance of traffic shall be in accordance with AASHTO and the Highway Capacity Manual. The existing levee along Groveland Ave will be raise from elevation 616 to 618. Sheet pile will be driven into the design to obtain the designed top elevation of 618. The sheet pile is approximately 870 feet in length. Steel cap will be placed over the sheet pile. The sheet pile will tie-into the proposed road raise at the north termination. The sheet pile terminates at Forest Ave at the south. A road closure structure at Forest Ave is proposed to tie into the south termination of the sheet pile and the proposed floodwall. A floodwall is proposed south of Forest Ave and along the Des Plaines River. The floodwall top elevation is 618.0 and approximately 699 feet in length. The floodwall will tie into the railroad embankment at the south termination and the proposed road closure structure at the north termination.

Pump stations and gate wells are included in the report and would also be included in final design. These features are intended to mitigate interior drainage issues.

DPLV04

69. DPLV04 is located in the city of River Grove in Cook County, Illinois. The site extends from Franklin St./Kennedy St. Railroad to the north and Palmer St. to the South. A levee/floodwall will be placed at the river side of River Rd. and along 5th Ave. on the south end. The levee/floodwall has a top elevation of 628.39 (NAVD 88). The levee and floodwall will have lengths of 4240 feet and 2190 feet respectively. The floodwall between Henrrick Ave. and Fullerton Ave. will be in close proximity with the River. Therefore, toe protection will be necessary along the floodwall. A levee will tie-in to high-ground at the railroad on the north end. At the south-end, a levee will tie-in to natural high ground at Palmer St. Two road closure structures are proposed where

the levee/floodwall intercepts existing roads. A road raise will be placed at 5th Ave to continue the line of protection. A road raise is recommended over a road closure since the depth from the road to the design elevation is less than two feet at this location. The road raise will allow River Road to be open and functional during a flood event. From aerial maps, an existing ditch was identified at approximately Sta. 49+00. Further investigation should be completed to determine if a drainage structure is necessary at this location. See Plate 20 for DPLV04 Site Plan.

DPLV05

70. DLPV05 is located in Shiller Park in Cook County, Illinois. The site extends just north of Irving Park Rd. to the north and Belmont Ave. at the south end. A levee/floodwall will be placed at the river side of River Rd with a top elevation of 629.31 (NAVD 88). The levee and floodwall will have lengths of 5576 feet and 1782 feet respectively. There will be three road closure structures to continue the line of protection. The levee will terminate into natural high-ground at the north and south ends. Existing driveways should be raised to allow for vehicle passage to the adjacent buildings. Another tie-in option at the north end is to extend the levee/floodwall further north on River Road to meet high-ground. This option will eliminate one road closure. However, the line of protection will include a bridge and it is not clear if the bridge is being supported on land by a retaining wall or supported by piers. From an aerial map, the parapet wall is not a solid wall. This option can be further investigated as an option to a road closure. From aerial views, an existing retaining wall is supporting River Rd and is at close proximity to Des Plaines River. The wall will be raised to the design elevation and will also act as a floodwall. See Plate 19 for DPLV05 Site Plan.

DPLV09

71. Site DPLV09 is a levee/floodwall combination from Miner St. to the north, the Illinois Tollway ramp at the south end, andalong the west side of the Des Plaines River. The site is located in the City of Des Plaines in Cook County, Illinois.

DPLV09 is divided into three segments - Segment 1 (northern segment), Segment 2 (middle segment), and Segment 3 (southern segment). The levees have a total length of 3,200 feet with a crest width of 10 feet. The floodwalls have a total length of 9,990 feet. Two road closure structures are needed for crossings at Oakton and Algonquin. The floodwall length includes 500 feet of raising an existing retaining wall. From aerial maps, the river is at close proximity to River Rd. approximately between Sta. 2+00 and Sta. 7+00 (Segment 1), and the road is supported by a retaining wall. The retaining wall will be raised to the design elevation and modified as needed to also act as a floodwall. The levee crest and top of floodwall elevations are shown on the site plans. Pump Stations, gate wells and closure structures are part of the recommended plan. At the south end (Segment 3), the levee wraps around the ramp to meet high ground at the embankment of the ramp/toll way. Further field investigation is necessary to ensure that the levee tie-in at the ramp/toll way is at the embankment and not the road. See plates 18A, 18B, and 18C for additional site plan details.

From aerial views, an existing culvert was identified at approximately Sta. 13+00 (opposite from Oakwood Ave., Segment 1). The levee will intercept two drainage structures at the toe of the ramp and toll way at Segment 3. Drainage structure(s) at these locations should be further investigated.

DPLV15

72. Site DPLV15 is a levee west of Buckley Rd. and east of the Des Plaines River. The levee has a total length of 2,938 feet with a crest width of 10 feet. The crest of the levee is at elevation 660. A permanent access road is required from Buckley Road to where the levee is located. See plate D7 for additional site plan details.

QUANTITY CALCULATIONS

73. The levee embankment quantity was calculated using a triangulated volume method with software. Using InRoads software, the first step was to create a surface model of the existing ground surface from 2-foot contour data. Then a levee alignment was created with the design elevation assigned to it. From that alignment another surface was created that contained the levee footprint. Using the existing surface model and the design surface model InRoads software can calculate the quantity of material necessary for the levee in cubic yards.

74. The height of exposed concrete floodwall had to be taken as an average for quantity purposes since the elevation of the existing ground varies. Using InRoads software, the first step was to create a surface model of the existing ground surface from 2-foot contour data. Then a floodwall alignment was created with the design elevation assigned to it. Using InRoads, cross sections were cut at 100-foot intervals along the proposed alignment. For each site, the existing ground elevation was measured at five stations along the proposed alignment and an average was taken. This average existing ground elevation and the elevation for the top of floodwall was used to determine the average height of exposed concrete floodwall for each site. Then a 3:1 ratio was used to determine the depth of the steel sheet pile. For quantity purposes it was also assumed PZ22 type steel sheet pile would be used. To calculate the volume of concrete necessary for the floodwall an average cross sectional area was determined and then multiplied by the total length of floodwall. It was also assumed that no topsoil would be needed for floodwall construction since excavation would be minimal.

75. Clearing and grubbing, determined in acreage, was assumed to occur over the entire temporary and permanent easement areas. Stripping is determined in cubic yards as the removal of one foot of material under the levee footprint. Top soil was assumed to occupy the top six inches of a levee section. Seeding calculations were performed assuming that the entire temporary and permanent easement areas were to be seeded after construction was completed.

BORROW/DISPOSAL AREA

76. Borrow and disposal areas for these sites were assumed to be within a twenty mile radius from the construction site. Borrow and disposal areas will be investigated further during the next phase of this project. Potential borrow locations are listed below:

Lake County Grading Co
32901 North Milwaukee Ave.
Libertyville, IL 60048
847-362-2590

Bluff City Materials, Inc
1245 Gifford Rd.
Elgin, IL 60120

STAGING/STORAGE/ACCESS

77. The temporary easements shown on the plates are assumed to be used as staging, storage, and access areas by the Contractor. Access during construction will be provided from the roads near each levee/floodwall location. All of these features will be further defined during the next phase of this project.

MITIGATION

78. As part of the Environmental Assessment, sites were reviewed to determine whether they would have any significant impacts. For sites with significant impacts that could not be avoided, a mitigation plan was developed. Reservoir site DPRS15 provides floodplain mitigation for DPLV09, C16 provides habitat mitigation for DPRS15, and L22 provides habitat mitigation for BCRS02. See plates D1b and D3c. Also, see Section 9, Environmental Assessment in the Main Report.

REAL ESTATE

79. Permanent Easement. Permanent easement consists of property that is necessary for the project features and access for performing maintenance such as mowing the levees, general inspections, and for flood fighting operations. The amount of property required is 15 feet beyond each toe of the levee and 15 feet beyond each side of the floodwall alignment.

80. Temporary Easement. Temporary easements consist of property that is needed during the construction phase of a levee or a floodwall and may also be used as staging, storage, and access by the Contractor. The amount of property required for the temporary easements for a levee or floodwall is generally 10 feet beyond the permanent easement. However, for all of the sites except DPLV15, there was not enough property to layout the temporary easements as described above due to the close proximity of existing buildings. All of the temporary easements were laid out in open areas near the levee/floodwall sites. It should also be noted that sites DPLV09 and DPLV07 have temporary easement areas on the river side of the levee/floodwall. This should be looked at further in the next phase of the project and possibly consider moving the levee/floodwall closer to the river to allow for the temporary easements to be on the land side of the levee/floodwall.

81. Utility Easement. Preliminary utility coordination was performed with utility companies to identify existing utilities in conflict with the proposed features. Utility easements required for relocations or remediation will be assessed.

OPERATION AND MAINTENANCE

82. For the operation and maintenance work for the various projects, historic data from Little Calumet Flood control project was used which included all the major features included in the DPII design. A spreadsheet was created which broke out the individual design projects into separate worksheets. Each worksheet was tailored so that only the appropriate O&M items were included for instance floodwall items were not included in a reservoir project. The individual O&M work was based on quantities from the bid schedule such as square footage of floodwall, length of levee, or number of pump stations.

DEMOLITION

83. Existing features to be demolished are discussed under the project descriptions above.

UTILITY RELOCATIONS

84. Preliminary utility coordination with utility companies was performed to identify existing utilities in significant conflict with the proposed features. This information was used to amend features to minimize utility conflicts. A detailed survey of all existing utilities within and adjacent to the project site will be required during the design phase for each individual site. There are no building relocations required for the projects.

SECTION 3 – OTHER MEASURES

GENERAL

85. Potential structural flood risk reduction sites where identified and screened through collaboration with the project partners and stakeholders. Refer to the main report for more information on the site developments. Conceptual site plans and quantities where developed for existing reservoir expansions, road raises, and bridge raise modifications, and flow conveyances. The sites are discussed in detail below.

86. The roads and bridges are owned and maintained by the Illinois Department of Transportation (IDOT Therefore, the road and bridge designs should be coordinated with IDOT and follow IDOT standard specifications and design. The road raise elevations for road raise sites were determined based on maximized net benefits calculated using preliminary costs and benefits at each site during the screening step.

87. Since the road and bridge reconstructions are within IDOT ROW, the permanent and temporary easements for the projects are the required areas in addition to IDOT ROW.

Railroad Bridge Pier Extension 01 (DPBM01)

88. DPBMO1 is located in the village of Riverside, IL and consists of a skewed railroad bridge that crosses the Des Plaines River between Forest Ave and Ogden Ave. See Plate D4. Currently the pier arrangement impedes natural flow of the river. This project extends and realigns the railroad piers upstream and downstream to provide flow conveyance. This flow improvement will change the piers effective width from 33-feet to the actual 6.5-feet and the effective bridge width from 219-feet to 265-feet in the hydraulic modeling.

89. Additionally river bank side-slope excavation upstream and downstream would be needed to allow for effective conveyance of flows through the bridge. Extending the piers and the excavation would reduce the 100-year flood elevation by 0.74-feet. Refer to Plate D4 for a general layout of this alternative.

90. The permanent easement for DPBMO1 includes only the excavation of the river bank to widen the river to improve flow. This bank loss occurs on the northwest, southeast, and southwest corners of the railroad bridge crossing the Des Plaines River.

91. The temporary easement for DPBMO1 is located at a minimum of 10 feet from the new bank edge to allow for equipment movement. Additionally a large area is enclosed in the temporary easement on the northeast corner of the bridge to provide for staging and storage. This staging and storage area will provide the site entrance access off the dead end of West Ave. Access to the west bank will be through the river. The work will need to be conducted during typical low water months from May to November.

92. The design assumptions used herein are based on IDNR assessments for the pier extensions. There is no boring data required for the design of the sheet pile pier extension. A conservative assumption of 25 ft deep sheet pile to anchor the pier extension to the river bed was used. A generalized river bed elevation of 596 ft was used based on the surrounding information. In addition, a total of 596 feet was assumed for the pier extension lengths. The extensions will be built at angles to the existing pier and in line with the flow of the river. The height above the water of the pier extension was assumed to be 10 ft and extend 12 ft below water giving the pier extension a total height of 22 ft. Hydraulic analysis is required to determine the effective length of the pier extensions for flow conveyance. In addition boring data are required for the design of the sheet pile.

93. Without a full hydraulic design an assumption of 1:1 side slopes for the river excavation was made for the river banks, although not conservative, the area is not publically accessible so this side slope seemed warranted when compared to existing contours. Additionally, the banks would be seeded/vegetated for stability.

94. There was no drainage utilities information provided; therefore, further investigations should be performed to determine the appropriate locations of storm water features to handle rainfall events during and post construction.

Lake Mary Anne Pump Station (FPCI01)

95. FPCI01 is located in the city of Des Plaines in Cook County, Illinois. See Plate 21. To maintain lower flood stages in Lake Mary Anne, storm water will be pumped out of

the lake to Dude Rand Pond, which is located just south of Lake Mary Anne and across from Golf Rd. According to IDNR Farmer’s Prairie Creek Study, there is an existing 12-inch and 18-inch outlet pipes that carries run-off from 294 Tollway. The pipes are currently inactive and will remain inactive. Therefore, the lake will no longer collect run-off from the tollway. There are two work areas and staging areas proposed for this project. The work areas are located on each side of Golf Rd.

96. Two-5 CFS pumps are proposed to pump storm water from Lake Mary Anne to Dude Rand Pond through a 12-inch outlet pipe. A 12-inch intake pipe is also proposed. Based on the existing topography, the inlet invert of the intake pipe is 626.0, and the outlet invert of the outlet pipe was determined to be 628.0. Adequate soundings survey of the lake and pond should be performed to properly determine the invert elevations of the proposed intake and outlet pipes. A headwall will be installed at the outlet pipe. Riprap will also be placed for erosion control. The outlet pipe will be installed under Golf rd to Dude Rand Pond. Golf road is a major road and will likely have major utilities crossing, including a 96" interceptor pipe. Therefore, the proposed pipe will be installed under the road by directional jacking to minimize impacts to crossing utilities and traffic. Refer to plate 21 for FPCI01 site plan.

97. There is no existing utilities information. Further investigations are required to confirm and evaluate the impacts to the existing utilities and also determine the appropriate depth of the pipe for directional jacking to minimize existing utility impacts.

Mt. Prospect Reservoir Expansion (WLME01)

98. WLME01 is an existing reservoir located in the village of Mt. Prospect in Cook County and adjacent to Melas Park. See Plate D5. The reservoir bottom elevation and depth are approximately 646 EL. and 24 feet respectively. The reservoir collects storm water from Arlington Heights and Mount Prospect through an 84” RCP and drop structure. After the storm event, water is pumped out of the reservoir through a 24” force main and ultimately to Weller Creek. An existing 72” over-flow pipe is located at the west slope of the reservoir. The over-flow structure is used when the pump station is off-line or when the inflow is greater than the pump station outflow. The over-flow structure collects storm water and transfer the water into the deep tunnel or directly into Weller Creek. An existing low-flow bypass pipe connects

the inflow structure to the pump station 24″ force main. The reservoir includes an under-drain pipe system the collects standing water in the reservoir. The pipe system drains water from the reservoir bottom into the collection chamber, which is then pumped out. Mt. Prospect is responsible for the operation of the reservoir inflow and under drain system. The city of Arlington Heights is responsible for the operation of the pump station. Construction access will be from the existing park access at Central Rd. Since the site is an existing park, a traffic control is recommended. The north-east corner of the existing parking lot is proposed for the staging area.

99. The existing reservoir will be expanded horizontally, at the south end of the reservoir, by approximately 370 feet and an additional storage of 156 AC-FT. The expanded reservoir will maintain the bottom elevation of 646 as the existing reservoir. The top of the expanded reservoir has a crest width of 10 feet and the top elevation varies between 670 and 676. 18″ under-drain pipes will be placed at the expanded reservoir to meet with the existing system. It is assumed that the inflow and outflow volume will be the same as the existing. Therefore, no modifications will be made to the inflow and outflow structures.

100. The excavated material from the reservoir will be stored on site at two locations – over the existing spoil (Spoil Area 1) and at the west end of the site (Spoil Area 2). Spoil Area 1 is approximately 14 feet high, which includes the existing spoil height. The side slopes varies from 1(V):6(H) to 1(V):12(H). Spoil Area 2 height varies between 18 to 28 feet and side slopes from 1(V):2.5(H) to 1(V):5(H). Spoil Area 2 displaces the existing trail and volley ball court. The spoil surface area will also be seeded over 6 inches of topsoil. Refer to Plate D5 for the WLME01 site plan.

101. There is no drainage utilities information provided. Therefore, further investigations should be perform to determine the appropriate locations and design of the proposed drainage structures connections with the existing structures as needed. In addition, the new sheet flow as a result of the new spoil should be managed on site.

Silver Creek Reservoir Expansion (SCME02)

102. SCME02 is an existing reservoir located in the city of Schiller Park in Cook County. See Plate D6. SCME02 contains two reservoirs (east and west reservoirs) that are separated by a 60″ diameter bypass pipe. The bypass pipe conveys flow

from Silver Creek. Storm water flows from Silver Creek into the east reservoir through the existing spillway structure. After the storm event, water is pumped out of the reservoir through the existing pump station. The west reservoir includes an under-drain pipe system that serves to collect standing water in the reservoir and feeds the pump station intake structure. Water pumped out of the reservoir discharges into Silver Creek. Storm water flows into the west reservoir from the east reservoir through a 60” diameter equalizer pipe. The west and east reservoirs are enclosed by 16-foot tall slurry wall with tip elevation of 629.0. There is an existing access ramp to the bottom of the reservoir located at the south-end of the reservoir. The existing access to the site is from Seymour Ave. on the north-east side of the project site.

103. The existing reservoirs will be expanded vertically by deepening the reservoir by 10 feet. As determined from the as-built drawings, the high grade elevation of the bottom reservoir at the west and east reservoir is at approximately 625 and 623 respectively. The new high grade reservoir bottom elevations will be 615 and 613 respectively. The expanded reservoirs will provide a total of approximately 155 AC-FT of storage. The existing under-drain system will be removed and replaced at the new depth. The existing spillway chute will be extended by approximately 35 feet to meet the new grade. The spillway berm, including the erosion control cell grout, will be replaced. The pump station intake structure will also be extended to meet the new grade. The existing equalizer pipe will be filled and abandoned in place and a new 60” diameter equalizer pipe will be installed.

104. It is assumed that the slurry wall tip is embedded in impermeable layer and no modifications will be made. However, further investigations are required to determine the soil conditions and evaluate the slurry wall, as a result of the improvements.

105. The excavated material from the reservoir will be stored on site. The proposed spoil area is located east of the reservoirs. An existing building on the site was recently demolished and the site is completely cleared. The total excavated material is determined to be approximately 212,000 CY. The spoil height approximately 23 feet with side slopes of 1(V):5(H). The spoil surface area will also be seeded over 6 inches of topsoil. Refer to Plate D6 for the SCME02 site plan.

106. There is no drainage utilities information provided. Therefore, further investigations should be perform to

determine the appropriate locations and design of the proposed drainage ditches and proposed drainage structures connections with the existing structures as needed. In addition, the new sheet flow as a result of the new spoil should be managed on site.

First Ave. Bridge Modification and Road Raise 04 (DPBM04)

107. DPBM04 is located in the city of Leyden in Cook County, Illinois. See Plate 23. The bridge to be modified is located on First Ave, over the Des Plaines River. First Ave. is a 4-lane highway with Design Hourly Volume (DHV) of 2501 vph and Average Daily Traffic (ADT) of 25010 vpd. The design speed is 65 MPH. The existing bridge is a concrete bridge with 3.5 feet deep concrete beams and 7.5 inches slab. Due to the high traffic volume, traffic maintenance is required. The bridge reconstruction should be performed in stages, where at least two lanes are opened to traffic. A staging area is proposed at the south end of the project site.

108. IDOT low beam clearance requirements controls for the road raise. The low beam elevation was determined to be 629.07, which is 2-foot above the design high water (500-year, 627.07). As shown on the bridge as-built, the existing low beam elevation is 625.2 (NAVD 88). Therefore, the roadway will be raised by approximately 3.9 feet at the bridge. It is assumed that the proposed bridge type and geometry will be the same as the existing bridge. Therefore, the proposed bridge superstructure will include 3.5 feet beams and 7.5 inches deck. The proposed bridge deck will maintain a 2-lane width of 22-foot with cross-slope of 1.56% and 8-foot shoulders with cross-slope of 2.0%. A longitudinal slope of 1.0% was used for the roadway and a side slopes of 1(V):2(H) was used for the roadway fill. The proposed pavement typical section is also assumed to be the same as existing. The total road raise length, including intersecting roads is 2036 feet. Refer to plate 23 for DPBM04 site plan, profile, and cross-section.

109. There is no existing utilities information. The existing storm drainage lines and inlets should be evaluated and the inlets should be raised accordingly. Traffic signals at the intersection of River Rd and First Ave should also be raised. Further investigations are required to confirm and evaluate the impacts to the existing utilities.

Route 120 Bridge Modification and Road Raise 13 (DPBM13)

110. DPBM13 is located in Park City in Lake County, Illinois. See Plate D9. The bridge to be modified is located on Route 120 (Belvedere Rd), over the Des Plaines River. Route 120 is a 4-lane divided highway with Design Hourly Volume (DHV) of 2501 vph and Average Daily Traffic (ADT) of 19200 vpd. The design speed is 65 MPH. The existing bridge is a concrete bridge with 3.5 feet deep steel beams and 7 inches slab. Due to the high traffic volume, traffic maintenance is required. The bridge reconstruction should be performed in stages, where at least two lanes are opened to traffic. A staging area is proposed at the east end of the project site.

111. IDOT low beam clearance requirements controls for the road raise. The low beam elevation was determined to be 666.45, which is 2-foot above the design high water (500-year, 664.47). As shown on the bridge as-built, the existing low beam elevation is 661.71 (NAVD 88). Therefore, the roadway will be raised by approximately 4.7 feet at the bridge. It is assumed that the proposed bridge type and geometry will be the same as the existing bridge. Therefore, the proposed bridge superstructure will include 3.5 feet beams and 7.5 inches deck. The proposed bridge deck will maintain its existing structure, with one bridge deck in each direction of traffic. Each deck will maintain a 2-lane width of 24-foot with cross-slope of 1.56%, 6-foot interior shoulders, and 10-foot exterior shoulders, each with cross-slope of 2.0%. A longitudinal slope of 1.0% was used for the roadway and a side slopes of 1(V):2(H) was used for the roadway fill. The proposed pavement typical section is also assumed to be the same as existing. The total road raise length is 1240 feet. Refer to plate D9 for DPBM13 site plan, profile, and cross-section.

112. There is no existing utilities information. The existing storm drainage lines and inlets should be evaluated and the inlets should be raised accordingly. Traffic signals at the intersection of River Rd and First Ave should also be raised. Further investigations are required to confirm and evaluate the impacts to the existing utilities.

Libertyville Marsh (L22)

113. A wetland complex currently exists on the proposed Bull Creek Reservoir site. See Plates D1a and D1b. To mitigate for adverse impacts from the reservoir construction, ecosystem restoration (mitigation) will be implemented at Libertyville

marsh, approximately two miles from the reservoir site within the same watershed. The hydrology will be restored on 112 acres of this former agricultural land and native marsh and wet prairie plantings will restore the natural habitat in the project area.

114. Bull Creek Reservoir (BCRS02) requires mitigation. The 112-acre wetland complex, although currently overridden with invasive plant species and secondary growth forest, still provides habitat for marsh and prairie species of insect, amphibian, reptile, bird and mammal and hydrologic functions. The marshes are dominated by cattails Typha spp. and reed canary grass (Phalaris aurndinacea) and the wet prairie by Eurasian cool season grasses and weedy tree species such as buckthorn (Rhamnus cathartica). The current floristic quality based on the coefficient of conservatives, or mean C, for marsh is 1.4 and wet prairie is 1.0.

115. It is typical of mitigation projects to be located as close as possible to the impacted site or within the watershed. Site L22, which was analyzed in the NER plan, is within the Bull Creek watershed and has enough wet prairie and marsh community types to serve as the mitigation site. The site is also in public ownership, with the Lake County Forest Preserve and the Township of Libertyville both owning parcels. Both of these agencies have designated this 760-acre site as protected open space with primary purpose of ecological restoration. There are approximately 214-acres of marsh and 138-acres of wet prairie on this site, which is more than enough for in-kind mitigation. See plate D1b for the restoration plan at site L22.

VOLUME CALCULATIONS

116. Quantity takeoffs for the sites were computed by using Bentley CADD software packages - Microstation and Inroads as well as Microsoft Excel. Digital Terrain Models (DTM) of the existing topography were developed using existing contours from GIS. DTMs of the proposed road raises were also created. By comparing the two DTMs the fill volume quantities for the road raise where determined though Triangle Volumes in Inroads. Triangle Volumes method projects the triangles from an existing surface onto the design Surface and then compute the volume of each of the resultant prismoids for a total volume. Profiles and cross-sections for the road raises where generated in Inroads. The cross-sections where checked for inconsistencies with the proposed road raise and existing topography DTMs data. Refer to

Section 1 for the quantity computations for the reservoir expansions.

117. The true and planar surface areas for the road raise side slopes and pavement where also determined in Inroads. The areas for the road raise side slopes where used to compute the seeding areas and topsoil volumes. The areas for the road raise pavement was used determined the roadway reconstruction quantities.

118. It is assumed that the existing bridge superstructure typical section will be used for the bridge reconstruction. Therefore, the quantities for the bridge modifications were determined from the as-built drawings.

REAL ESTATE

119. The conceptual real estate requirements, including the permanents and temporary easement (PE & TE), for each site are shown and documented on the site plans. The real estate for the road raises and bridge modifications did not consider the areas within IDOT ROW. The permanent and temporary easement where drawn based on the parcel data provided from GIS. The access roads and staging areas where considered as temporary easements.

OPERATION AND MAINTENANCE

120. For the operation and maintenance work for the various projects, historic data from Little Calumet Flood control project was used which included all the major features included in the DPII design. A spreadsheet was created which broke out the individual design projects into separate worksheets. Each worksheet was tailored so that only the appropriate O&M items were included for instance floodwall items were not included in a reservoir project. The individual O&M work was based on quantities from the bid schedule such as square footage of floodwall, length of levee, or number of pump stations.

DEMOLITION

121. Existing features to be demolished are discussed under the project descriptions above.

UTILITY RELOCATIONS

122. Preliminary utility coordination with utility companies was performed to identify existing utilities in significant conflict with the proposed features. This information was used to amend features to minimize utility conflicts. A detailed survey of all existing utilities within and adjacent to the project site will be required during the design phase for each individual site. There are no building relocations required for the projects.

SECTION 4 – DAM REMOVALS

GENERAL

123. Five existing dams on the upper Des Plaines River were considered for complete removal. The five dams are named Dam No. 1, Dam No. 2, Dempster St. Dam, Touhy Dam, and Dam No. 4. See Plates 41 through 45 for the site plans and Plates D10 through D12 for details and typical sections. The five dams are classified as small, run-of-the-river low-head dams that currently serve no functional purpose. Through dam removal, both fish passage and riverine function may be restored, which have benefits of habitat restoration and water quality improvement. The dam removal sites were developed utilizing contours, parcels, aerial images, and existing building locations from local GIS data. Four of the sites are located in heavily wooded areas owned by the Forest Preserve District. The fifth site (Dempster St. Dam) is located in downtown Des Plaines, Illinois. While each site presents challenges, the dams can be physically removed from the river.

REAL ESTATE

124. The conceptual real estate requirements for each site are shown and documented on the site plans. The work limits, access roads, and staging areas shown on the site plans are all considered temporary easements. Since the existing dams are being removed from the river and no other permanent features are being built there is no need for permanent easements. If any existing paved parking lots or roads are used for staging, storage or access; these areas shall be repaired to before project condition or better.

OPERATION AND MAINTENANCE

125. Since the existing dams are being removed from the river and no other permanent features are being built there is no need for operation and maintenance work.

DEMOLITION

126. At each site an existing dam will be demolished and removed from the river. Historical data indicates all five of the dams are made of reinforced concrete. It is assumed that clearing and grubbing would be performed only in the areas

necessary to build temporary access roads and staging areas needed to access the dams and store construction equipment. The access roads and staging areas will be constructed with stone. It is assumed that all five dams will be demolished in-the-wet by driving excavators into the river to perform the work without the use of any type of coffer dam or water diversion structure. Based on previous dam removal experience this is the most practical method of removal. Once demolition of the dam is complete the staging areas and access roads will be removed. If any paved parking lots or roads are used for staging, storage or access; these areas shall be repaired to before project condition or better. Once all construction activities are complete the affected areas will be restored to pre-existing condition by seeding and planting of new trees. Turbidity curtains shall be required downstream from each dam removal site.

UTILITY RELOCATIONS

127. There is no utility information available for the conceptual design of the dam removal sites for this feasibility study. Based on the locations of the dams and the surrounding areas it is unlikely that any existing utilities are present under or adjacent to the dams where the demolition would take place. Detailed survey of all existing utilities within and adjacent to the dam removal sites will be required during the design phase. There are no utility relocations, building relocations, or utility connections required for the dam removal sites at this time.

UPPER DES PLAINES RIVER, ILLINOIS
INTERIM FEASIBILITY STUDY II

APPENDIX D
CIVIL DESIGN

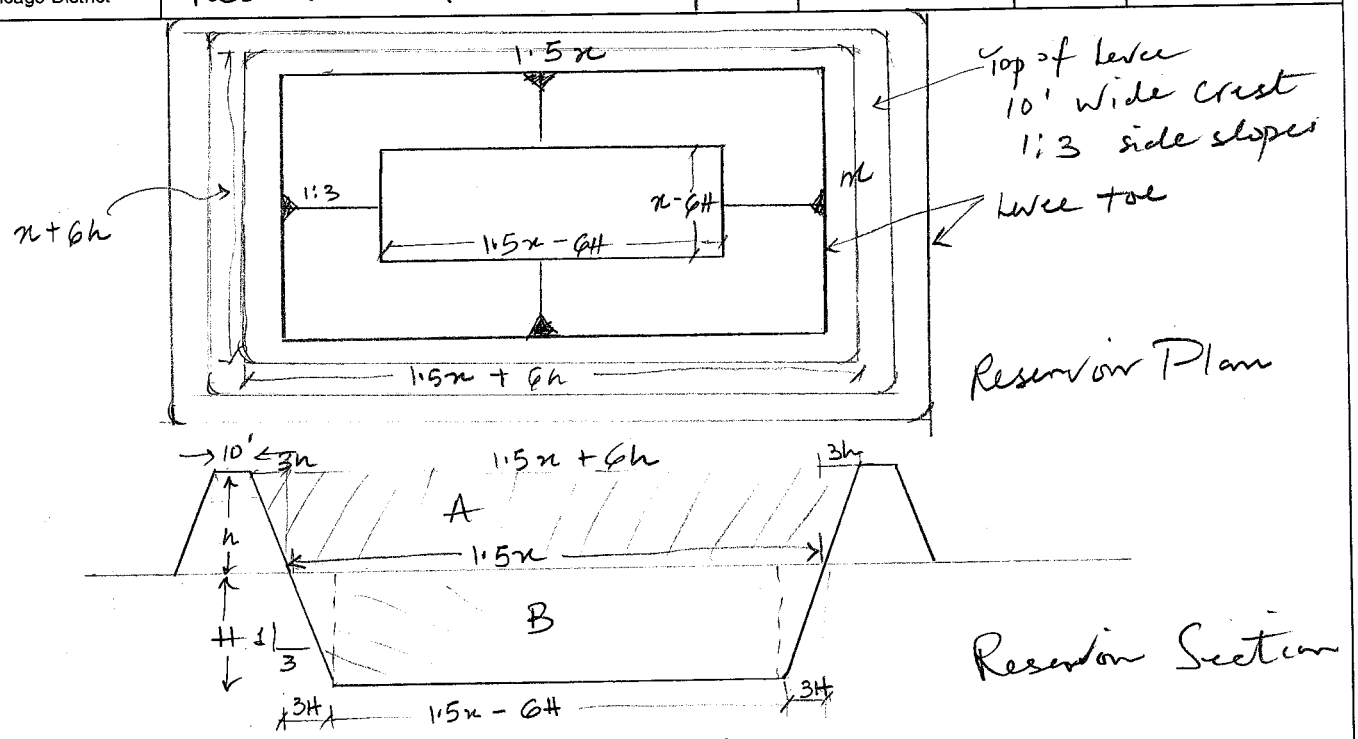
ATTACHMENT D-1
IDEALIZE RESERVOIR ANALYSES

UPPER DES PLAINES RIVER, ILLINOIS
INTERIM FEASIBILITY STUDY II

APPENDIX D
CIVIL DESIGN

ATTACHMENT D-1
IDEALIZE RESERVOIR ANALYSES

US Army Corps of Engineers Chicago District	PROJECT TITLE: DP II	COMPUTED BY: Faye L	DATE: 12/23	SHEET: 1	3
	STRUCTURE TITLE: Reservior Volume Computations	CHECKED BY:	DATE:	CONTRACT NO:	



1) Total Volume = Volume A + Volume B

Volume B: $\left[\frac{(1.5x-6H)(x-6H)+(1.5x \times x)}{2}\right] H$

$= \left(\frac{1.5x^2 - 9Hx - 6Hx + 36H^2 + 1.5x^2}{2}\right) H$

$= \left(\frac{3x^2 - 15Hx + 36H^2}{2}\right) H$

Vol. B $= (x^2 - 5Hx + 12H^2)\frac{3H}{2}$

Volume A: $\left[\frac{(1.5x \times x) + (1.5x+6h)(x+6h)}{2}\right] h$

$= \left(\frac{1.5x^2 + 1.5x^2 + 9hx + 6hx + 36h^2}{2}\right) h$

US Army Corps of Engineers Chicago District	PROJECT TITLE:	COMPUTED BY:	DATE:	SHEET: 2	3
	STRUCTURE TITLE:	CHECKED BY:	DATE:	CONTRACT NO:	

$$= \left(\frac{3x^2 + 15hx + 36h^2}{2}\right)h$$

Vol. A $= (x^2 + 5hx + 12h^2)\frac{3h}{2}$

Total Volume =

$$\frac{3h}{2}(x^2 + 5hx + 12h^2) + \frac{3H}{2}(x^2 - 5Hx + 12H^2)$$

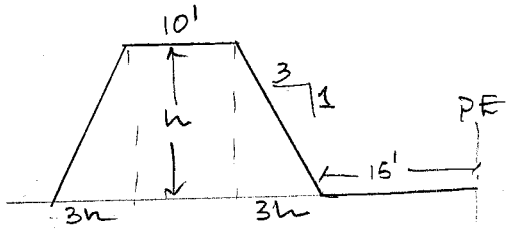
2) Levee Length: Reservoir Perimeter − Weir Length

Assume Weir Length = 10 FT

Levee Length: $2(x + 1.5x) - 10$

$= 5x - 10$

3)



Levee Cross-Sectional Area: $2(3h \times \frac{1}{2} \times h) + (10 \times h)$

$= 3h^2 + 10h$

Levee fill Volume $= (3h^2 + 10h) \times$ Levee Length

Levee Seeding Area: $\left[2\left(\sqrt{9h^2 + h^2}\right) + 10 + 15\right] \times$ Levee Length

$= \left[2\left(\sqrt{10h^2}\right) + 25\right] \times$ Levee Length

US Army Corps of Engineers Chicago District	PROJECT TITLE:	COMPUTED BY:	DATE:	SHEET: 3	3
	STRUCTURE TITLE:	CHECKED BY:	DATE:	CONTRACT NO:	

4) Clearing and Grubbing Area:

Total Length $= 1.5x + 2(6h + 10 + 15)$

$= 1.5x + 12h + 50$

Total Width $= x + 12h + 50$

Area $= (1.5x + 12h + 50)(x + 12h + 50)$

$1.5x^2 + 18xh + 75x + 12xh + 144h^2 + 600h + 50x$

$+ 600h + 2500$

$= 1.5x^2 + 144h^2 + 30xh + 125x + 1200h + 2500$

DPII - FEASIBILITY

IDEALIZE RESERVOIR EXCAVATION AND LEVEE FILL COMPUTATION

Civil Engineer: Faye Leffler
Cost Engineer: Kristin Cipriano
Date: 12/31/2009

			Reservoir Excavation (CY)			Levee Length (FT)			**Levee Fill (CY)**			**Levee Seeding Area (SY)**			**Topsoil Stripping (CY)**		
			H, Reservoir Depth (FT)			H, Reservoir Depth (FT)			H, Reservoir Depth (FT)			H, Reservoir Depth (FT)			Assumed 18"		
No.	Reservoir Storage (AC-FT)	h-2, Weir Height (FT)	5	10	15	5	10	15	5	10	15	5	10	15	5	10	15
1	25	4	20831.4	26289.4	28626.8	1420.4	1196.0	1086.6	8838.2	7442.0	6761.1	9934.7	8365.3	7599.8	4967.3	4182.6	3799.9
2	25	6	16199.2	21683.3	24243.8	1258.5	1095.5	1011.1	12677.8	11036.1	10186.4	10570.6	9201.7	8493.2	5285.3	4600.9	4246.6
3	25	8	12902.9	17994.8	20522.6	1128.5	1006.8	941.3	16717.8	14916.2	13944.6	11064.5	9872.2	9229.1	5532.3	4936.1	4614.6
4	50	4	42584.5	54046.0	59101.4	2009.3	1669.9	1496.9	12502.2	10390.4	9313.8	14053.2	11679.5	10469.2	7026.6	5839.7	5234.6
5	50	6	33644.0	45411.7	51096.7	1791.6	1539.5	1402.5	18048.4	15508.9	14128.6	15048.5	12931.1	11780.2	7524.2	6465.5	5890.1
6	50	8	27324.4	38537.4	44325.1	1619.5	1426.4	1316.5	23993.1	21132.1	19504.3	15879.7	13986.1	12908.7	7939.8	6993.0	6454.4
7	100	4	86474.5	110179.3	120864.5	2841.6	2338.4	2073.2	17681.1	14550.3	12899.8	19874.6	16355.4	14500.1	9937.3	8177.7	7250.1
8	100	6	69055.4	93742.1	105971.0	2544.8	2165.4	1951.4	25636.2	21814.1	19658.7	21375.0	18188.3	16391.1	10687.5	9094.1	8195.6
9	100	8	56809.4	80726.6	93430.7	2312.9	2017.2	1842.0	34264.7	29884.3	27289.0	22677.8	19778.7	18061.0	11338.9	9889.3	9030.5
10	200	4	174796.6	223318.9	245525.1	4018.4	3282.8	2885.5	25003.2	20426.3	17954.4	28105.1	22960.4	20181.8	14052.5	11480.2	10090.9
11	200	6	140614.3	191629.7	217343.0	3609.4	3049.1	2724.6	36361.6	30716.9	27448.3	30317.7	25611.3	22885.9	15158.9	12805.6	11443.0
12	200	8	116683.6	166651.0	193718.1	3292.6	2850.9	2581.5	48778.5	42234.9	38244.4	32283.7	27952.8	25311.7	16141.8	13976.4	12655.9
13	400	4	352207.0	450828.9	496438.8	5682.3	4617.5	4032.5	35356.7	28731.4	25090.9	39743.1	32295.8	28203.7	19871.5	16147.9	14101.9
14	400	6	284772.2	389133.7	442362.5	5114.7	4297.9	3816.0	51525.9	43297.3	38442.5	42961.5	36100.6	32052.7	21480.7	18050.3	16026.4
15	400	8	237708.6	340676.0	397197.8	4677.5	4028.6	3624.8	69295.6	59682.5	53700.1	45862.7	39500.4	35541.0	22931.4	19750.2	17770.5
16	800	4	708111.1	907587.9	1000510.1	8035.4	6504.6	5653.2	49997.9	40473.1	35175.3	56200.6	45494.2	39539.1	28100.3	22747.1	19769.6
17	800	6	574557.9	786582.5	895605.6	7243.2	6063.3	5357.8	72968.9	61081.8	53975.2	60840.3	50929.0	45003.7	30420.1	25464.5	22501.8
18	800	8	481562.3	691796.1	808243.3	6635.6	5693.2	5098.4	98305.0	84343.9	75531.4	65062.3	55822.3	49989.8	32531.2	27911.1	24994.9
19	1200	4	1064623.5	1365322.9	1505839.9	9840.9	7952.4	6896.3	61232.2	49481.7	42910.6	68828.6	55620.4	48234.0	34414.3	27810.2	24117.0
20	1200	6	865169.3	1185401.2	1350644.9	8876.4	7417.6	6540.4	89421.8	74725.9	65888.9	74558.5	62305.3	54937.1	37279.2	31152.7	27468.6
21	1200	8	726428.8	1044638.9	1221578.5	8138.0	6970.2	6228.5	120562.7	103262.9	92274.6	79793.4	68343.7	61071.2	39896.7	34171.8	30535.6
22	1600	4	1421450.8	1823563.0	2011820.6	11363.0	9172.9	7944.2	70703.0	57076.0	49430.8	79474.4	64156.8	55563.2	39737.2	32078.4	27781.6
23	1600	6	1156207.9	1584928.8	1806613.2	10253.2	8559.4	7537.3	103291.9	86227.7	75930.9	86123.2	71895.3	63310.0	43061.6	35947.7	31655.0
24	1600	8	971819.4	1398373.0	1636097.5	9404.5	8046.7	7181.1	139326.1	119210.9	106386.8	92211.8	78898.7	70411.2	46105.9	39449.4	35205.6

Assumptions:

1) Reservoir Excavation =	3H/2*(x^2-5Hx+12H^2)
2) Levee Length =	Reservoir Perimeter - Weir Length
Levee Length =	2*(X + 1.5X) -10
Levee Height =	Weir Height + 2FT
Levee Cross-sectional area =	3*h^2 + 10h
Levee Fill =	Cross-sectional area x Length

Where:

H =	Reservoir Excavation depth
h =	Levee Height
X =	Shortest side of the reservoir

3) Assumed that the existing terrain is flat. Therefore, excavation and fill quantities are generated on a flat grade.

Inroads Volume Check Report

Using No. 21, Storage Volume = 1200 AC-FT, X = 1396.0, Levee Height = 8, and Reservoir Depth = 10

Inroad Report:
RESERVOIR LENGTH = 1396*1.5 = 2094 FT
RESERVOIR WIDTH = 1396.0 FT
RESERVOIR DEPTH = 10 FT
LEVEE HEIGHT = 8 FT
INROADS STORAGE REPORT = 1199.7 AC-FT
INROADS RESERVOIR EXCAVATION = 28197137.7 CF (1044338.4CY)

DPII - FEASIBILITY
IDEALIZE RESERVOIR AREA COMPUTATIONS PER STORAGE, LEVEE HEIGHT, & RESERVOIR DEPTH

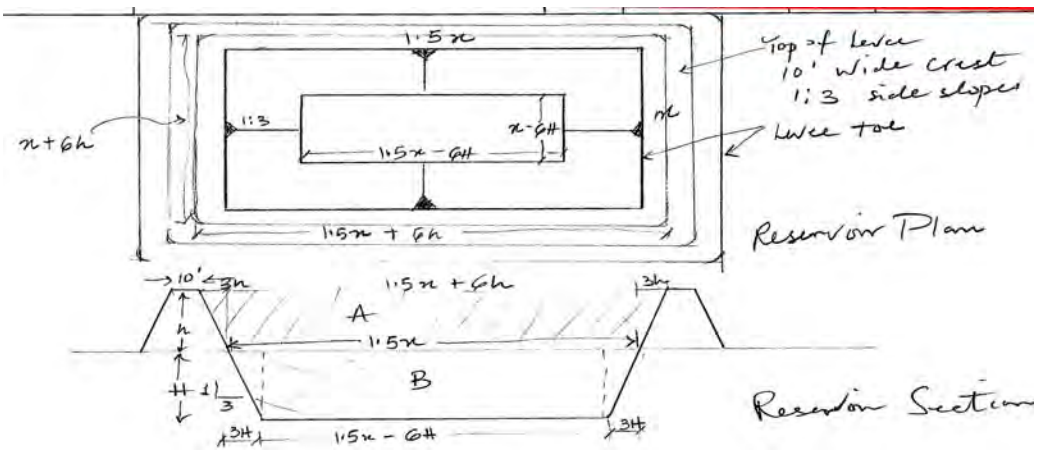
				x (FT)			Reservoir Area (AC)		
				H, Reservoir Depth (FT)			H, Reservoir Depth (FT)		
No.	Reservoir Storage (AC-FT)	Reservoir Storage (CF)	h, Weir Height (FT)	5	10	15	5	10	15
1	25	1089000	4	286.1	241.2	219.3	2.82	2.00	1.66
2	25	1089000	6	253.7	221.1	204.2	2.22	1.68	1.44
3	25	1089000	8	227.7	203.4	190.3	1.79	1.42	1.25
4	50	2178000	4	403.9	336.0	301.4	5.62	3.89	3.13
5	50	2178000	6	360.3	309.9	282.5	4.47	3.31	2.75
6	50	2178000	8	325.9	287.3	265.3	3.66	2.84	2.42
7	100	4356000	4	570.3	469.7	416.6	11.20	7.60	5.98
8	100	4356000	6	511.0	435.1	392.3	8.99	6.52	5.30
9	100	4356000	8	464.6	405.4	370.4	7.43	5.66	4.72
10	200	8712000	4	805.7	658.6	579.1	22.35	14.93	11.55
11	200	8712000	6	723.9	611.8	546.9	18.04	12.89	10.30
12	200	8712000	8	660.5	572.2	518.3	15.02	11.27	9.25
13	400	17424000	4	1138.5	925.5	808.5	44.63	29.50	22.51
14	400	17424000	6	1024.9	861.6	765.2	36.17	25.56	20.16
15	400	17424000	8	937.5	807.7	727.0	30.26	22.47	18.20
16	800	34848000	4	1609.1	1302.9	1132.6	89.16	58.46	44.18
17	800	34848000	6	1450.6	1214.7	1073.6	72.46	50.81	39.69
18	800	34848000	8	1329.1	1140.6	1021.7	60.83	44.80	35.94
19	1200	52272000	4	1970.2	1592.5	1381.3	133.66	87.33	65.70
20	1200	52272000	6	1777.3	1485.5	1310.1	108.77	75.99	59.10
21	1200	52272000	8	1629.6	1396.0	1247.7	91.45	67.11	53.61
22	1600	69696000	4	2274.6	1836.6	1590.8	178.16	116.15	87.15
23	1600	69696000	6	2052.6	1713.9	1509.5	145.09	101.15	78.46
24	1600	69696000	8	1882.9	1611.3	1438.2	122.08	89.41	71.23

Assumptions:

1) Reservoir Volume Equation = 3H/2*(x^2-5Hx+12H^2) + 3h/2*(x^2+5hx+12h^2)
Where:
h = Weir Height
H = Reservoir Depth
x = Shortest side of the reservoir

2) Reservoir Area = x*1.5x

3) The area calculated above represents half the area for each site.
The excavated material will be deposited on the other half of the site.



UPPER DES PLAINES RIVER, ILLINOIS
INTERIM FEASIBILITY STUDY II

APPENDIX D
CIVIL DESIGN

ATTACHMENT D-2
SITE SUITABILITY STUDY – GEOTECHNICAL REVIEW

UPPER DES PLAINES RIVER, ILLINOIS
INTERIM FEASIBILITY STUDY II

APPENDIX D
CIVIL DESIGN

ATTACHMENT D-2
SITE SUITABILITY STUDY – GEOTECHNICAL REVIEW

CELRC-ED-G January 26, 2010
MEMORANDUM FOR RECORD
SUBJECT: Des Plaines II: Site Suitability Study Geotechnical Review

1. TS-DG was asked to assist in determining the site suitability of proposed reservoir sites along the Des Plaines River in Lake and Cook counties, IL, (Figure 1) based on available geologic data.

2. Site suitability was determined by utilizing a surficial geology map of the Chicago area (ISGS, scale 1:250,000) and NRCS soil maps to establish what geologic units or material the proposed reservoir sites lie within as well as available subsurface boring data where available. It should be noted that while geologic maps attempt to delineate areas of similar geologic materials and stratigraphic characteristics they are open to broad interpretation and should be used conservatively for design purposes.

3. Proposed sites were ranked using a three-tiered designation of: 'Good', 'Fair', and 'Poor', based on the in situ materials found in the area and the likelihood that the materials would mitigate the issues of seepage and stability. In general, areas likely to contain free draining material such as sand or gravel as well as areas that are comprised mostly of unstable deposits of peat, 'muck', or other organic material are less suitable than areas that are more likely to contain finer, more stable sediments (silt, clay, silty clay, etc.). The following guidelines were used to identify the suitability of each site location:

    a. Sand & Gravel - poor for seepage, fair for stability;
    b. Silt - fair for seepage, poor for stability;
    c. Clay - good for seepage, fair to good for stability;
    d. Peat/Muck - fair to poor for seepage, poor for stability

4. The proposed sites **AC08, MD04, FD02** (Figure 6), and **SC02** (Figure 8) lie within the Wadsworth Member of the Wedron Formation according to the map of surficial geology of the Chicago region. The Wadsworth member is a system of glacial moraines and is described as containing, 'Mostly gray clayey and silty clayey till, relatively low in content of pebbles, cobbles, and boulders; contains local lenses of silt; commonly mantled with 1-2 ft. of leached silt (loess) and soil.' (Willman and Lineback 1970). Additionally, the surficial soils in these sites have been mapped by the NRCS as containing fine-silty sediments (Figure 7). Due to a higher likelihood of stable, less permeable sediments in these areas, these sites are given a designation of '**Good**'.

5. Sites **FD01, FD03, DP24, DP23** (Figures 6 & 7), and **DPRS57** (Figure 9) lie partially within the Cahokia alluvium which is described as, 'Modern floodplain and stream deposits, mostly poorly sorted silt and sand with local deposits of sandy gravel'. There are ~50 borings located in the Cahokia alluvium within 200-3000 ft of DP23 and FD01 that confirm the presence of lenses of fine-coarse sand at varying depths up to ~40 ft and thicknesses of 1-3 ft. The likely existence of coarser sediments may result in potential seepage issues that may result in remedial measurements such as the need for drains and/or cutoff walls. Thus, these proposed sites are designation as '**Fair**'. Site specific

investigation and analysis would be required to determine the presence and depths of the coarse soil lenses.

6. While **BC02** lies within the Wedron formation (Figure 4), NRCS soil maps designate this area as being comprised mostly of 'Houghton muck', (Figure 5) a soil unit that contains mostly peat and poorly drained organic sediments. This soft soil may lead to slope stability concerns that may require relatively flatter slope or the addition of engineered systems to support the required slopes. Thus, it is also given a designation of '**Fair'**. Site specific investigations and analysis would be required to determine the presence and depths of the soft soil layers.

7. Sites **DP38, DP40, DP41** (Figure 2-3), **DP34** (Figure 4-5), and **AC03** (Figure 6-7) and **DP07** (Figure 8) are located either partially or completely within the Mackinaw member of the Henry formation. The Mackinaw member has been mapped as glacial valley deposits and outwash terraces containing, 'Sand and gravel, generally well sorted and evenly bedded.' (Willman and Lineback, 1970). Additionally, there are 15 borings located 200-3000 ft. from the SE corner of the DP34 site within the mapped Mackinaw member that indicate consistent layers of fine-coarse sand at depth of ~1.5-30 ft. with thicknesses ranging from ~2.5-20 ft. NRCS soil maps also classify these areas as containing sandy material. The sand material at the site locations may result in groundwater control issues which may require remedial measurement implementations such as drains, cut-off walls, and/or dewatering pumps. Due to the likely presence of permeable sediments in these proposed sites and the potential issues of seepage they are designated as '**Poor**'. Site specific investigations and analysis will be required to identify the presence and depths of sand materials.

8. The following table provides a summary of the site suitability findings related to geotechnical considerations for the proposed site locations:

Site Location	**Material**	**Slope Stability**	**Seepage**	**Overall**
AC08	Clay, Silty Clay	Good	Good	Good
MD04	Clay, Silty Clay	Fair to Good	Good	Good
FD02	Clay, Silty Clay	Fair to Good	Good	Good
SC02	Clay, Silty Clay	Fair to Good	Good	Good
BC02	Peat/Muck, Clay, Silt	Poor	Fair to Poor	Fair
FD01	Clay, Silt, Sand, Gravel	Fair	Fair	Fair
FD03	Silt, Sand	Fair	Fair	Fair
DP23	Clay, Silt, Sand, Gravel	Fair	Fair	Fair
DP24	Clay, Silt, Sand, Gravel	Fair	Fair	Fair
DPRS57	Sand, Gravel, Clay, Silt	Fair	Fair	Fair
AC03	Sand, Gravel	Fair to Poor	Poor	Poor
DP07	Mostly Sand, Gravel	Fair to Poor	Poor	Poor
DP34	Mostly Sand, Gravel	Fair to Poor	Poor	Poor
DP38	Silty/Sandy, Gravel	Fair to Poor	Poor	Poor
DP40	Silty/Sandy, Gravel, Peat	Fair to Poor	Poor	Poor
DP41	Silty/Sandy, Gravel, Peat	Fair to Poor	Poor	Poor

Reference:
Willlman, H.B., Lineback, J.A., *Surficial Geology of the Chicago Region*, 1:250,000, Illinois State Geological Survey, 1970.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov. Accessed Jan 12, 2010

Des Plaines II Feasibility: Proposed Reservoir Sites

U.S. Army Corps of Engineers
Chicago District

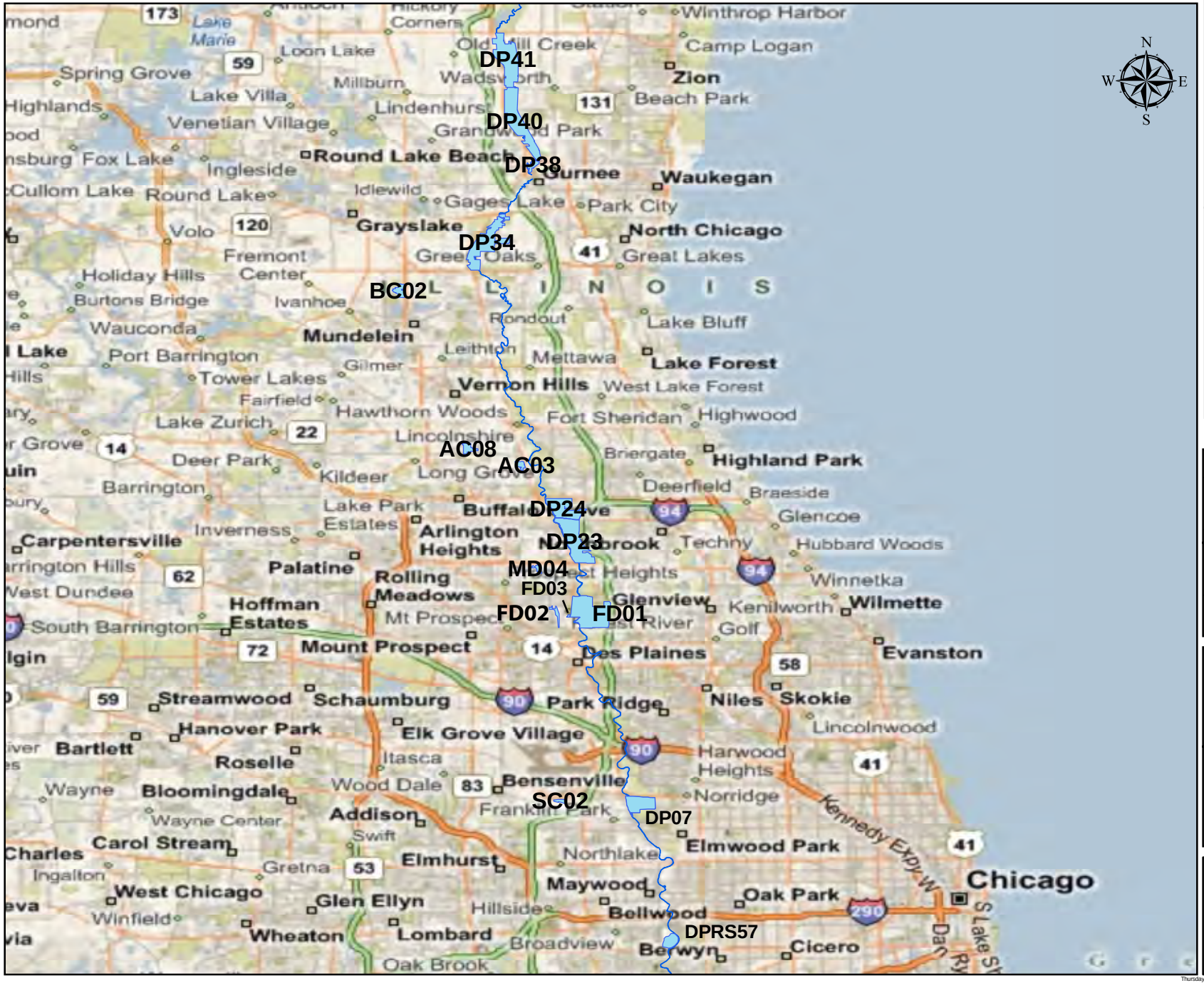


Figure 1: Location Map

Des Plaines II Feasibility: Proposed Reservoir Sites

U.S. Army Corps of Engineers
Chicago District

Wadsworth Till:
- Mostly gray clayey and silty clayey till, relatively low in content of of pebbles, cobbles, and boulders; contains local lenses of silt

Mackinaw Till:
- Sand and Gravel, well sorted evenly bedded; valley deposits and glacial outwash terraces

Cahokia Alluvium:
- Modern floodplain and stream deposits; mostly poorly sorted silt and sand with local deposits of sandy gravel

Grayslake Peat:
- Peat and muck; dominantly organic deposits with inter-bedded silt and clay in places

Proposed Reservoir sites

Location Map

0 0.25 0.5 1
Miles

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Description of Geologic units taken from: Willman, H.B., and Lineback, J.A., *Surficial Geology of the Chicago Region*, Illinois State Geological Survey, 1970.

Thursday, February 19, 2009 J:\Templates\GN_Landscape_A_Size93.mxt

Figure 2: Surficial Geology Deposits

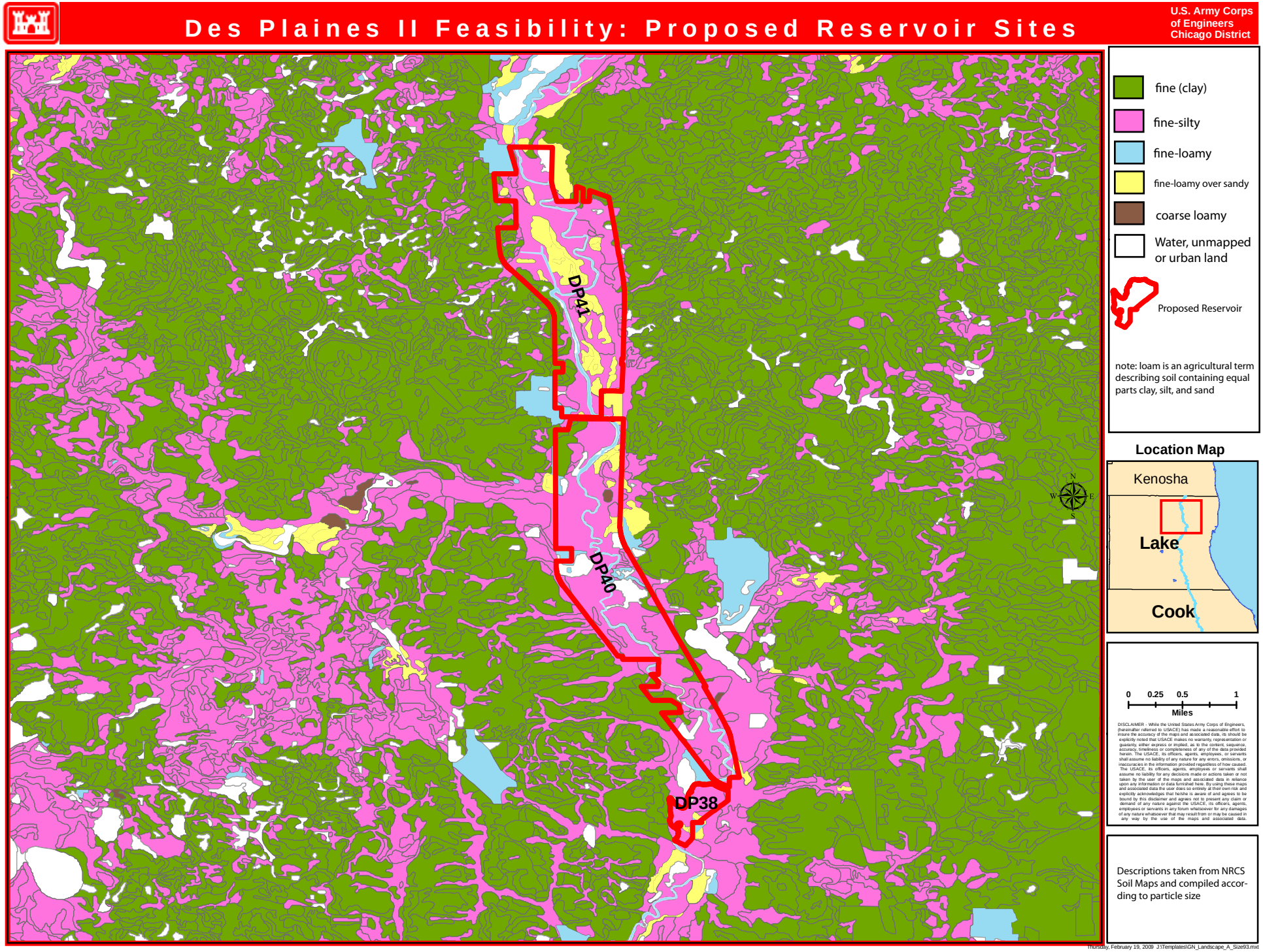
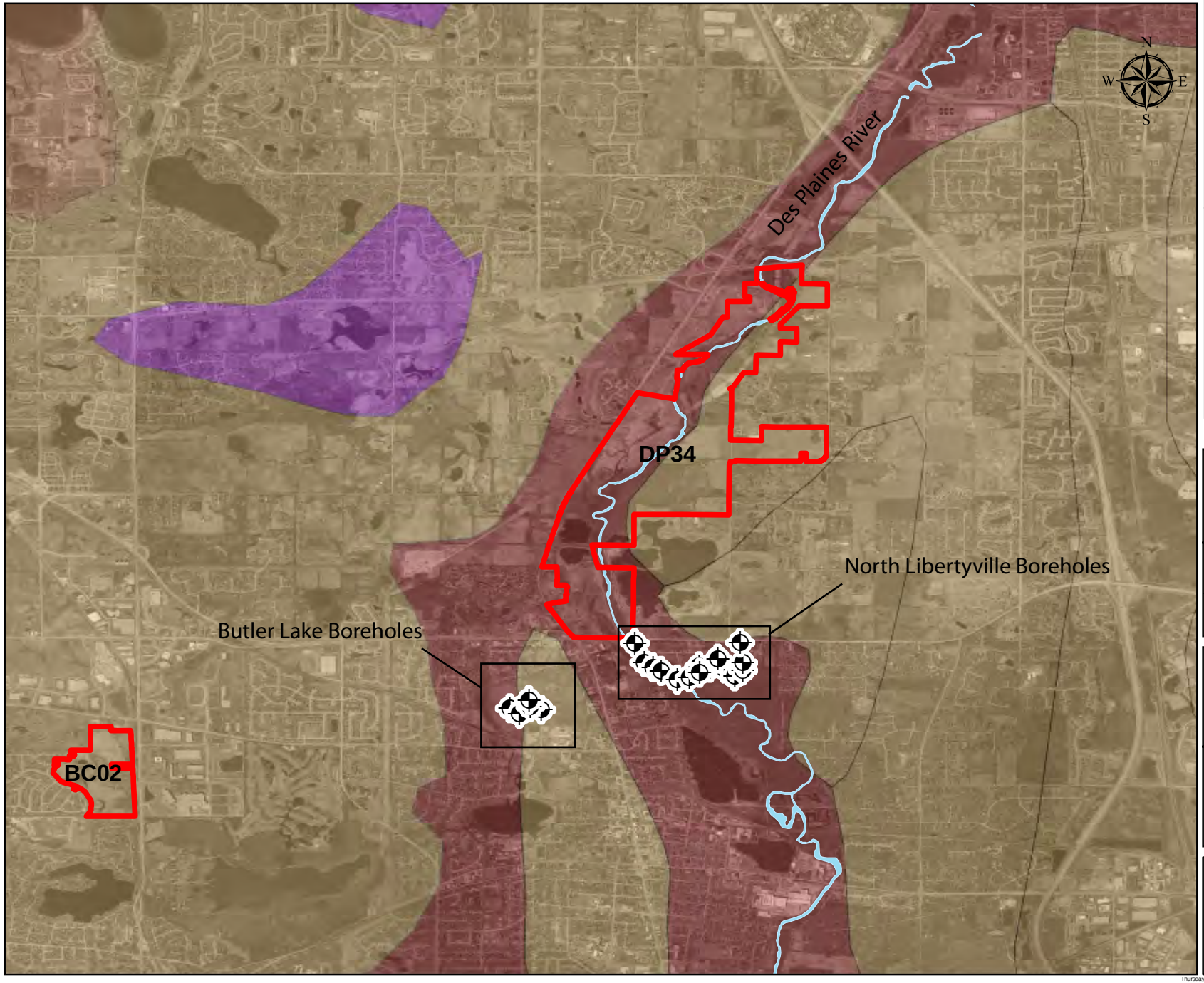


Figure 3: NRCS soil map

Des Plaines II Feasibility: Proposed Reservoir Sites

U.S. Army Corps of Engineers
Chicago District



Wadsworth Till:
- Mostly gray clayey and silty clayey till, relatively low in content of of pebbles, cobbles, and boulders; contains local lenses of silt

Mackinaw Till:
- Sand and Gravel, well sorted evenly bedded; valley deposits and glacial outwash terraces

Grayslake Peat:
- Peat and muck; dominantly organic deposits with inter-bedded silt and clay in places

Proposed Reservoir

Borehole Location

Location Map

0 0.15 0.3 0.6
Miles

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Description of Geologic units taken from: Willman, H.B., and Lineback, J.A., *Surficial Geology of the Chicago Region*, Illinois State Geological Survey, 1970.

Thursday, February 19, 2009 J:\Templates\GN_Landscape_A_Size93.mxt

Figure 4: Surficial Geology Deposits

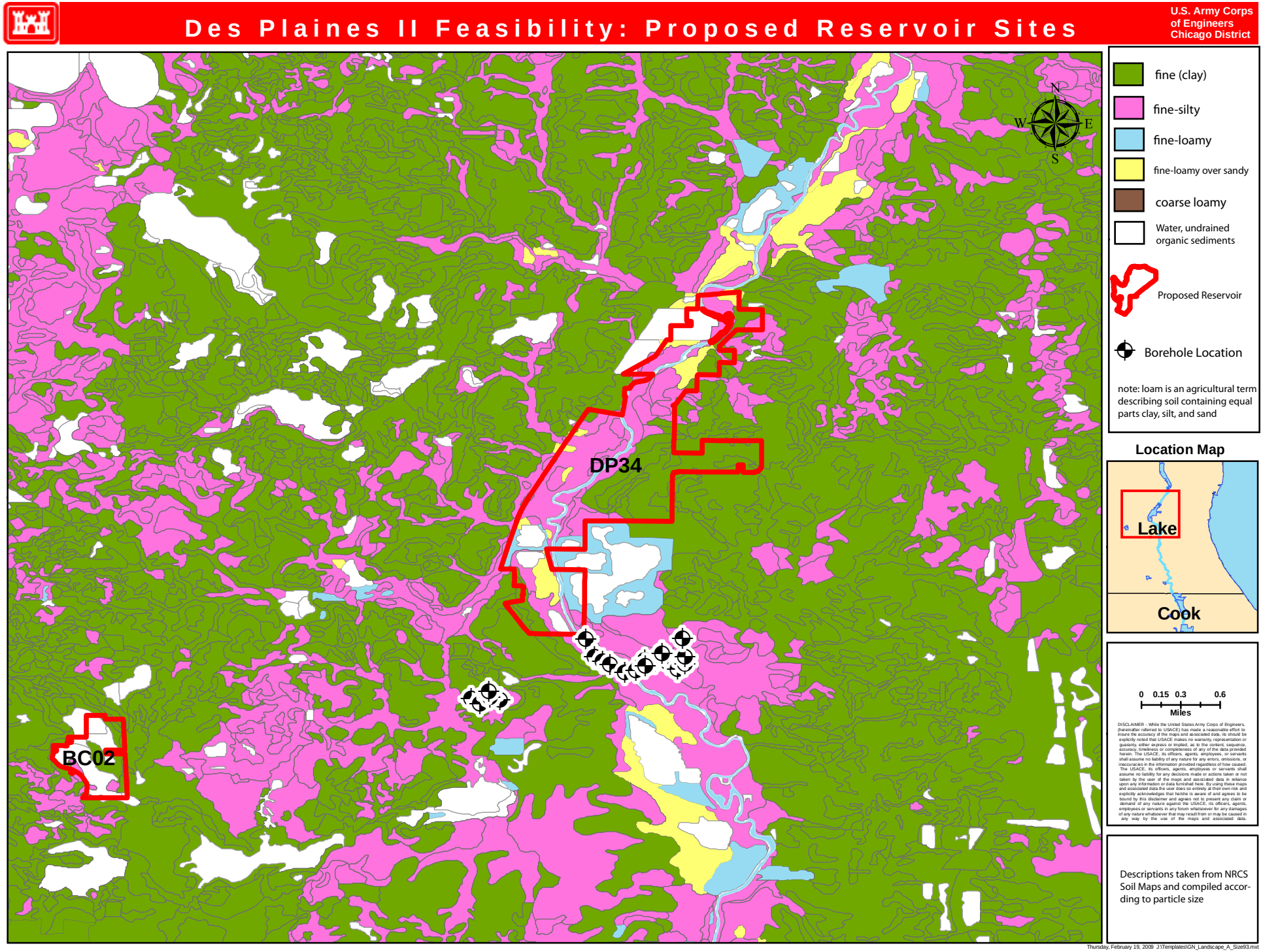
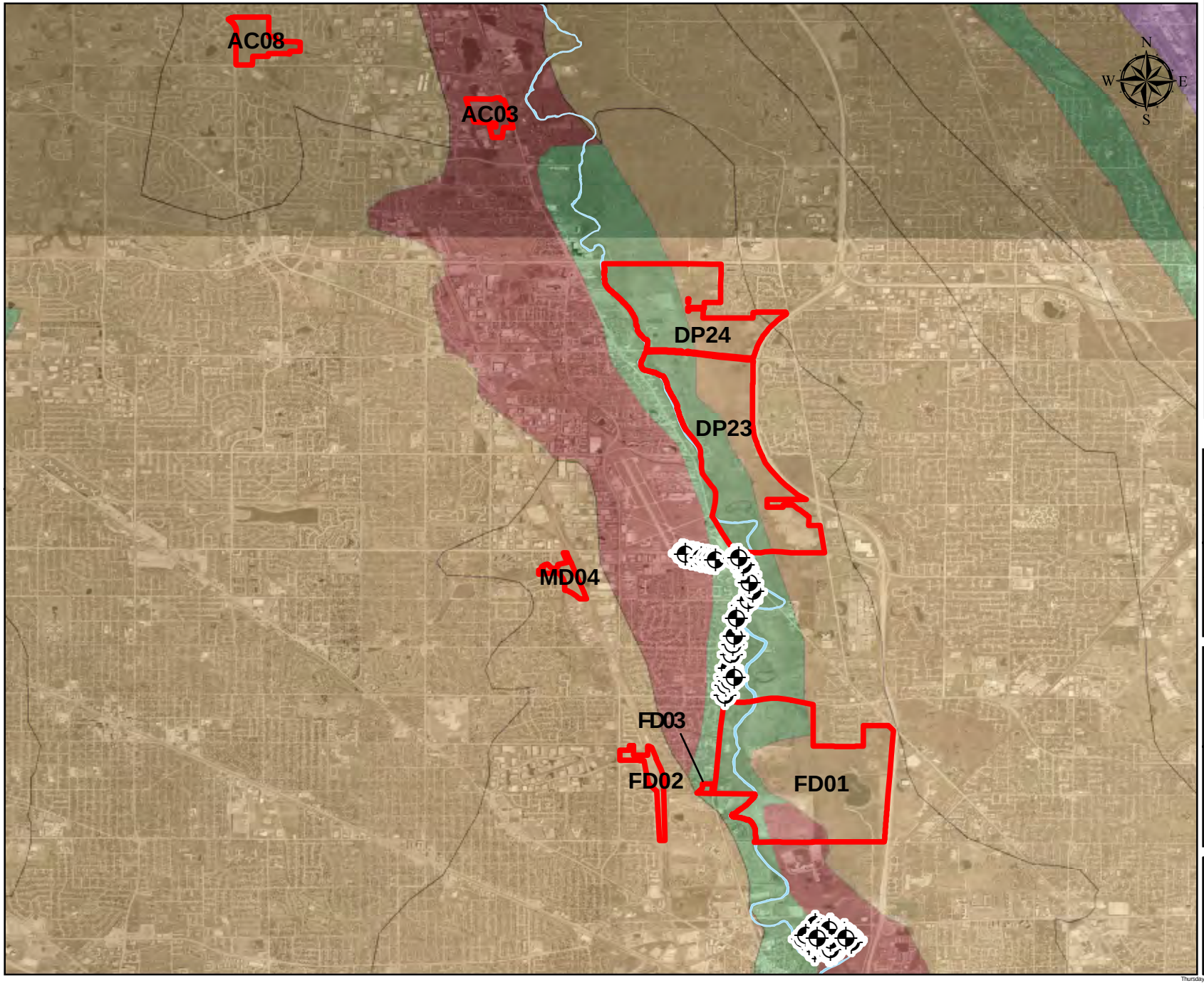


Figure 5: NRCS Soil map

Des Plaines II Feasibility: Proposed Reservoir Sites

U.S. Army Corps of Engineers
Chicago District



Wadsworth Till:
- Mostly gray clayey and silty clayey till, relatively low in content of of pebbles, cobbles, and boulders; contains local lenses of silt

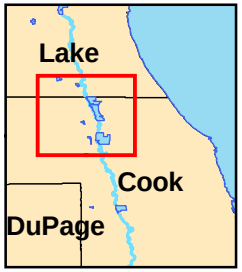
Mackinaw Till:
- Sand and Gravel, well sorted evenly bedded; valley deposits and glacial outwash terraces

Cahokia Alluvium:
- Modern floodplain and stream deposits; mostly poorly sorted silt and sand with local deposits of sandy gravel

Proposed Reservoir

Borehole Location

Location Map



0 0.35 0.7 1.4
Miles

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Thursday, February 19, 2009 J:\Templates\GN_Landscape_A_Size93.mxt

Figure 6: Surficial Geology Deposits

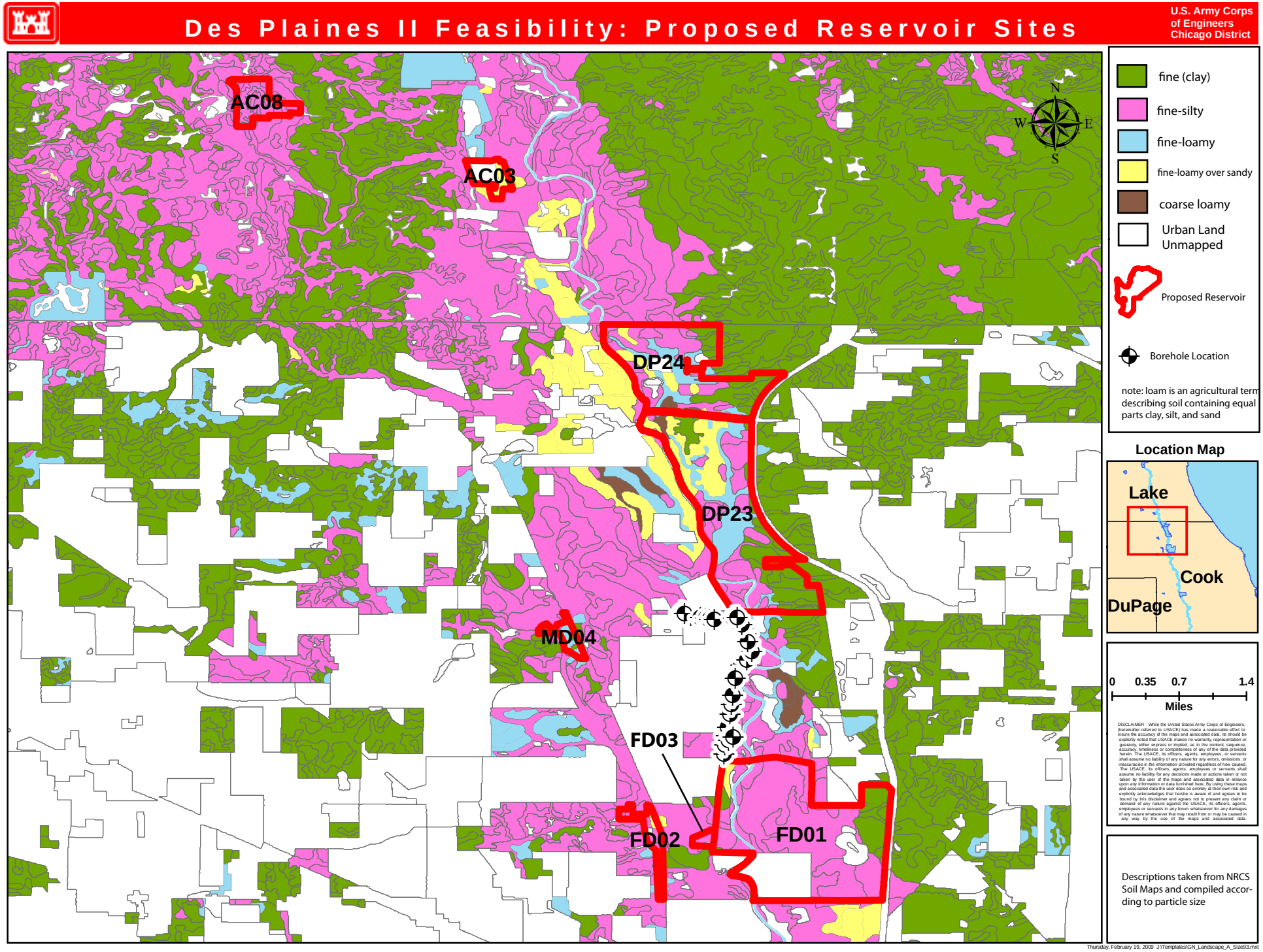
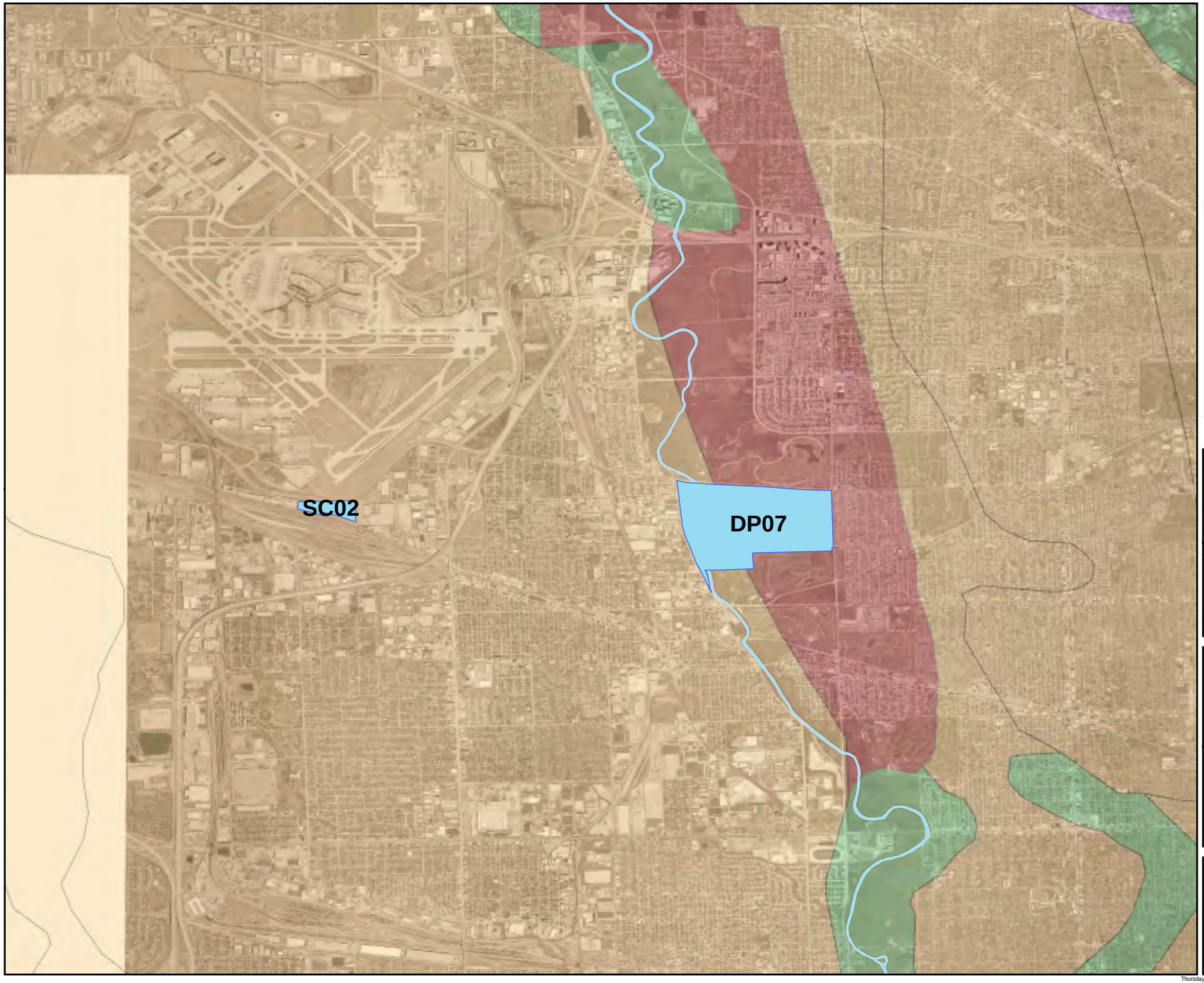


Figure 7: NRCS Soil Map

Des Plaines II Feasibility: Proposed Reservoir Sites

U.S. Army Corps of Engineers
Chicago District



Wadsworth Till:
- Mostly gray clayey and silty clayey till, relatively low in content of of pebbles, cobbles, and boulders; contains local lenses of silt

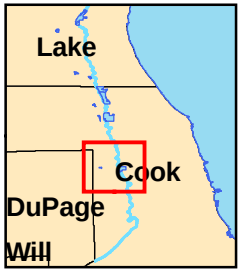
Mackinaw Till:
- Sand and Gravel, well sorted evenly bedded; valley deposits and glacial outwash terraces

Cahokia Alluvium:
- Modern floodplain and stream deposits; mostly poorly sorted silt and sand with local deposits of sandy gravel

Proposed Reservoir

N
W E
S

Location Map



0 0.25 0.5 1
Miles

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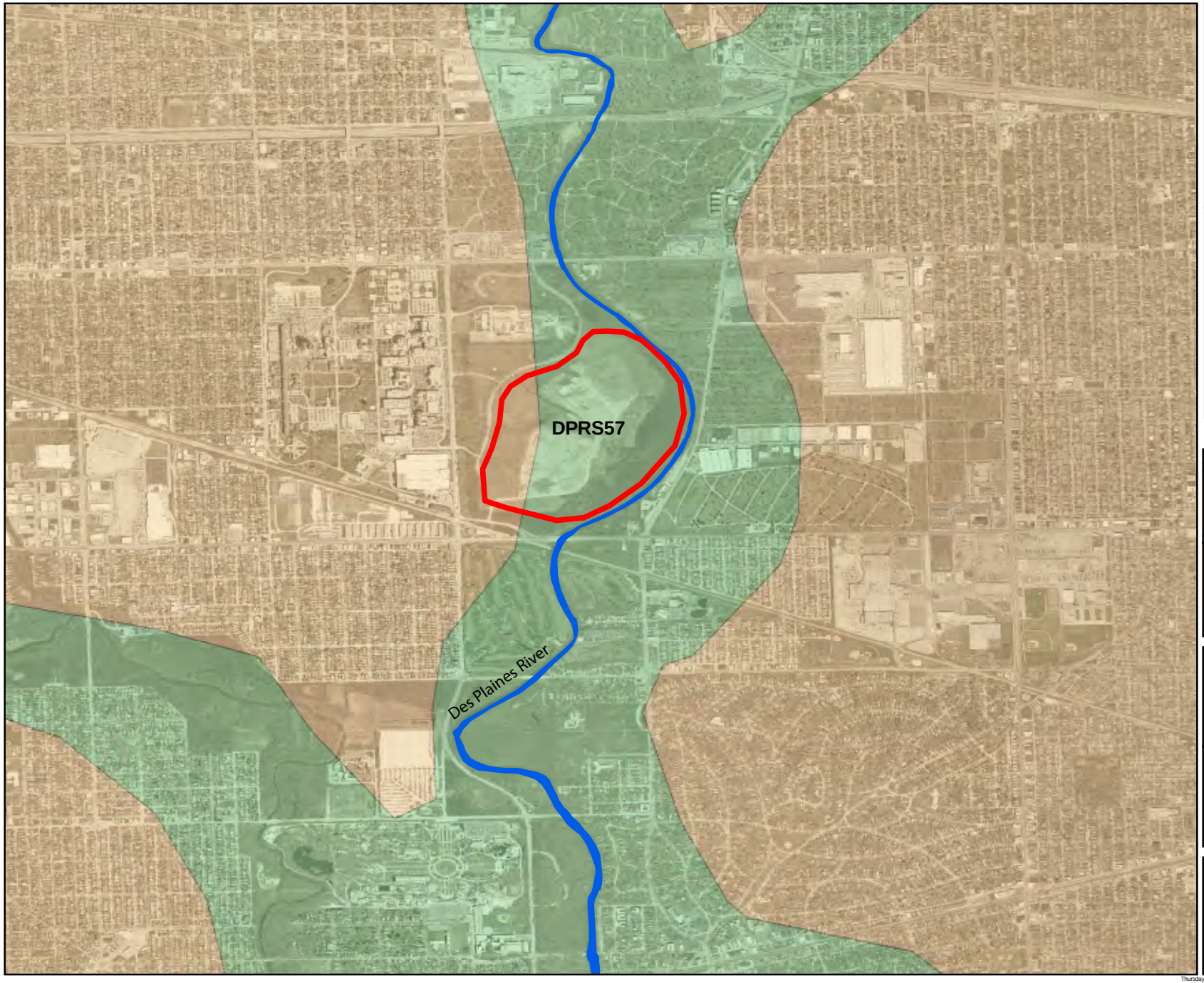
Thursday, February 19, 2009 J:\Templates\GN_Landscape_A_Size93.mxt

Figure 8: Surficial Geology Deposits

Des Plaines II Feasibility: Proposed Reservoir Sites

U.S. Army Corps of Engineers
Chicago District



Explanation:

Wadsworth Till:
- Mostly gray clayey and silty clayey till, relatively low in content of of pebbles, cobbles, and boulders; contains local lenses of silt

Cahokia Alluvium:
- Modern floodplain and stream deposits; mostly poorly sorted silt and sand with local deposits of sandy gravel

Proposed Reservoir

N
W E
S

Location Map

0 0.125 0.25 0.5
Miles

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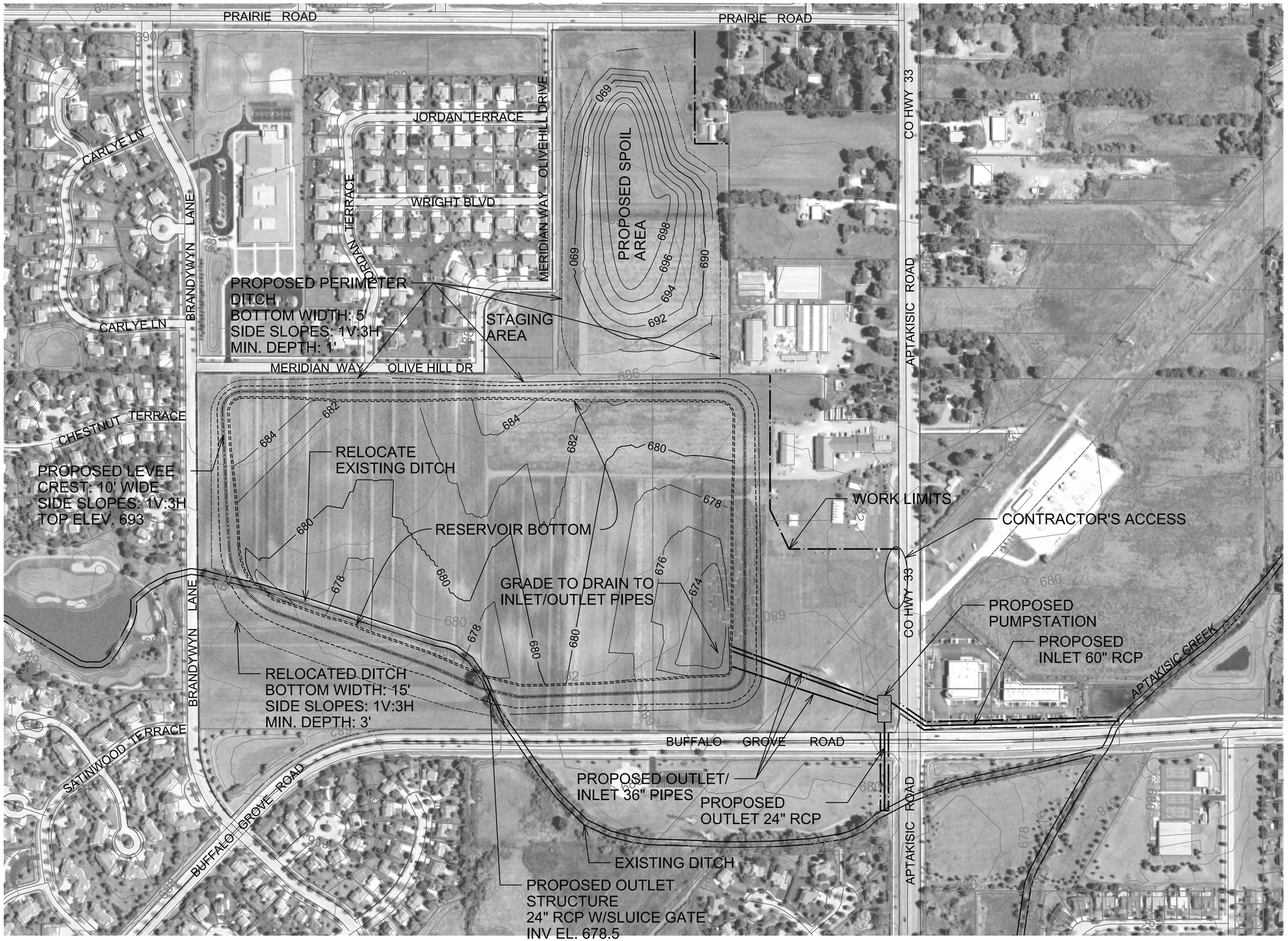
Thursday, February 19, 2009 J:\Templates\GN_Landscape_A_Size93.mxt

FIgure 9: Surficial Geology Deposits

UPPER DES PLAINES RIVER, ILLINOIS
INTERIM FEASIBILITY STUDY II

APPENDIX D
CIVIL DESIGN

ATTACHMENT D-3
PLATES



N

0 400' 800'

RESERVOIR DATA

TOP AREA = 45.4 AC
BOTTOM AREA = 40 AC
STORAGE = 550 AC-FT
INFLOW = 200 CFS
FEE AREA = 94.2 AC
TEMPORARY EASEMENT AREA = 1.4 AC

NOTES:

1. THE SURVEY CONDITIONS SHOWN ON THESE DRAWINGS ARE FROM A LOCAL GIS DATA AND REPRESENTS CONDITIONS EXISTING AT THAT TIME. REFER TO THE CIVIL APPENDIX FOR THE SURVEY DATA SOURCES.

2. ALL COORDINATES SHOWN ARE REFERENCED TO THE ILLINOIS STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83) U.S. FEET.)

3. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) U.S. FEET.

U.S. Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER AND TRIBUTARIES
FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT
VOLUME 2 - NED PLAN

ACRS08 RESERVOIR
CONCEPTUAL SITE PLAN
BUFFALO GROVE, IL

SCALE:	DATE:	DRAWING CODE:
1IN:400FT	AUGUST 2013	FILENAME.DGN

N

NOTES:

1. THE SURVEY CONDITIONS SHOWN ON THESE DRAWINGS ARE FROM A LOCAL GIS DATA AND REPRESENTS CONDITIONS EXISTING AT THAT TIME.

2. ALL COORDINATES SHOWN ARE REFERENCED TO THE ILLINOIS STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83) U.S. FEET.

3. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) U.S. FEET.

4. THE PROPOSED FLOOD WALL LENGTH IS 3020 FEET, WHICH INCLUDES 500 OF RAISING AN EXISTING RETAINING WALL (STA. 2+00 TO 7+00). THE FLOODWALL TOP ELEVATION IS 633.7.

5. THE PERMANENT EASEMENT AREA IS 2.1 ACRES. THE TEMPORARY EASEMENT AREA IS 1.0 ACRES.

6. ONE ROAD CLOSURE STRUCTURES WILL BE NECESSARY TO COMPLETE THE LINE OF PROTECTION.

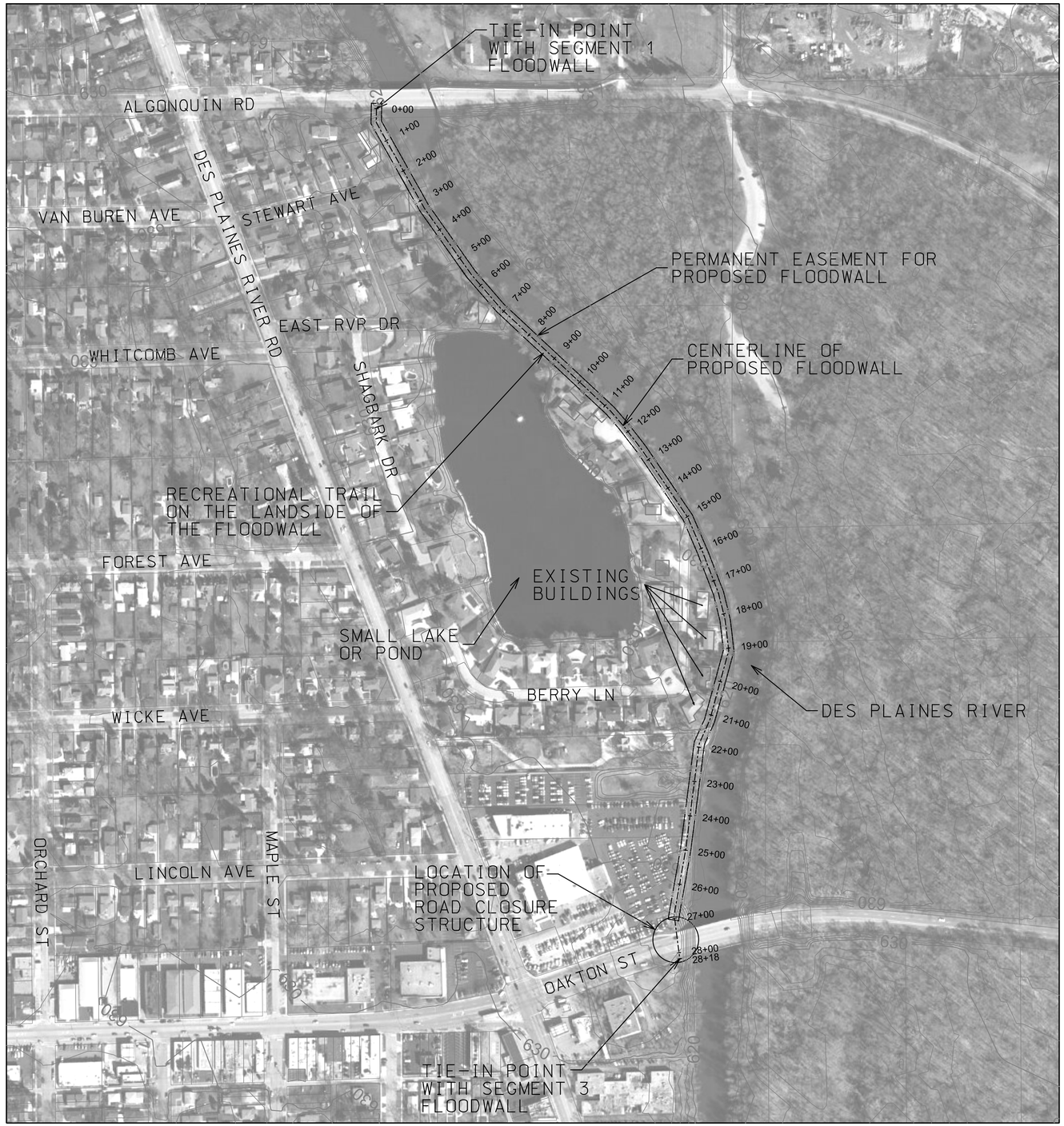
0 300' 600'

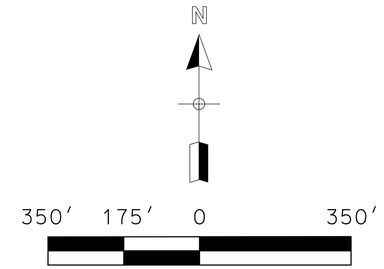
U.S. Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER AND TRIBUTARIES
FEASIBILITY REPORT
AND EVIRONMENT ASSESSMENT
VOLUME 2 - NED PLAN

DPLV09SEG1 LEVEE
CONCEPTUAL SITE PLAN
DES PLAINES, COOK COUNTY, IL

SCALE:	DATE:	DRAWING CODE:
AS SHOWN	AUG 2013	DPLV09SEG1-CS101.dgn





SCALE: 1′′= 350′-0″

NOTES:

1. THE SURVEY CONDITIONS SHOWN ON THESE DRAWINGS ARE FROM A LOCAL GIS DATA AND REPRESENTS CONDITIONS EXISTING AT THAT TIME.

2. ALL COORDINATES SHOWN ARE REFERENCED TO THE ILLINOIS STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83) U.S. FEET.

3. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) U.S. FEET.

4. THE PROPOSED FLOODWALL IS 2,718 LF WITH AN ELEVATION OF 635.0 FT.

5. THE PERMANENT EASMENT AREA TOTALS 2.1 ACRES.

6. ONE ROAD CLOSURE STRUCTURE WILL BE NECESSARY TO COMPLETE THE LINE OF PROTECTION.

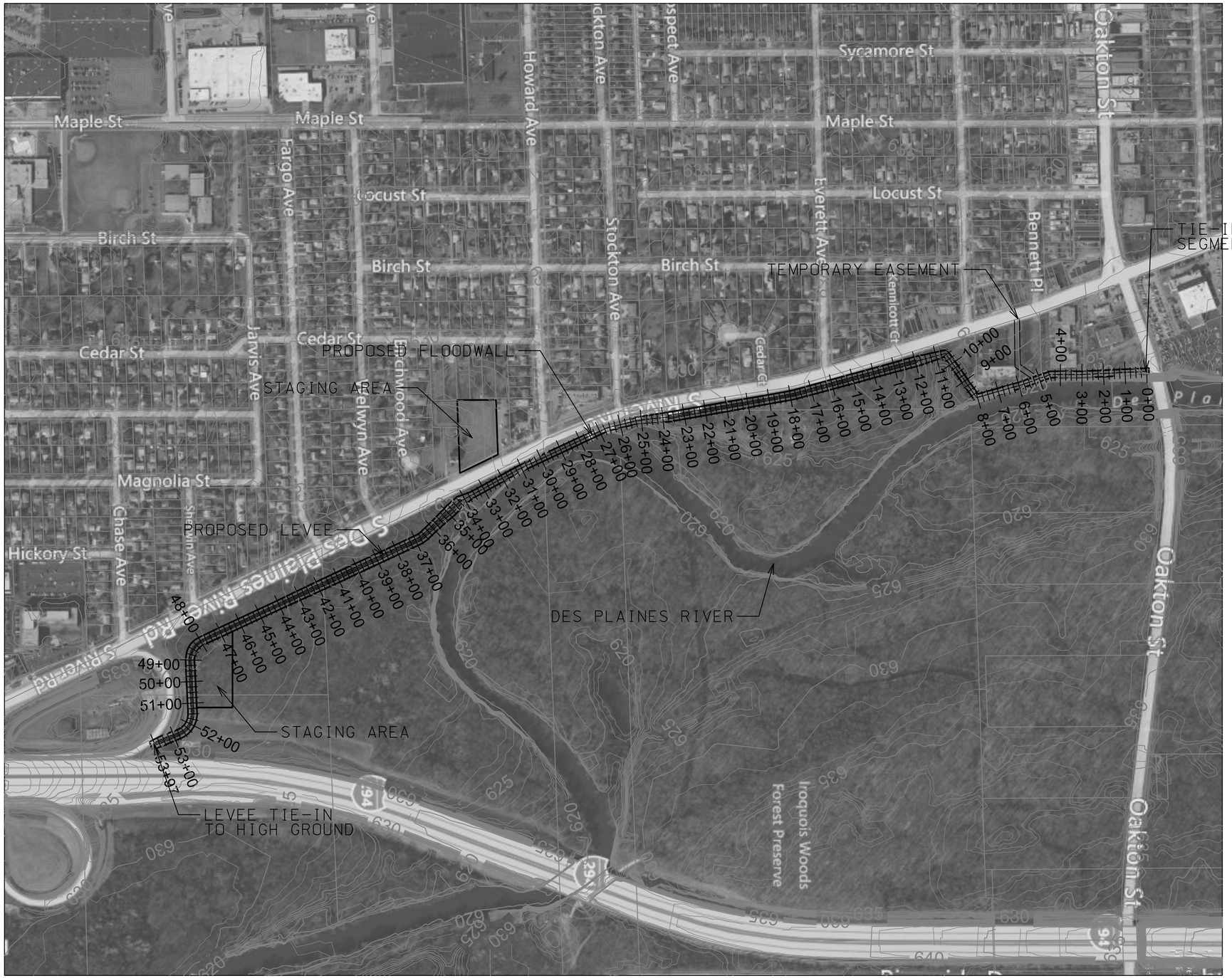
7. THIS SEGMENT OF FLOODWALL SHALL HAVE A PAVED RECREATIONAL TRAIL ALONG ITS ENTIRE LENGTH.

U.S. Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER AND TRIBUTARIES FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT

DPLV09 – SEGMENT 2
FLOODWALL SITE PLAN
DES PLAINES, COOK COUNTY, IL

SCALE:	DATE:	DRAWING CODE:
AS-SHOWN	AUG 2013	DPLV09_S2_Siteplan.dgn



NOTES:

1. THE SURVEY CONDITIONS SHOWN ON THESE DRAWINGS ARE FROM A LOCAL GIS DATA AND REPRESENTS CONDITIONS EXISTING AT THAT TIME.

2. ALL COORDINATES SHOWN ARE REFERENCED TO THE ILLINOIS STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83) U.S. FEET.

3. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) U.S. FEET.

4. THE PROPOSED FLOOD WALL LENGTH IS 2250 FEET, AND LEVEE LENGTH IS 3197 FEET. TOP OF FLOODWALL/LEVEE: STA. 0+00 TO STA. 16+00, EL. 633.7; STA. 16+00 TO 53.97, EL. 633.4.

5. THE PERMANENT EASEMENT AREA IS 4.82 ACRES. THE TEMPORARY EASEMENT AREA IS 2.44 ACRES.

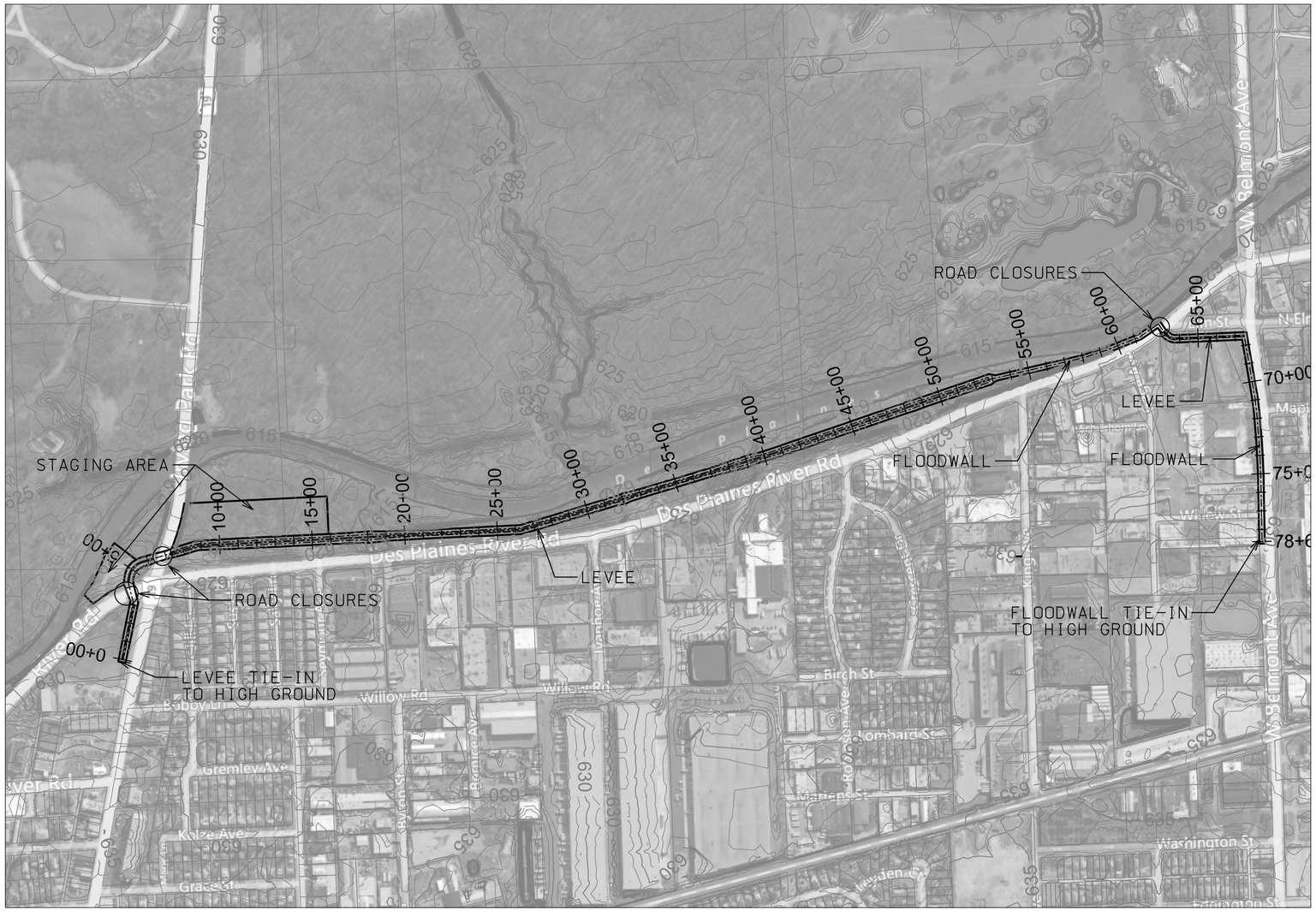
0 500' 1000'

U.S. Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER AND TRIBUTARIES
FEASIBILITY REPORT
AND EVIRONMENT ASSESSMENT
VOLUME 2 - NED PLAN

DPLV09SEG3 LEVEE
CONCEPTUAL SITE PLAN
DES PLAINES, COOK COUNTY, IL

SCALE:	DATE:	DRAWING CODE:
AS SHOWN	AUG 2013	DPLV09SEG3-CS101.dgn



PLAN VIEW

NOTES:

1. THE SURVEY CONDITIONS SHOWN ON THESE DRAWINGS ARE FROM A LOCAL GIS DATA AND REPRESENTS CONDITIONS EXISTING AT THAT TIME.

2. ALL COORDINATES SHOWN ARE REFERENCED TO THE ILLINOIS STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83) U.S. FEET.

3. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) U.S. FEET.

4. THE PROPOSED FLOOD WALL LENGTH IS 1782 FEET AND LEVEE LENGTH IS 5576 FEET. THE LEVEE/FLOODWALL CREST ELEVATION IS 629.31.

5. THE PERMANENT EASEMENT AREA IS 8.2 ACRES. THE TEMPORARY EASEMENT AREA IS 4.7 ACRES.

6. THREE ROAD CLOSURE STRUCTURES WILL BE NECESSARY TO COMPLETE THE LINE OF PROTECTION.

7. THE EXISTING RETAINING WALL SUPPORTING RIVER RD AT THE RIVER SIDE BETWEEN APPROXIMATELY STA. 62+22 AND STA. 63+44 (122 FEET) SHALL BE RAISED TO THE DESIGN ELEVATION AND ALSO ACT AS A FLOODWALL.

0 700' 1400'

U.S. Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER AND TRIBUTARIES
FEASIBILITY REPORT
AND EVIRONMENT ASSESSMENT
VOLUME 2 - NED PLAN

DPLV05 LEVEE
CONCEPTUAL SITE PLAN
SCHILLER PARK, COOK COUNTY, IL

SCALE:	DATE:	DRAWING CODE:
AS SHOWN	AUG 2013	DPLV05-CS101.DGN

PLAN VIEW

N

NOTES:

1. THE SURVEY CONDITIONS SHOWN ON THESE DRAWINGS ARE FROM A LOCAL GIS DATA AND REPRESENTS CONDITIONS EXISTING AT THAT TIME.

2. ALL COORDINATES SHOWN ARE REFERENCED TO THE ILLINOIS STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83) U.S. FEET.

3. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) U.S. FEET.

4. THE PROPOSED FLOOD WALL LENGTH IS 2190 FEET AND LEVEE LENGTH IS 4240 FEET. THE FLOODWALL/LEVEE CREST ELEVATION IS 628.39.

5. THE PERMANENT EASEMENT AREA IS 6.8 ACRES. THE TEMPORARY EASEMENT AREA IS 4.6 ACRES.

6. TWO ROAD CLOSURE STRUCTURES WILL BE NECESSARY TO COMPLETE THE LINE OF PROTECTION. THE ROAD WILL BE RAISED AT 5TH AVE.

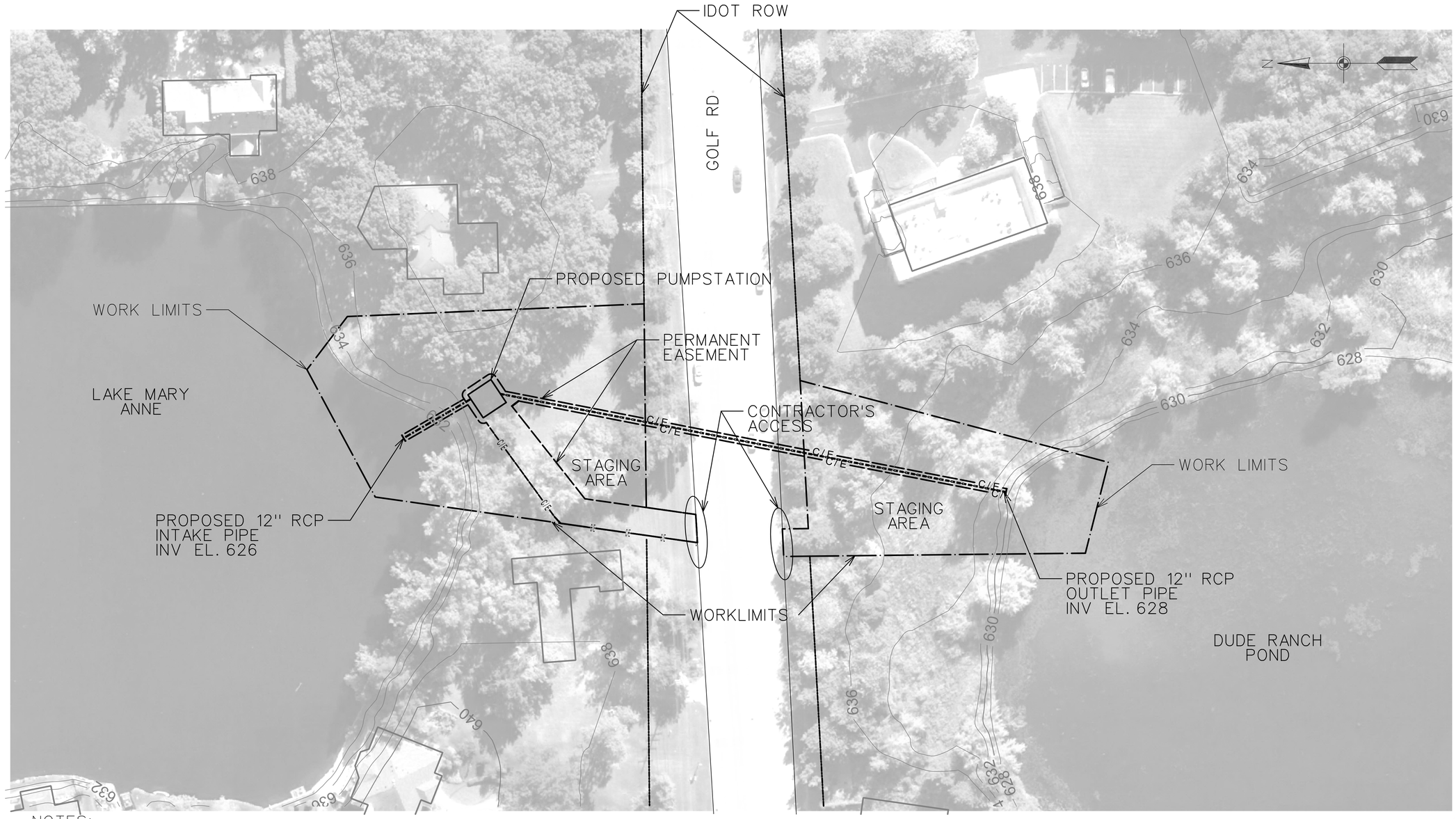
0 600' 1200'

U.S. Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER AND TRIBUTARIES
FEASIBILITY REPORT
AND EVIRONMENT ASSESSMENT
VOLUME 2 - NED PLAN

DPLV04 LEVEE
CONCEPTUAL SITE PLAN
RIVER GROVE, COOK COUNTY, IL

SCALE:	DATE:	DRAWING CODE:
AS SHOWN	AUG 2013	DPLV04-CS101.DGN



NOTES:

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3. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) U.S. FEET.
4. THE 12" RCP UNDER GOLF RD. WILL BE PLACED BY PIPE JACKING.

FEE AREA = 0.018 AC

STAGING AREA = 0.179

TEMPORARY EASEMENT = 1.021 AC

UTILITY AREA = 0.049 AC

80 40 0 80 160

1 INCH = 80 FEET

U.S. Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER AND TRIBUTARIES
FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT
VOLUME 2 – NED PLAN

FPCI01 PUMPSTATION
CONCEPTUAL SITE PLAN
DES PLAINES, COOK COUNTY, IL

SCALE:	DATE:	DRAWING CODE:
AS SHOWN	AUG 2013	FPCI01_Site Plan.DGN

NOTES:

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2. ALL COORDINATES SHOWN ARE REFERENCED TO THE ILLINOIS STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83) U.S. FEET.
3. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) U.S. FEET.
4. STEEL SHEET PILE WILL BE DRIVEN INTO THE EXISTING LEVEE ALONG GROVELAND AVE. TO RAISE THE TOP ELEVATION TO 618. THE LENGTH OF SHEET PILE IS 867 LF.
5. THE PROPOSED FLOODWALL ON THE SOUTH SIDE OF FOREST AVE HAS A LENGTH OF 699 LF AND TOP ELEVATION OF 618.
6. THE PROPOSED ROADRAISE HAS A TOP ELEVATION OF 618 AND SIDE SLOPES OF 1(V):2(H).
7. ONE ROAD CLOSURE STRUCTURE WILL BE REQUIRED AT FOREST AVE TO CONTINUE THE LINE OF FLOOD PROTECTION.
8. FEE AREA TOTALS 2.5 ACRE.
9. THE TEMPORARY EASMENT AREA TOTALS 1.0 ACRE.

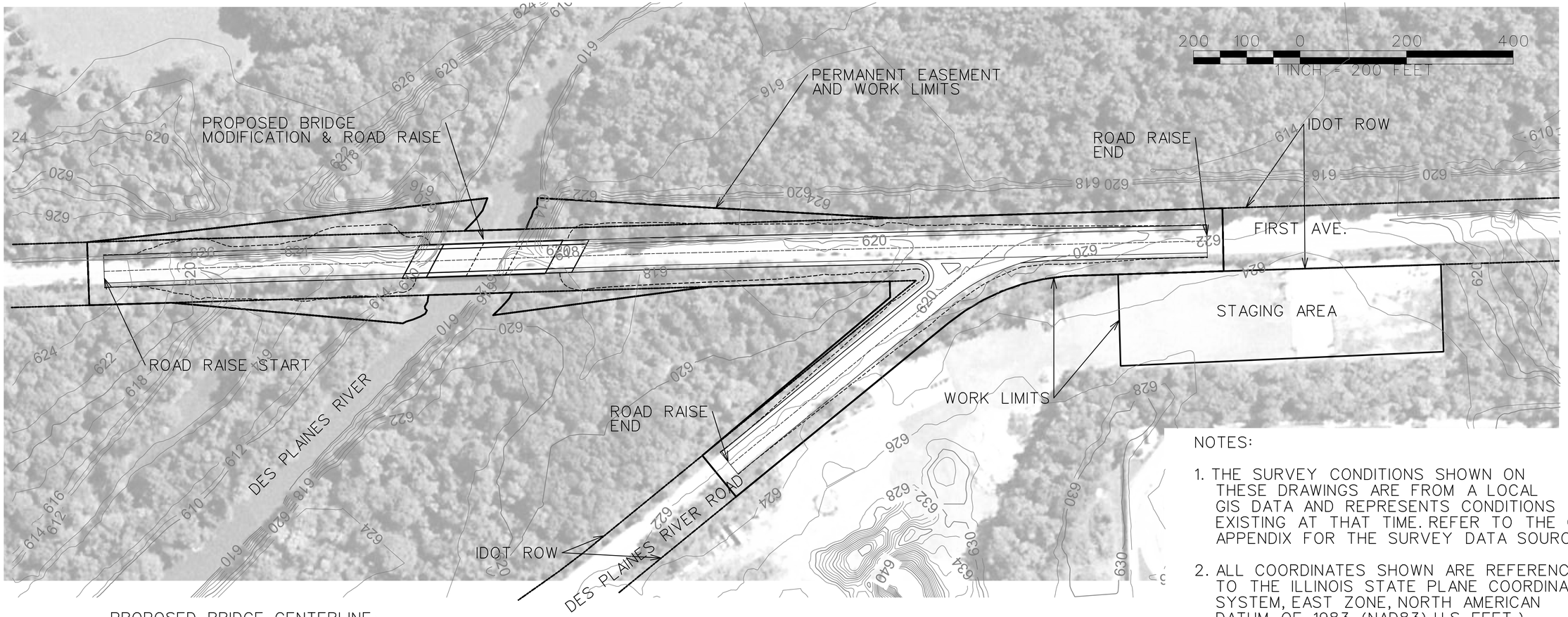
N

200′ 100′ 0 200′

SCALE: 1′′= 200′-0″

U.S. Army Corps of Engineers Chicago District	UPPER DES PLAINES RIVER AND TRIBUTARIES FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT VOLUME 2 - NED PLAN
DPLV01 FLOODWALL CONCEPTUAL SITE PLAN RIVERSIDE , COOK COUNTY, IL	

SCALE:	DATE:	DRAWING CODE:
1″ = 200′	AUG 2013	DPLV01_Siteplan.dgn

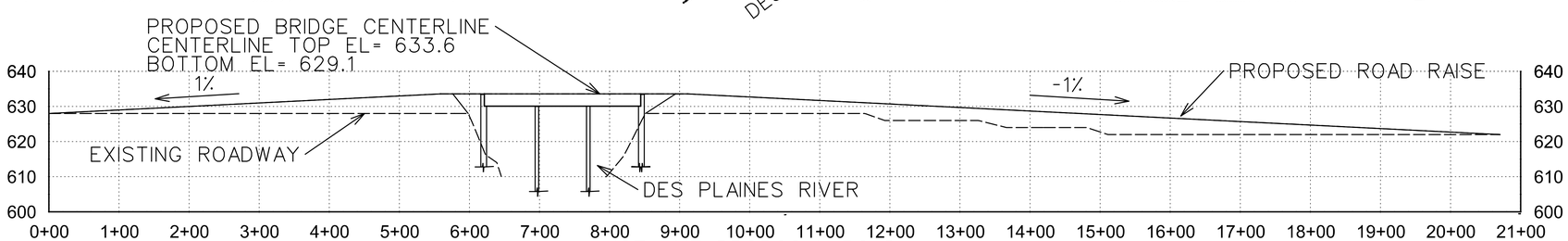


NOTES:

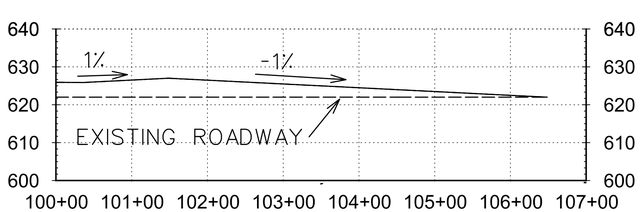
1. THE SURVEY CONDITIONS SHOWN ON THESE DRAWINGS ARE FROM A LOCAL GIS DATA AND REPRESENTS CONDITIONS EXISTING AT THAT TIME. REFER TO THE CIVIL APPENDIX FOR THE SURVEY DATA SOURCES.
2. ALL COORDINATES SHOWN ARE REFERENCED TO THE ILLINOIS STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83) U.S. FEET.)
3. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) U.S. FEET.

FEE AREA= 8.7 AC

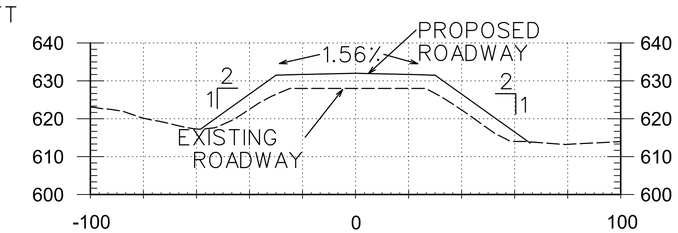
TEMPORARY EASEMENT AREA= 2.3 AC



1ST AVE PROPOSAL ROAD RAISE CENTERLINE PROFILE
VERTICAL SCALE: 1IN = 40 FT



RIVER ROAD PROPOSED ROAD RAISE CENTERLINE PROFILE
VERTICAL SCALE: 1IN = 40FT



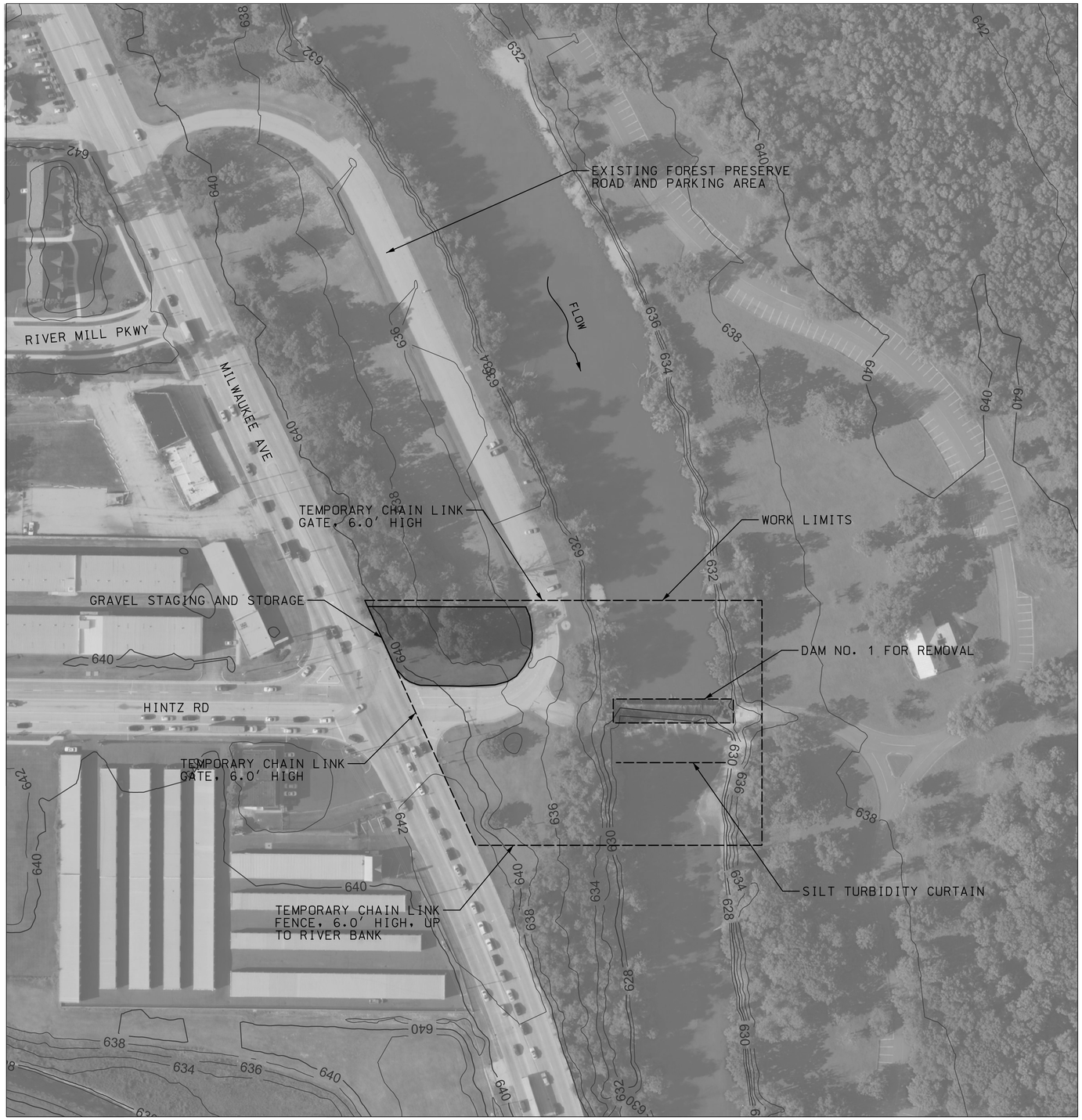
PROPOSED ROAD RAISE TYPICAL SECTION
NTS

U.S. Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER AND TRIBUTARIES
FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT
VOLUME 2 – NED PLAN

DPBM04 BRIDGE & ROAD RAISE
CONCEPTUAL SITE PLAN
LEYDEN, COOK COUNTY IL

SCALE:	DATE:	DRAWING CODE:
AS-SHOWN	AUG 2013	DPBM04_Siteplan.dgn



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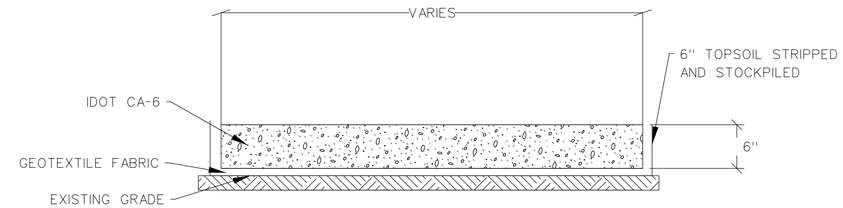


DAM NO. 1 GRAVEL STAGING & STORAGE (TYP)
N.T.S.

NOTES:

1. THE SURVEY CONDITIONS SHOWN ON THESE DRAWINGS ARE FROM LOCAL GIS DATA AND REPRESENTS CONDITIONS EXISTING AT THAT TIME.
2. ALL COORDINATES SHOWN ARE REFERENCED TO THE ILLINOIS STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83) U.S. FEET.
3. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) U.S. FEET.
4. STAGING AND STORAGE AREAS SHALL BE CONSTRUCTED AS SHOWN ON TYPICAL SECTION
5. ALL GRAVEL AND GEOTEXTILE FABRIC SHALL BE REMOVED AFTER DEMOLITION ACTIVITIES ARE COMPLETED AND PROPERLY DISPOSED.
6. STRIPPED TOPSOIL SHALL BE REPLACED AND THE ACCESS ROAD AND STAGING/STORAGE AREA SHALL BE RESTORED TO PRE-CONSTRUCTION CONDITION.
7. AT A MINIMUM CLEARING AND GRUBBING SHALL TAKE PLACE ON THE AREA COVERED BY THE TEMPORARY GRAVEL ACCESS ROAD AND STAGING/STORAGE AREA TO ALLOW THE CONTRACTOR ACCESS TO THE DAM.

0 150' 300'

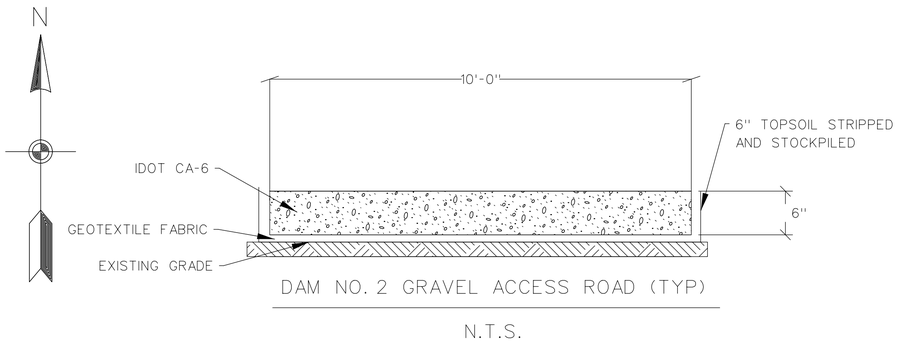
SCALE:1"=150'

U.S. Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER AND TRIBUTARIES FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT

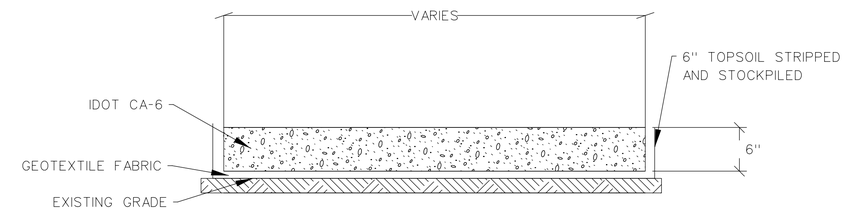
DAM NO. 1 REMOVAL SITE PLAN
WHEELING, COOK COUNTY, IL

SCALE:	DATE:	DRAWING CODE:
1" = 150'-0"	AUG 2013	DAM_NO_1_SITE_PLAN.DGN



DAM NO. 2 GRAVEL ACCESS ROAD (TYP)

N.T.S.



DAM NO. 2 GRAVEL STAGING & STORAGE (TYP)

N.T.S.

NOTES:

1. THE SURVEY CONDITIONS SHOWN ON THESE DRAWINGS ARE FROM LOCAL GIS DATA AND REPRESENTS CONDITIONS EXISTING AT THAT TIME.
2. ALL COORDINATES SHOWN ARE REFERENCED TO THE ILLINOIS STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83) U.S. FEET.
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0 150' 300'

SCALE:1"=150'

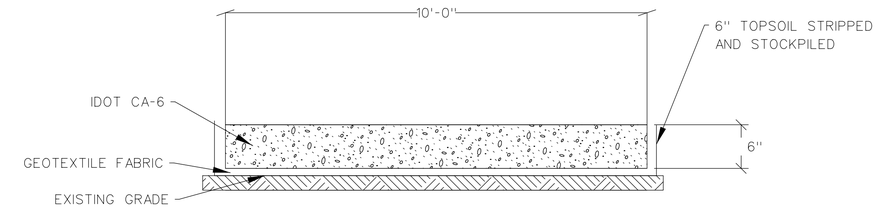
U.S. Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER AND TRIBUTARIES FEASIBILITY REPORT AND ENVIROMENTAL ASSESSMENT

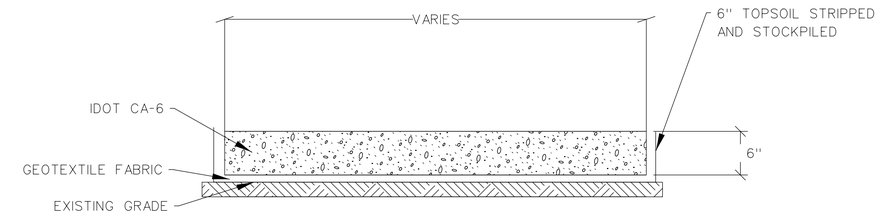
DAM NO. 2 REMOVAL SITE PLAN
MOUNT PROSPECT, COOK COUNTY, IL

SCALE:	DATE:	DRAWING CODE:
1" = 150'- 0"	AUG 2013	DAM_NO_2_SITE_PLAN.DGN

N



DEMPSTER ST. DAM GRAVEL ACCESS ROAD (TYP)
N.T.S.



DEMPSTER ST. DAM GRAVEL STAGING & STORAGE (TYP)
N.T.S.

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0 150' 300'

SCALE:1"=150'

U.S. Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER
AND TRIBUTARIES
FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT

DEMPSTER ST. DAM REMOVAL SITE PLAN
DES PLAINES, COOK COUNTY, IL

SCALE:	DATE:	DRAWING CODE:
1" = 150'- 0"	AUG 2013	DEMPSTER_DAM_SITE_PLAN.DGN

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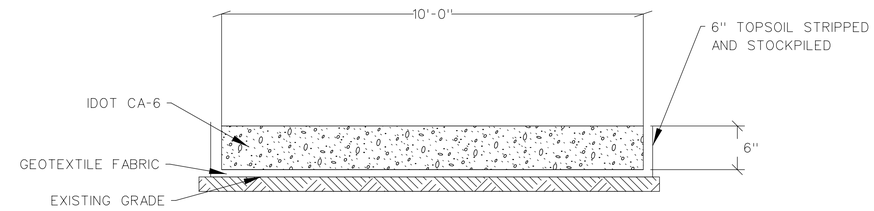
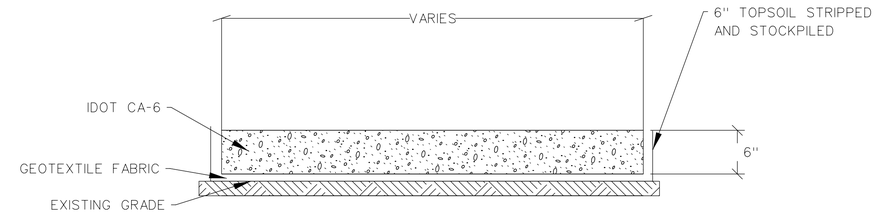


TOUHY DAM GRAVEL ACCESS ROAD (TYP)
N.T.S.



TOUHY DAM GRAVEL STAGING & STORAGE (TYP)
N.T.S.

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0 200' 400'

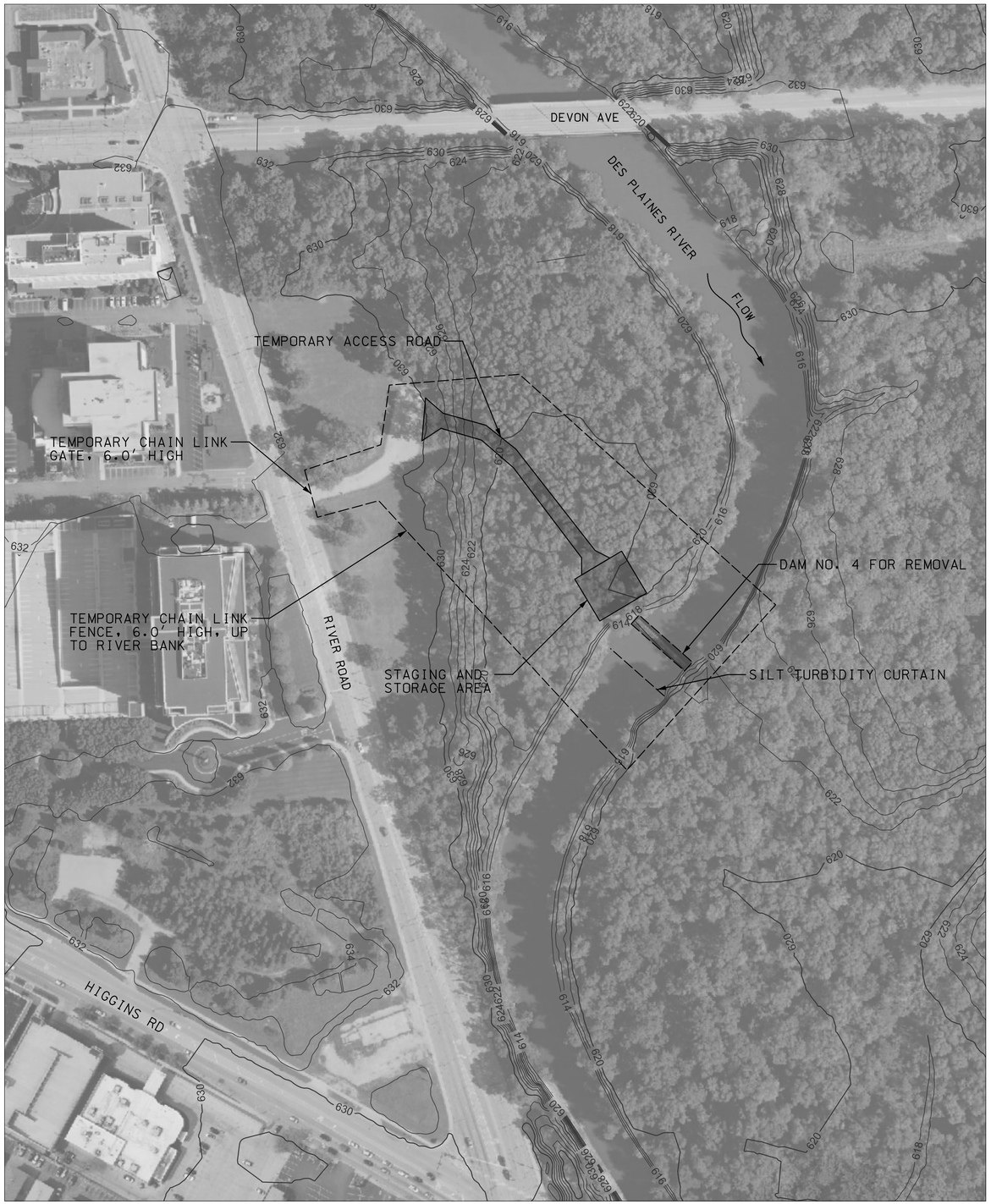
SCALE:1"=200'

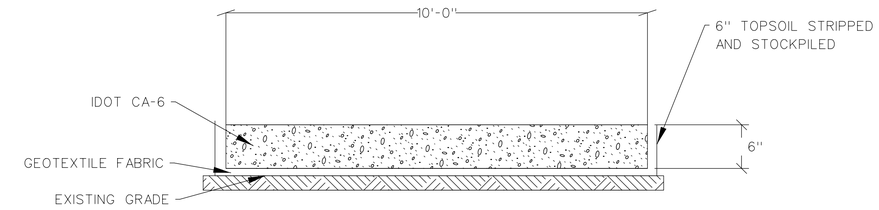
U.S. Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER
AND TRIBUTARIES
FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT

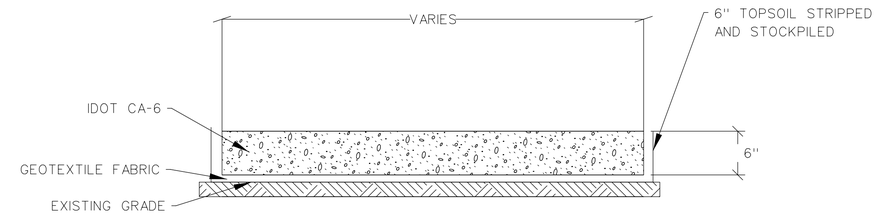
TOUHY DAM REMOVAL SITE PLAN
DES PLAINES, COOK COUNTY, IL

SCALE:	DATE:	DRAWING CODE:
1" = 200'- 0"	AUG 2013	TOUHY_DAM_SITE_PLAN.DGN





DAM NO. 4 GRAVEL ACCESS ROAD (TYP)
N.T.S.



DAM NO. 4 GRAVEL STAGING & STORAGE (TYP)
N.T.S.

NOTES:

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0 200' 400'

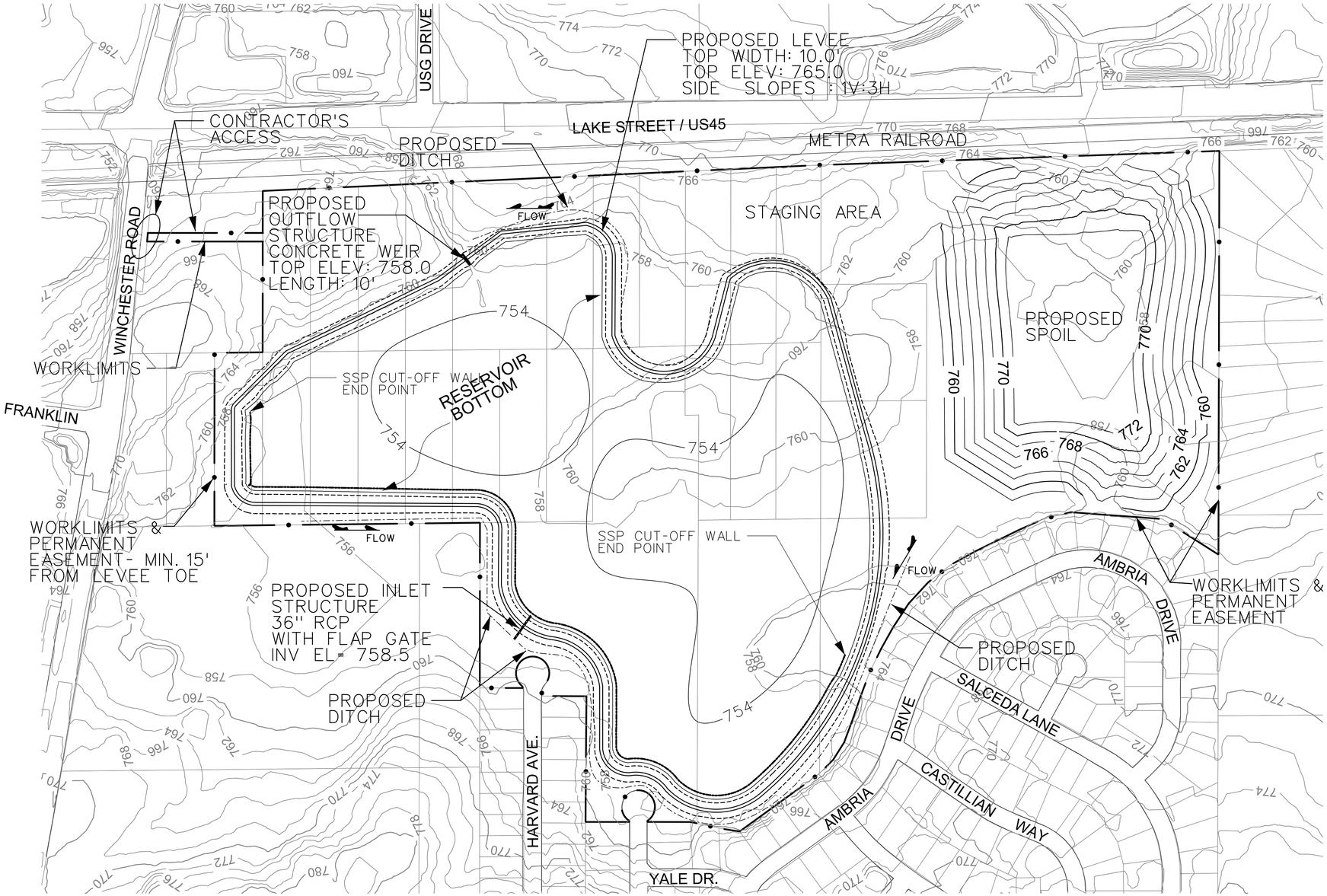
SCALE:1"=200'

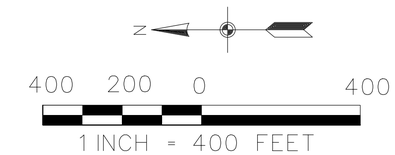
U.S. Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER AND TRIBUTARIES FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT

DAM NO. 4 REMOVAL SITE PLAN
DES PLAINES, COOK COUNTY, IL

SCALE:	DATE:	DRAWING CODE:
1" - 200'- 0"	AUG 2013	DAM_NO_4_SITE_PLAN.DGN





RESERVOIR DATA

TOP AREA = 53 AC
BOTTOM AREA = 47.5 AC
RETENSION STORAGE = 177 AC-FT
DETENSION STORAGE = 166 AC-FT (OVERFLOW)

OUTFLOW FLOW - 100 CFS

FEE AREA = 111.12 AC

NOTES:

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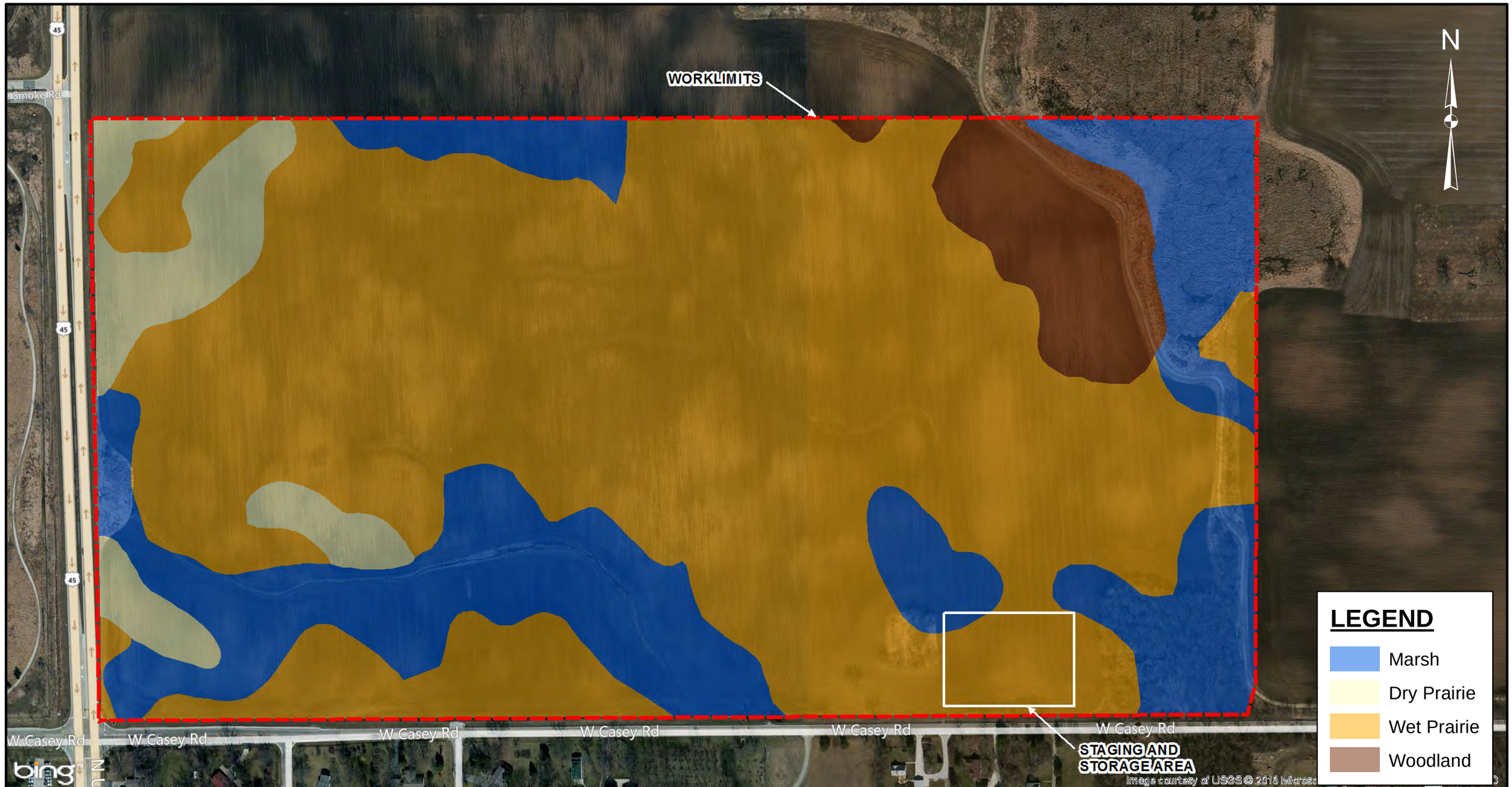
3. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) U.S. FEET.
4. PROPOSED SSP CUTOFF WALL WILL BE 20 FT DEEP AND APPROXIMATELY 330 FT LONG.

U.S. Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER AND TRIBUTARIES
FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT
VOLUME 2 - NED PLAN

BCRS02 RESERVOIR
CONCEPTUAL SITE PLAN
MUNDELEIN, LAKE COUNTY, IL

SCALE:	DATE:	DRAWING CODE:
1 IN:400FT	JUNE 2010	BCRS02_SITE PLAN.DGN



US Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER AND TRIBUTARIES, IL & WI
INTEGRATED FEASIBILITY REPORT &
ENVIRONMENTAL ASSESSMENT

L22 (BCRS02 Habitat Mitigation)

SCALE:	DATE:	PLATE NO:
1 in = 250 ft	5/23/2013	PLATE D-14

VEGETATION RESTORATION COMMUNITY

- DRY PRAIRIE 6.52 ACRES
- MARSH 24.90 ACRES
- WET PRAIRIE 72.67 ACRES
- SAVANNA 0.22 ACRES
- WOODLAND 7.96 ACRES
- WORK LIMITS

600′ 300′ 0 600′

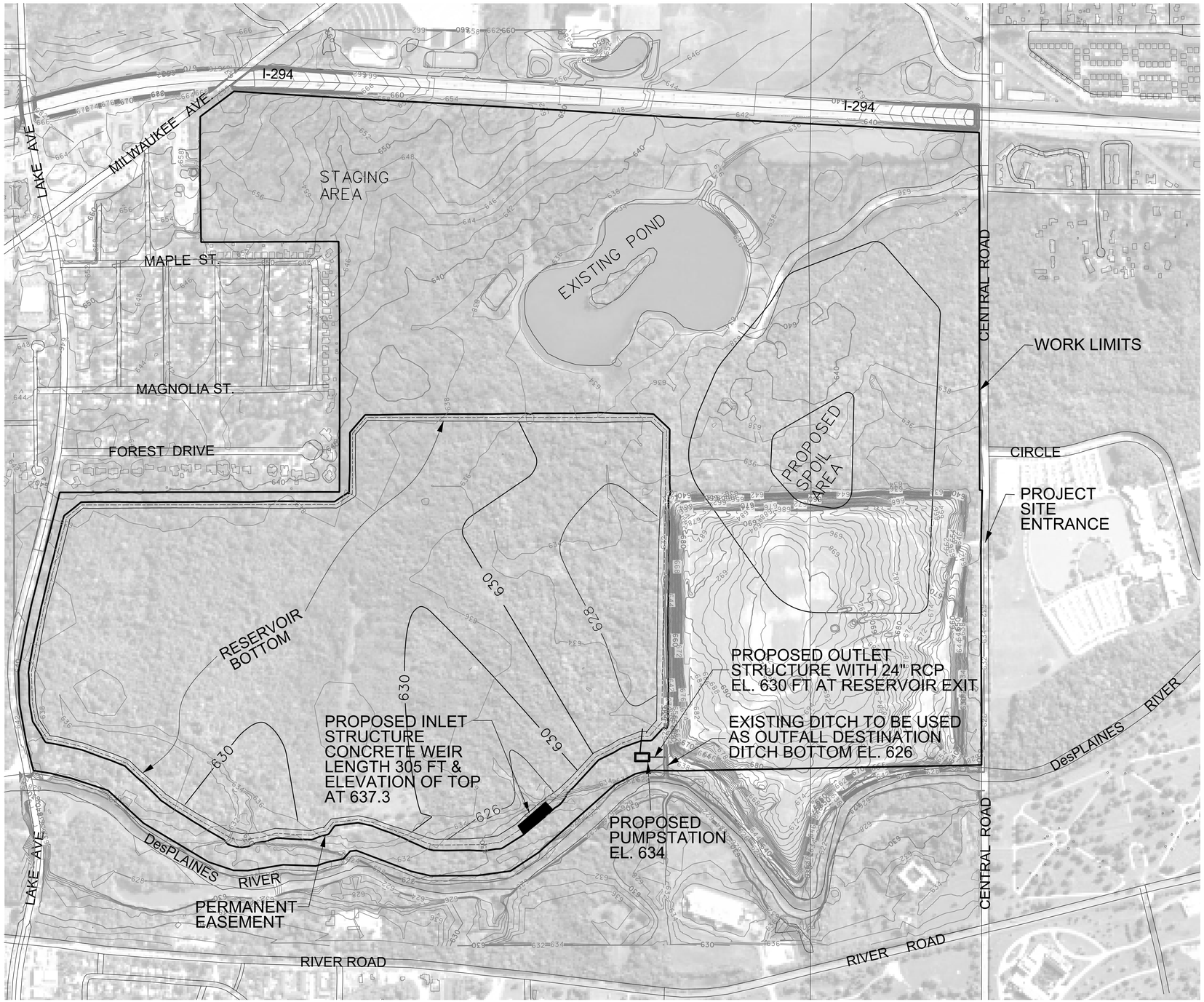
SCALE IN FEET

U.S. Army Corps of Engineers Chicago District

UPPER DesPLAINES RIVER AND TRIBUTARIES FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT

SITE L22 (BCRS02 Mitigation) RESTORATION SITE PLAN GRAYSLAKE, LAKE COUNTY IL,

SCALE:	DATE:	DRAWING CODE:
AS SHOWN	SEPTEMBER 2011	SITE C15.DGN



N

900 450 0 900

1 INCH = 900 FEET

RESERVOIR DATA

TOP AREA = 322 AC
BOTTOM AREA = 312 AC
STORAGE = 2140.9 AC-FT
INFLOW = 200 CFS
PERMANENT EASEMENT AREA = 335.6 AC

NOTES:

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3. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) U.S. FEET.
4. BASED ON THE SURFICIAL GEOLOGY AND NRCS SOIL MAPS, CUTOFF WALL WILL BE PLACED ALONG THE PERIMETER OF THE RESERVOIR. FURTHER INVESTIGATIONS ARE REQUIRED FOR THE LOCATIONS AND DESIGN OF THE CUTOFF WALL.

U.S. Army Corps of Engineers
Chicago District

DES PLAINES II
FEASIBILITY STUDY
FLOOD DAMAGE REDUCTION

FDRS01 RESERVOIR
CONCEPTUAL SITE PLAN
MT. PROSPECT, COOK CTY, IL

SCALE:	DATE:	DRAWING CODE:
1" = 900'	JANUARY 2010	FDRS01_Siteplan.dgn

RESERVOIR STAGE STORAGE

ELEVATION	AREA (acres)	AVERAGE AREA (acres)	STAGE VOLUME (acre-feet)	CUMULATIVE VOLUME (acre-feet)	COMMENT
622.7	19.30			0.00	*Bottom of Reservoir*
		19.348	5.804		
623.0	19.40			5.80	
		19.554	19.554		
624.0	19.71			25.36	
		19.867	19.867		
625.0	20.02			45.23	
		20.181	20.181		
626.0	20.34			65.41	
		20.496	20.496		
627.0	20.65			85.90	
		20.812	20.812		
628.0	20.97			106.71	
		21.130	21.130		
629.0	21.29			127.84	
		21.449	21.449		
630.0	21.61			149.29	
		21.769	21.769		
631.0	21.93			171.06	
		22.091	22.091		
632.0	22.25			193.15	
		22.349	13.409		
632.6	22.45			**206.56**	*100-Yr HWL Elev.*
		22.511	9.004		
633.0	22.58			215.57	
		22.738	22.738		
634.0	22.90			238.30	
		23.063	23.063		
635.0	23.23			261.37	
		23.324	13.995		
635.6	23.42			275.36	*Top of Reservoir 3' Freeboard*

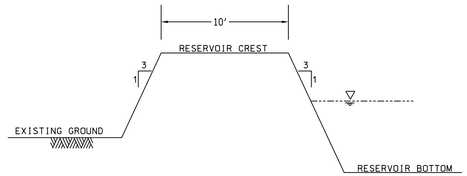
	AC-FT
Req'd Storage Volume =	205
Volume Provided at 100-yr HWL Elev. =	**206.56**
Volume Provided w/ 3' Freeboard =	275.36

NOTES:

1. THE SURVEY CONDITIONS SHOWN ON THESE DRAWINGS ARE FROM A LOCAL GIS DATA AND REPRESENTS CONDITIONS EXISTING AT THAT TIME. SURVEY SHOWS 2' CONTOURS.
2. ALL COORDINATES SHOWN ARE REFERENCED TO THE ILLINOIS STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83) U.S. FEET.
3. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) U.S. FEET.
4. DRAINAGE SWALE EAST OF RESERVOIR CREATED TO DIVERT OVERLAND RUNOFF FROM SITE HIGH POINT.
5. RESERVOIR FOOTPRINT = 28.1 ACRES
   SPOIL PILE FOOTPRING = 11.6 ACRES

ST 1
4-3.5'x1.5' RCP
BOX CULVERTS @ 35 LF EACH
UPSTREAM IE = 630.7 (W)
DOWNSTREAM IE = 629.7 (E)
(PROVIDE CONCRETE DROP STRUCTURE AT DOWNSTREAM END)

ST 2
350 LF - 30" RCP
UPSTREAM IE = 622.7 (E)
DAYLIGHT PIPE AT RIVER
WITH HEADWALL AND FLAP GATE



TYPICAL RESERVOIR X-SECTION

N

500' 250' 0 500'

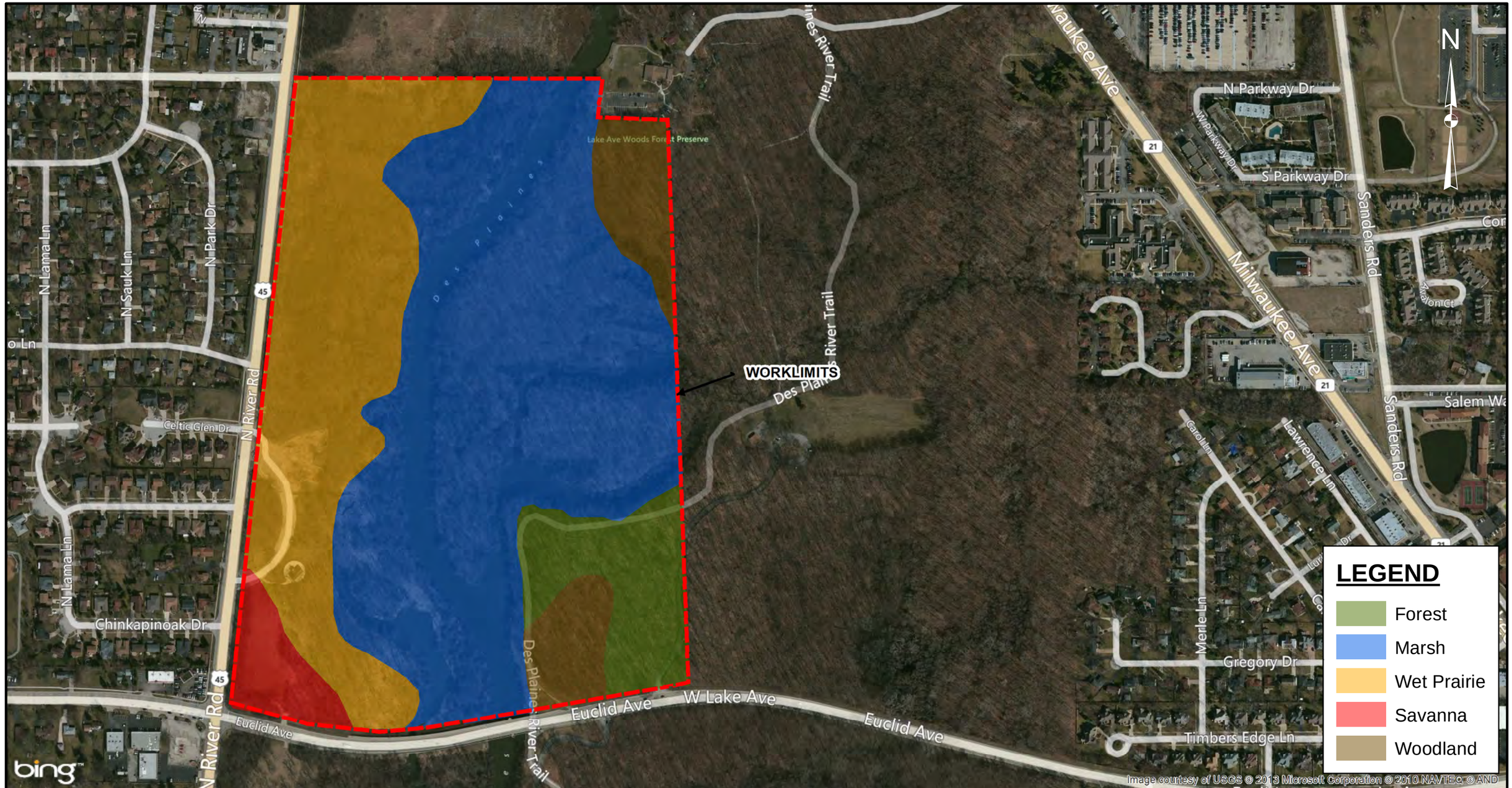
SCALE: 1'' = 500'-0"

U.S. Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER AND TRIBUTARIES
FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT

DPRS15 - OPTION 1
COMP STORAGE SITE FOR DPLV09
DES PLAINES, COOK COUNTY, IL

SCALE:	DATE:	DRAWING CODE:
1" = 500'	SEPTEMBER 2012	DPLV7A_CSS_Siteplan.dgn

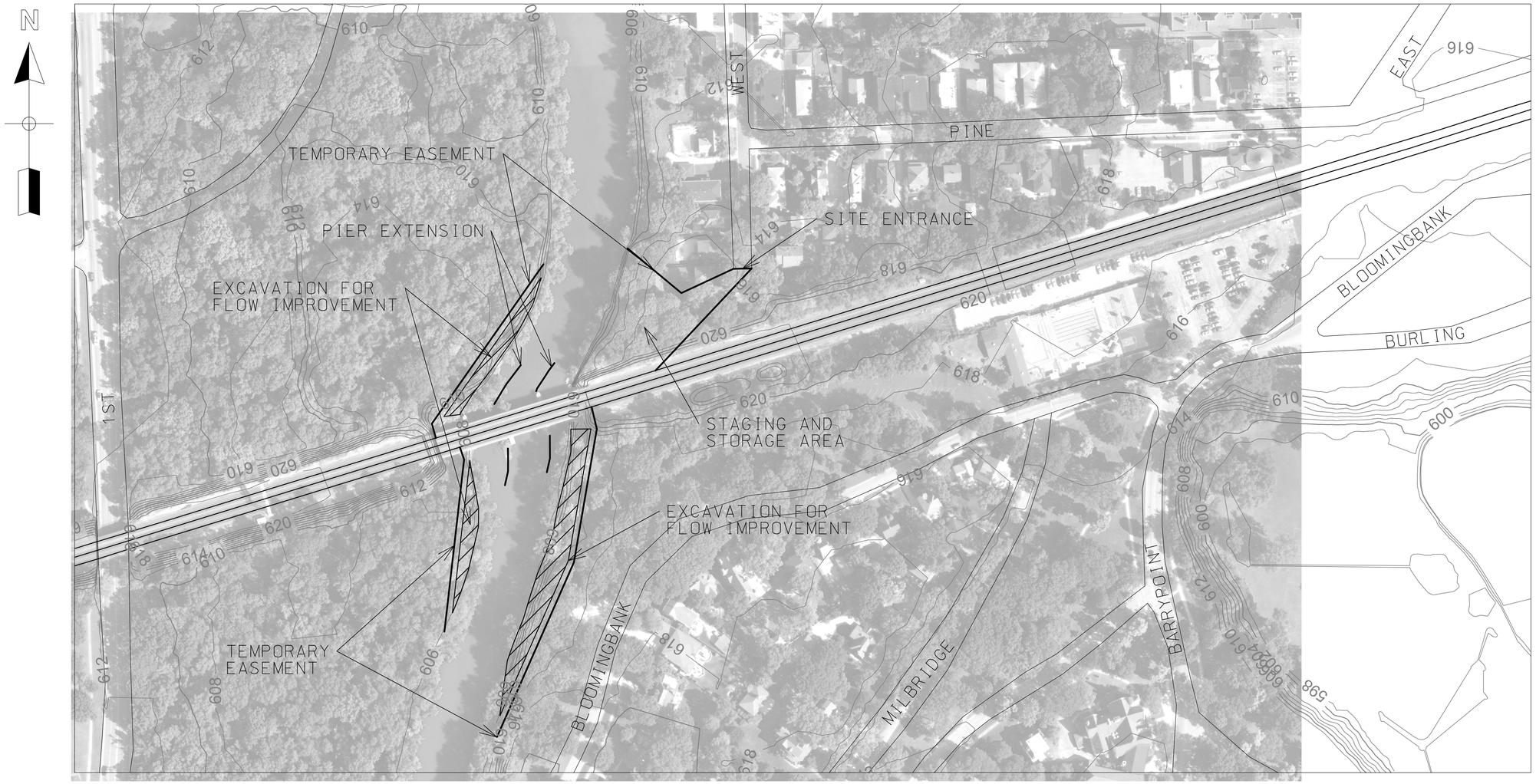


US Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER AND TRIBUTARIES, IL & WI
INTEGRATED FEASIBILITY REPORT &
ENVIRONMENTAL ASSESSMENT

C16
(DPRS15 Habitat Mitigation)

SCALE:	DATE:	PLATE NO:
1 in = 400 ft	8/6/2013	PLATE D-3c



1. THE SURVEY CONDITIONS SHOWN ON THESE DRAWINGS ARE FROM A LOCAL GIS DATA AND REPRESENTS CONDITIONS EXISTING AT THAT TIME

2. ALL COORDINATES SHOWN ARE REFERENCED TO THE ILLINOIS STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83) U.S. FEET.

3. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) U.S. FEET.

4. THE FEE AREA TOTALS .34 ACRES

5. THE TEMPORARY EASMENT AREA TOTALS 1.62 ACRES

6. LENGTH OF COMBINDED PIERS EXTENSION WOULD TOTAL 264 FT

200′ 100′ 0 200′

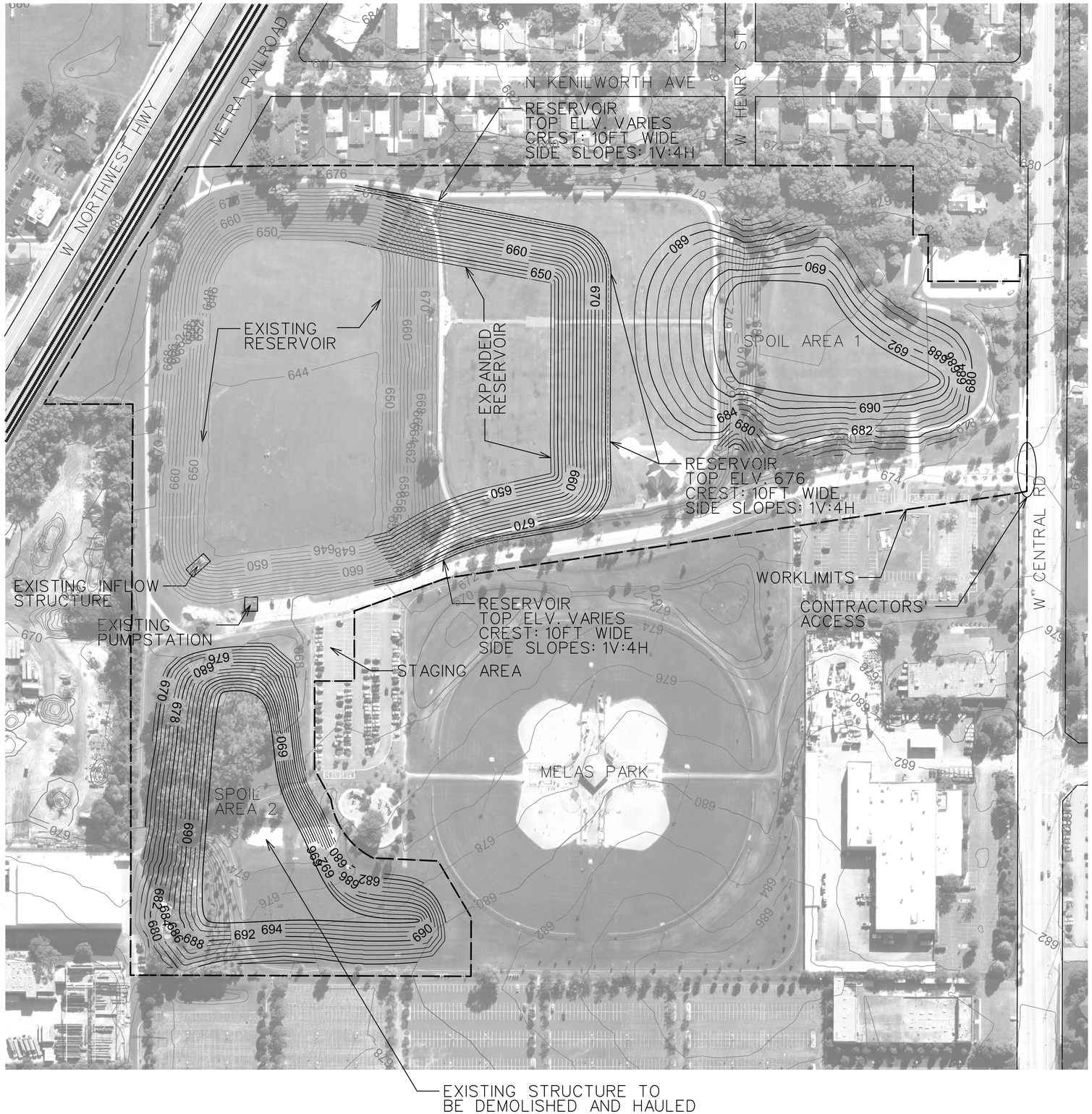
SCALE: 1′′= 200′-0″

U.S. Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER AND TRIBUTARIES
FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT
VOLUME 2 - NED PLAN

DPBM01 BRIDGE PIER EXTENSION
CONCEPTUAL SITE PLAN
RIVERSIDE , COOK COUNTY, IL

SCALE:	DATE:	DRAWING CODE:
1″ = 200′	APRIL 2010	DPBM01_Siteplan.dgn



N

200′ 100′ 0 200′

SCALE: 1′′= 200′-0″

RESERVOIR DATA (EXPANDED AREA)

TOP AREA=	5.89 ACRE
BOTTOM AREA=	2.65 ACRE
STORAGE=	156 AC-FT

NOTES:

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2. ALL COORDINATES SHOWN ARE REFERENCED TO THE ILLINOIS STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83) U.S. FEET.)

3. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) U.S. FEET.

PERMANMENT EASEMENT AREA=46.3 AC
TEMPORARY EASEMENT AREA=1AC

U.S. Army Corps of Engineers
Chicago District

DES PLAINES II
FEASIBILITY STUDY
FLOOD DAMAGE REDUCTION

WLME01 RESERVOIR EXPANSION
CONCEPTUAL SITE PLAN
MT PROSPECT, IL

SCALE:	DATE:	DRAWING CODE:
1″=250′	DATE	FILENAME.DGN

NOTES:

1. THE SURVEY CONDITIONS SHOWN ON THESE DRAWINGS ARE FROM A LOCAL GIS DATA AND REPRESENTS CONDITIONS EXISTING AT THAT TIME. REFER TO THE CIVIL APPENDIX FOR THE SURVEY DATA SOURCES.

2. ALL COORDINATES SHOWN ARE REFERENCED TO THE ILLINOIS STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83) U.S. FEET.)

3. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) U.S. FEET.

FEE = 44.4 AC

TERMPORARY EASEMENT = 0

250 125 0 250 500

1 INCH = 250 FEET

U.S. Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER AND TRIBUTARIES
FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT
VOLUME 2 - NED PLAN

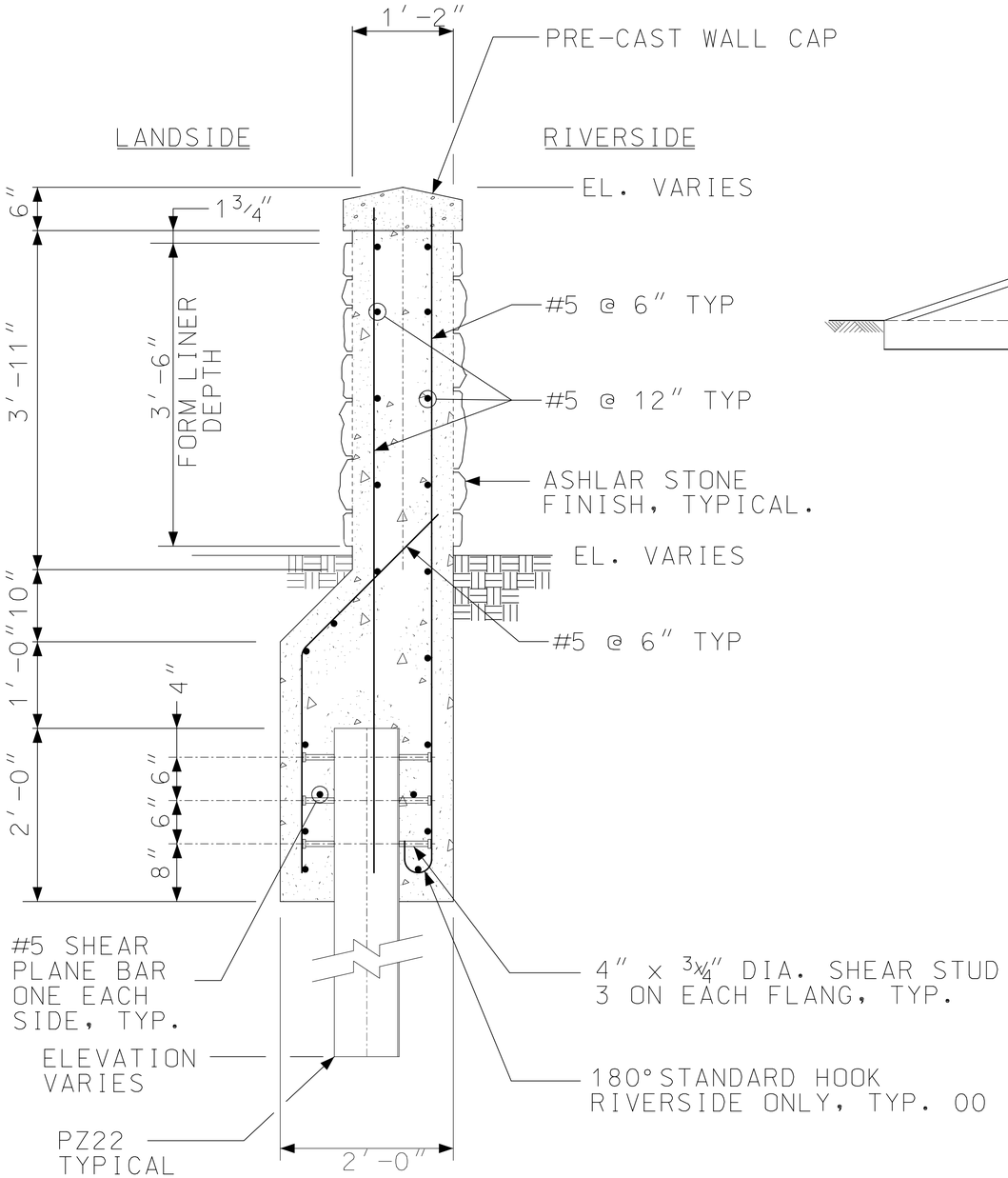
SCME02 RESERVOIR EXPANSION
CONCEPTUAL SITE PLAN
FRANKLIN PARK, COOK COUNTY IL

SCALE:	DATE:	DRAWING CODE:
AS SHOWN	APRIL 2010	FILENAME.DGN

NOTES:

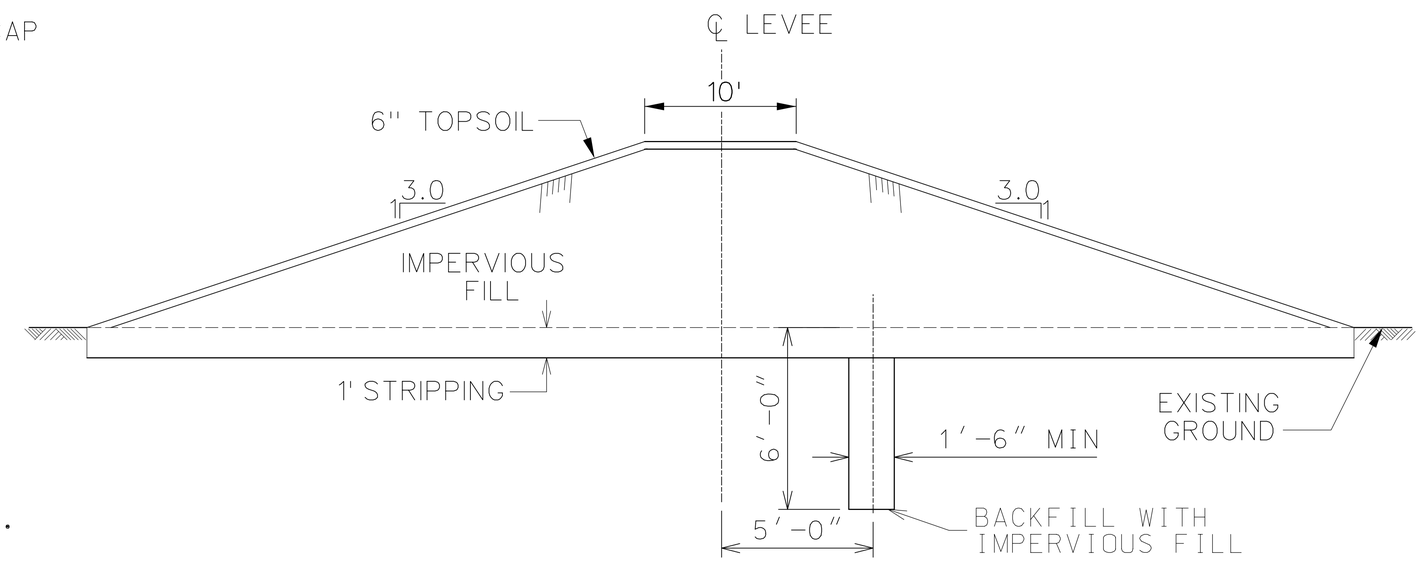
1. THE SURVEY CONDITIONS SHOWN ON THESE DRAWINGS ARE FROM A LOCAL GIS DATA AND REPRESENTS CONDITIONS EXISTING AT THAT TIME.
2. ALL COORDINATES SHOWN ARE REFERENCED TO THE ILLINOIS STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83) U.S. FEET.
3. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) U.S. FEET.
4. THE PROPOSED LEVEE IS 2,938 LF WITH AN ELEVATION OF 660 FT.
5. THE FEE AREA IS 6.8 ACRES AND THE TEMPORARY EASEMENT AREA IS 2.2 ACRES.

U.S. Army Corps of Engineers Chicago District	UPPER DES PLAINES RIVER AND TRIBUTARIES FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT VOLUME 2 - NED PLAN
DPLV15 LEVEE CONCEPTUAL SITE PLAN HIGHLAND PARK, LAKE COUNTY, IL	
SCALE: 1" = 250'	DATE: AUGUST 2011 / DRAWING CODE: DPLV15_Siteplan.dgn



TYPICAL FLOODWALL SECTION

N.T.S



TYPICAL LEVEE SECTION WITH SLIT TRENCH

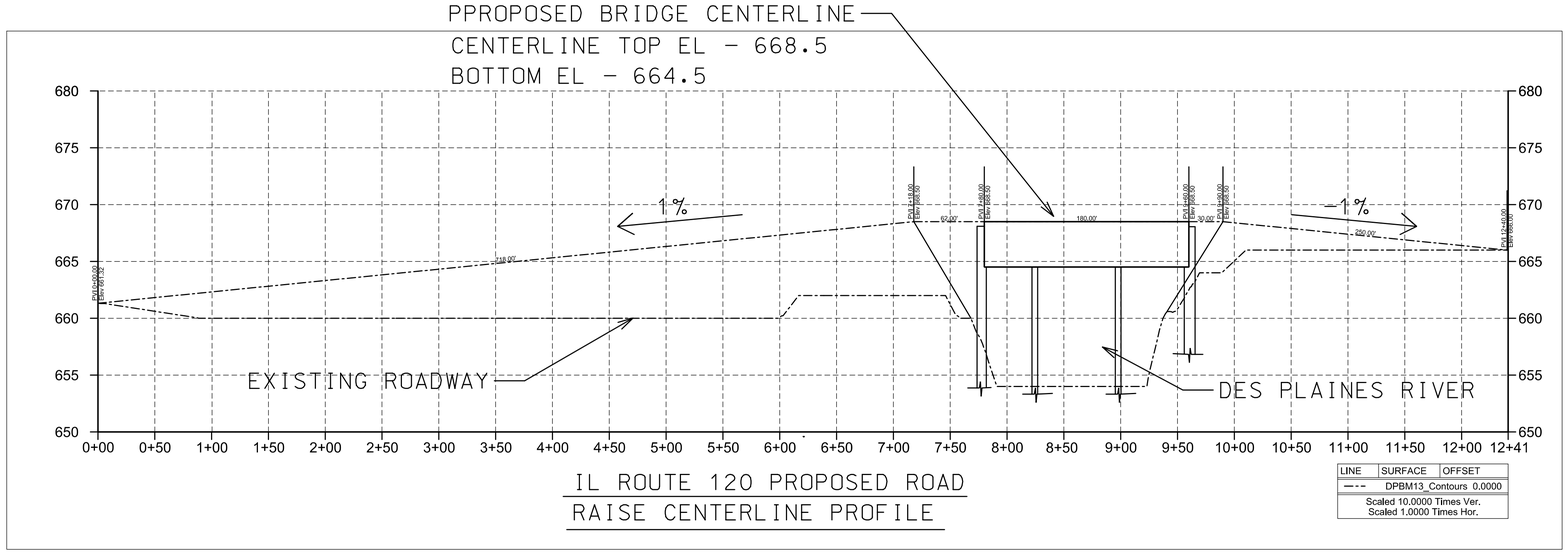
N.T.S

U.S. Army Corps of Engineers
Chicago District

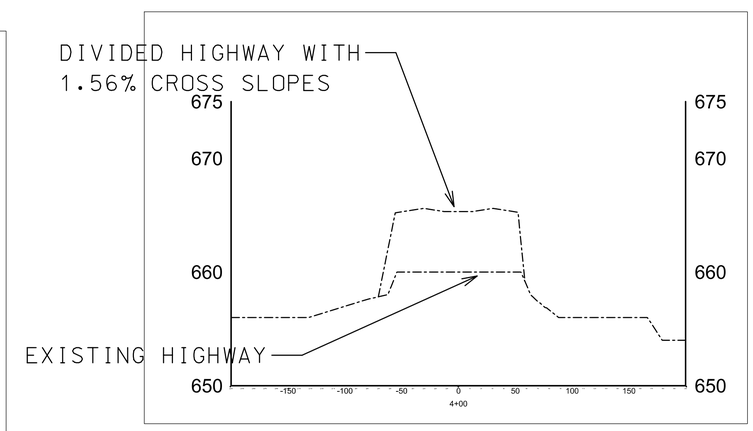
UPPER DES PLAINES RIVER AND TRIBUTARIES
FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT
VOLUME 2 - NED PLAN

LEVEE & FLOODWALL
TYPICAL SECTIONS

SCALE:	DATE:	DRAWING CODE:
AS SHOWN	MAY 2010	Typical_Sections.dgn



IL ROUTE 120 PROPOSED ROAD RAISE CENTERLINE PROFILE



PROPOSED ROAD RAISE TYPICAL SECTION

NTS

1. THE SURVEY CONDITIONS SHOWN ON THESE DRAWINGS ARE FROM LOCAL GIS DATA AND REPRESENT THE CONDITIONS EXISTING AT THAT TIME. REFER TO THE CIVIL APPENDIX FOR THE SURVEY DATA SOURCES.
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3. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) U.S. FEET.

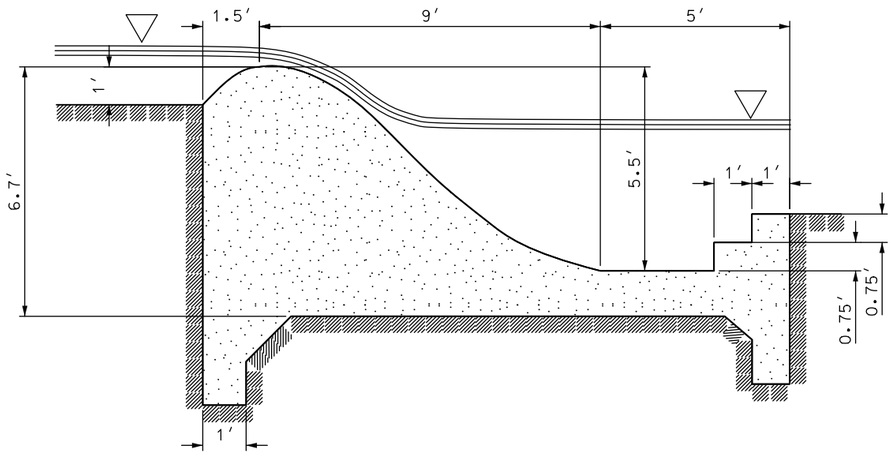
REAL ESTATE MEASUREMENTS:
FEE AREA = 5.4 AC
TEMPORARY EASEMENT = 1.8 AC

U.S. Army Corps of Engineers
Chicago District

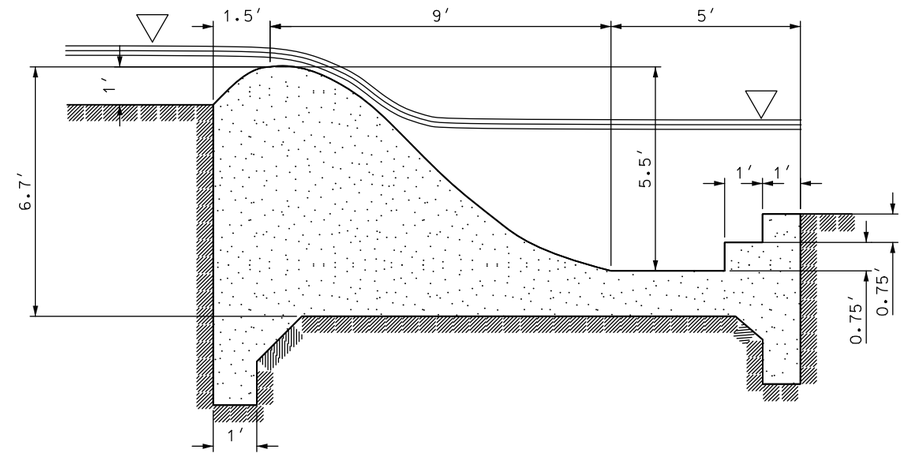
UPPER DES PLAINES RIVER AND TRIBUTARIES
FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT
VOLUME 2 - NED PLAN

DPBM13 BRIDGE & ROAD RAISE
CONCEPTUAL SITE PLAN
GURNEE, COOK COUNTY IL

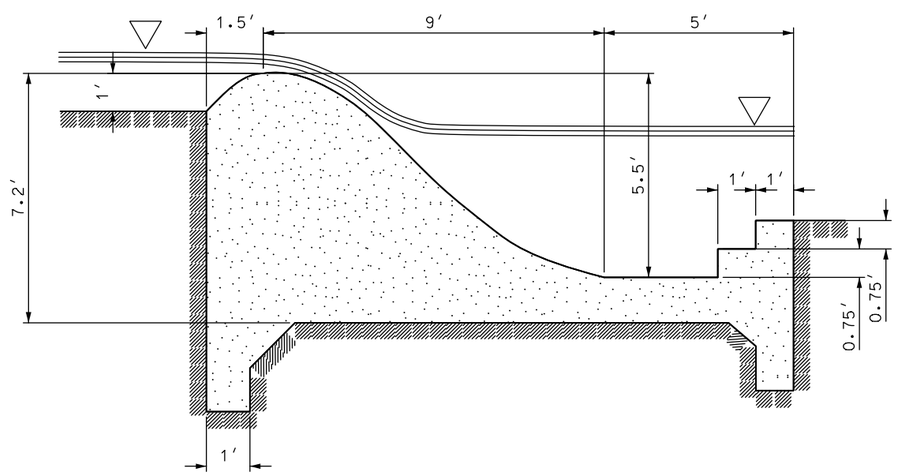
SCALE:	DATE:	DRAWING CODE:
AS-SHOWN	APRIL 2012	DPBM13_Siteplan.dgn



DEMPSTER STREET DAM CROSS SECTION



TOUHY AVENUE DAM CROSS SECTION



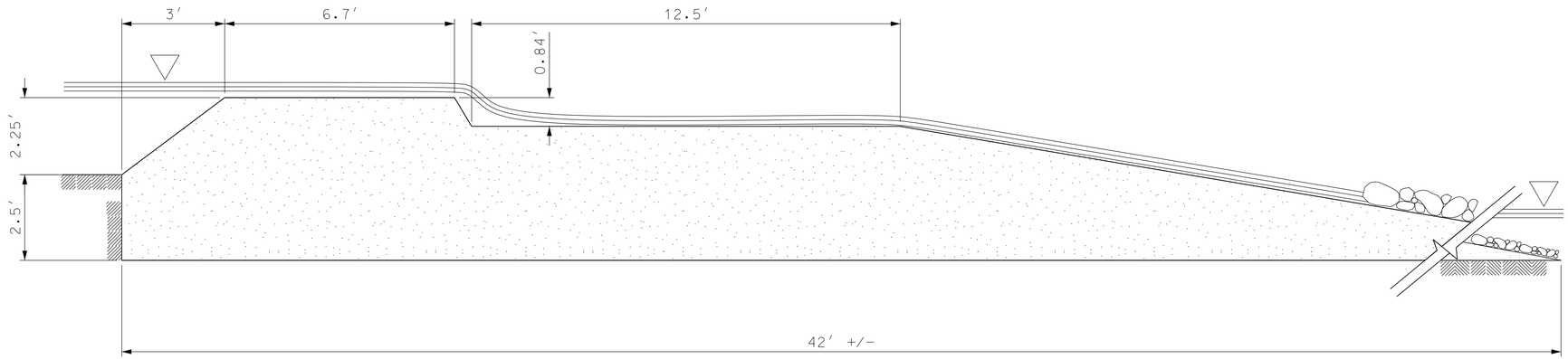
DAM NO. 4 CROSS SECTION

U.S. Army Corps of Engineers
Chicago District

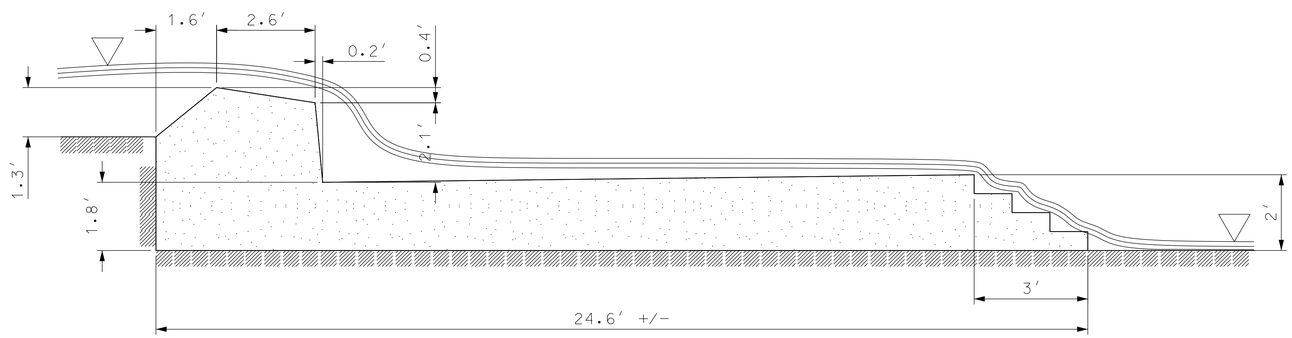
UPPER DES PLAINES RIVER
AND TRIBUTARIES
FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT

DEMPSTER, TOUHY & DAM NO. 4
TYPICAL CROSS SECTIONS

SCALE:	DATE:	DRAWING CODE:
1″ = 2′-0″	OCTOBER 2011	



DAM NO. 1 CROSS SECTION



DAM NO. 2 CROSS SECTION

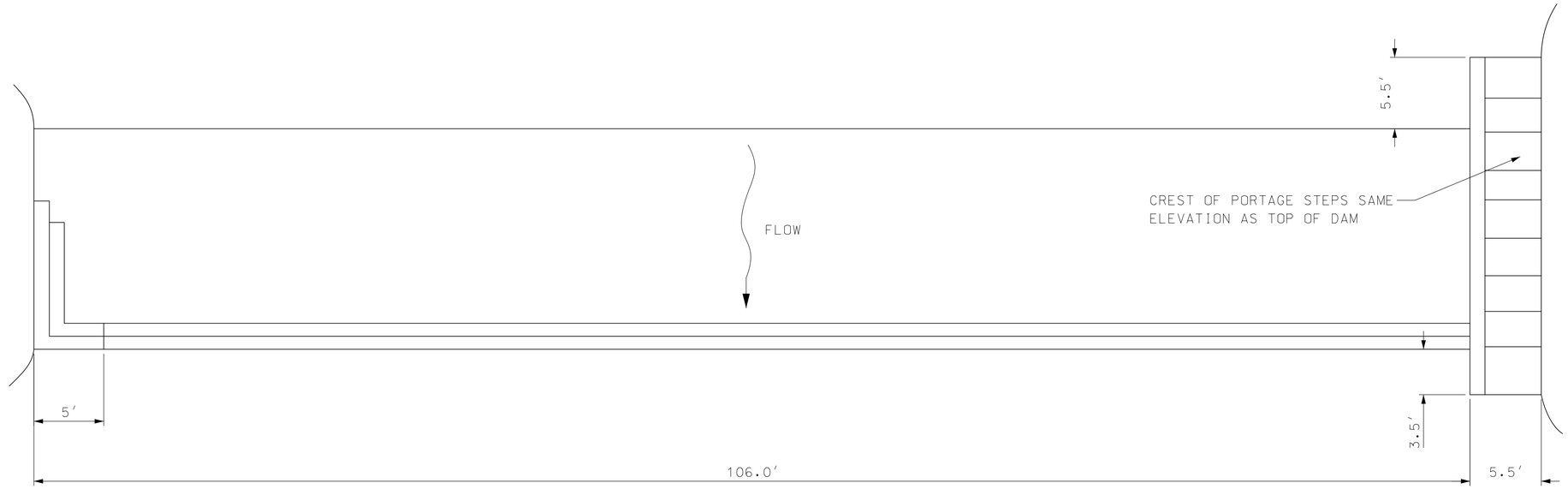
U.S. Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER
AND TRIBUTARIES
FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT

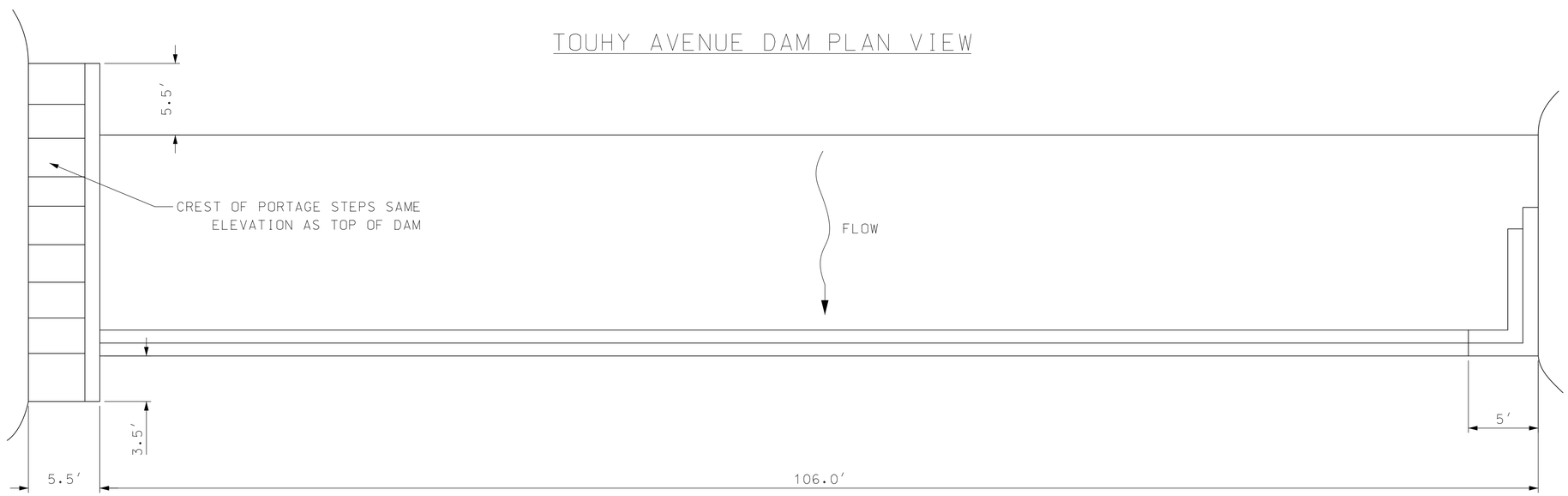
DAM NO. 1 & DAM NO. 2
TYPICAL CROSS SECTIONS

SCALE:	DATE:	DRAWING CODE:
1" = 2'-0"	AUG 2013	

PLATE D11



TOUHY AVENUE DAM PLAN VIEW



DAM NO. 4 PLAN VIEW

U.S. Army Corps of Engineers
Chicago District

UPPER DES PLAINES RIVER
AND TRIBUTARIES
FEASIBILITY REPORT
AND ENVIRONMENTAL ASSESSMENT

TOUHY & DAM NO. 4
TYPICAL PLAN VIEW

SCALE:	DATE:	DRAWING CODE:
1" = 5'-0"	AUG 2013	

UPPER DES PLAINES RIVER, ILLINOIS
INTERIM FEASIBILITY STUDY II

APPENDIX D
CIVIL DESIGN

ATTACHMENT D-4
QUANTITY TAKE-OFF COMPUTATIONS

US Army Corps of Engineers Chicago District	PROJECT TITLE: Site ACRS08 Reservoir	COMPUTED BY: FAYE LEFFLER	DATE: 8/1/2013
	COMPUTATION TITLE: QUANTITY COMPUTATIONS	CHECKED BY: ADAM TENNANT	DATE:

Bid Item 0001 - Mobilization and Demobilization

See Cost Appendix and MII report for mobilization and demobilization assumptions.

Bid Item 0002 - Temporary Field Office, Project and Safety Signs

See Cost Appendix and MII report for Temporary Field Office, Project and Safety Signs

Bid Item 0003 - Clearing and Grubbing Area

The clearing and grubbing areas will include the Reservoir, Ditch, and Spoil Areas.
The permanent easement (work limits) area is a minimum of 15 feet from the toe of the levee.

Location	(1)Area (AC)
Reservoir	50.02777319
Ditch	3.4
Spoil Area	11.1
Total Area =	64.5

(2)Clearing and Grubbing Area =	6.4 AC

(1)Area calculated from microstation
(2)There are no trees within most of the area. Assumed 10% of the total area will be cleared

Bid Item 0004 - Topsoil Stripping

Assumptions: Topsoil will be stripped within the levee footprint, 15 FT permanent
Adjacent areas will be stripped to get more topsoil needed for seeding
12" Topsoil will be stripped.

Required Topsoil Volume

Levee Seeding =		7841.22037	CY
Spoil Areas =		8936.19259	CY
Reservoir =		32903.3093	CY
Ditch =		2829.47593	CY
Total =		52510.1981	CY

*The levee seeding area is determined by subtracting the Inroad Surface Area reports of the reservior base from the entire reservoir (levee + reservoir). Refer to the ACRS08 Inroads Report. The levee topsoil volume was determined my multipling the levee surface area by 6" of topsoil.
*The spoil, reservoir, and ditch areas were determined by the Inroads Surface Area report of the areas - Refer to the ACRS08 Inroads Report. The topsoil volume was determined by multipling the area by 6" of top soil.

(1) Available Topsoil Volume

Levee Footprint=		14984.4926	CY
Ditch =		5480.11111	CY
Levee Footptint +Ditch =		20464.6037	CY
Adjacent Areas =		32045.5944	CY

(1) Topsoil will be available on site to be reused. There will be no import.

Total Stripping Topsoil Vol =	52510.1981	CY

Bid Item 0005 - Reservoir/Levee Excavation & Fill Volume

Item 0005AA and 0005AB
The Reservoir/Levee excavation and fill quantities were determined using Inroads Triangle Volume Report - See ACRS08 Inroads Report.

Original Surface: ACRS08_topo
Design Surface: ACRS08 Reservoir
Cut Factor: 1
Fill Factor: 1

Cut:	4851469.2	cu ft
Fill:	2513781.9	cu ft
Net:	2337687.3	cu ft

Cut:	179684	cu yd
Fill:	93103	cu yd
Net:	86581	cu yd

Total Cut Volume =	179684	CY
Total Fill Volume =	93103	CY

Item 0005AC - Levee Trench Excavation/Fill

Levee Trench

Assumptions:	Width =	3	FT
	Depth =	5	FT
Length of Levee =		5658.35	FT
Trench Fill & Excavation Volume =		3143.52778	CY

Length of levee was determined from the levee centerline alignment in inroads. The trench fill and excavation volume was determined by multipling the trench width, depth, and length of levee.

Item 0005 AD - Levee Seeding Area

	Topsoil Stripping		Seeding Area	
Location	Planar Area (SF)	Topsoil Stripping (CY)[1]	True Area (SF)	Topsoil Vol. (CY)[2]
Levee Footprint	404581.3	14984.4926	423425.9	7841.22
Ditch Area	147963	5480.11111	152791.7	2829.476
Total =	552544.3	20464.6037	576217.6	10670.7

Seeding Area =	13.2281359	AC
Topsoil Volume =	10670.6963	CY

[1]Use 12 inches for the topsoil stripping depth
[2]Use 6" for topsoil placement
*Topsoil stripping is determined using the planar (2D) area of the levee footprint and ditch areas, assuming the areas are flat.
*The seeding area for the levee and ditch areas were determined by the Inroads Surface Area report of the areas - Refer to the ACRS08 Inroads Report. The topsoil volume was determined by multipling the area by 6" of top soil.

Bid Item 0005 AE - Reservoir Seeding

Reservoir Area =	1776778.7	SF
	40.7892264	AC

Topsoil Vol =	32903.3093	CY

The seeding area for the reservoir was determined by the Inroads Surface Area report of the area - Refer to the ACRS08 Inroads Report. The topsoil volume was determined by multipling the area by 6" of top soil.

Bid Item 0006 - Spoil Construction

Spoil Approximate Height =	10	FT
Spoil Side Slopes =	1(V): 15(H)	

[1]Spoil from Reservior Grading =		86581	CY
Spoil from Ditches Grading =		9366.30	
		95947.30	CY

Available Spoil Fill =		101802.6	CY

Seeding Surface Area =		482554.4	SF
		11.1	AC

[2]Topsoil =		241277.2	CF
		8936.19259	CY

(1)Spoil Fill = Reservoir Excavated Vol - Levee Fill Vol
(2)Assumed 6" Topsoil
*Available Spoil Fill is the spoil fill capacity. Therefore the proposed spoil grading plan has enough capacity to contain the excess materials from grading.
*The seeding area for the spoil were determined by the Inroads Surface Area report of the area - Refer to the ACRS08 Inroads Report. The topsoil volume was determined by multipling the area by 6" of top soil.

Bid Item 0007 - Pumpstation

Required Flow = 200 CFS
Pumps = three, 100 CFS pumps
Per VE recommendations, two 100 CFS pumps will be utilitized plus one 100 CFS pump for redundancy.

Bid Item 0008 - Storm Drainage Structures

Inlet Pumpstation

Flow =		200	cfs
Pumping Days =		2	Days
60" Inlet RCP =		876.2107	LF
Three 36" Outlet RCP =		1734	LF

The pumpstation flow and pumping duration data were provided by H&H. See H&H appendix.
The lengths of pipes were determined using the length measure tool in microstation.

Outlet Pumpstation
Two of the three 36" RCP at the reservior will be used pump water from the reservior back into the river
Water will discharge back into the river through the 60" RCP and an additional 24" RCP.

24" Inlet RCP =		330	LF

Other Storm Sewers

24" Oulet RCP with sluice gate	150	LF

Total 60" RCP =		**876.2107**	**LF**
Total 36" RCP =		**1734**	**LF**
Total 24" RCP =		**480**	**LF**

Bid Item 0009 Ditch Grading

Assumptions for Ditch at Spoil Areas:

Width =	5	FT
Average Depth =	1.5	FT
Side Slope	1(V):3(H)	

Excavation Volume:

Length =	2397.9943	FT
Cross-sectional Area =	10.875	SF
Excavation/Grading Volume =	965.858815	CY

The excavation volume for the ditches surrounding the spoil area was determined by multipling the length of the ditch with cross-sectional area of the ditch using the assumptions provided above. The length of the ditch was determine in microstation.

Total Ditch Excavation and Fill:

Ditch	Excavation (CY)	Fill (CY)
Main Ditch	2808.9	92.2
Ditch A	3767.6	0
Ditch B	3224.1	342
Spoil Area Ditch	965.8588153	0
Total	10766.45882	434.2

The main ditch, Ditch A and B excavation and fill volumes were determined using Inroads Triangle Volume report - see ACRS08 Inroads report

Total Ditch Grading =	10332.2588	CY

*The ditch grading volume was determined by subtracting the fill volume from the excavation volume.
*The ditch footprint is within the PE easement. Therefore, the topsoil and seeding is accounted for under Topsoil Striping and Levee Seeding respectively.

US Army Corps of Engineers Chicago District	PROJECT TITLE: Site ACRS08 Reservoir	COMPUTED BY: FAYE LEFFLER	DATE: 8/1/2013
	COMPUTATION TITLE: INROADS REPORT	CHECKED BY: ADAM TENNANT	DATE:

Triangle Volume Report for Reservoir (Reservoir Cut and Levee Fill)

Original Surface: ACRS08_topo
Description:
Preference: Default
Type: Existing
Design Surface: ACRS08 Reservior_alignment3
Created from roadway
Description: designer
Preference: Default
Type: Design
Cut Factor: 1
Fill Factor: 1

Cut: 4851469.2 cu ft
Fill: 2513781.9 cu ft
Net: 2337687.3 cu ft

Cut: 179684 cu yd
Fill: 93103 cu yd
Net: 86581 cu yd

Ditch Excavation and Fill Volume

Main Ditch (Existing Ditch Relocation)

Original Surface: ACRS08_topo
Description:
Preference: Default
Type: Existing
Design Surface: ACRS08 Main Ditch
Created from roadway
Description: designer
Preference: Default
Type: Design
Cut Factor: 1
Fill Factor: 1

Cut:	75839.5	cu ft
Fill:	2489	cu ft
Net:	73350.6	cu ft
Cut:	2808.9	cu yd
Fill:	92.2	cu yd
Net:	2716.7	cu yd

Reservoir Ditch A

Original Surface: ACRS08_topo
Description:
Preference: Default
Type: Existing
Design Surface: Ditch A
Created from roadway
Description: designer
Preference: Default
Type: Design
Cut Factor: 1
Fill Factor: 1

Cut:	101725.2	cu ft
Fill:	0.2	cu ft
Net:	101725	cu ft
Cut:	3767.6	cu yd
Fill:	0	cu yd
Net:	3767.6	cu yd

Reservoir Ditch B

Original Surface: ACRS08_topo
Description:
Preference: Default
Type: Existing
Design Surface: Ditch B
Created from roadway
Description: designer
Preference: Default
Type: Design
Cut Factor: 1
Fill Factor: 1

Cut:	87049.4	cu ft
Fill:	9235.1	cu ft
Net:	77814.3	cu ft
Cut:	3224.1	cu yd
Fill:	342	cu yd
Net:	2882	cu yd

Spoil Construction

Triangle Volume Report for Spoil Fill

Original Surface: ACRS08_topo
Design Surface: ACRS08_spoil1
Cut Factor: 1
Fill Factor: 1

Cut:	174.2	cu ft
Fill:	2748668.9	cu ft
Net:	-2748494.7	cu ft
Cut:	6.5	cu yd
Fill:	101802.6	cu yd
Net:	-101796.1	cu yd

Reservoir Storage report:

Elevation	Incremental Volume CF	Cumulative Volume CF	Acre-Feet AC-FT	Surface Area SF
684.00	7439208.8	7439208.8	170.8	1739897.3
686.00	3568250.6	11007459.4	252.7	1817338.5
688.00	3695607.8	14703067.2	337.5	1864355.3
690.00	3761962.7	18465029.9	423.9	1897644.6
692.00	3828764.7	22293794.6	511.8	1931157.3
693.00	1939572.7	24233367.3	556.3	1947997.5

Surface Area Reports

Surface Area Report for Spoil

Spoil Area 2
Surface: ACRS08_spoil1
Fence Mode: Ignore

True Area:	482554.4	sq ft
Planar Area:	481688.3	sq ft

Surface Area Report for Reservior and Levee

Surface: ACRS08 Reservior_alignment 3
Fence Mode: Ignore

True Area: sq ft	2200204.6	SF
Planar Area: sq ft	2179209.8	SF

Surface Area Report for Reservoir Only

Surface: ACRS08 Reservoir_alignment 3
Fence Mode: Inside

True Area:	1776778.7	sq ft
Planar Area:	1774628.5	sq ft

Surface Area Report for Levee

Levee Surface True Area =		423425.9	SF
Levee Planar Area =		404581.3	SF

Surface Area Report for Main Ditch

Surface: ACRS08 Main Ditch
Fence Mode: Ignore

True Area: sq ft	42744.7	SF
Planar Area: sq ft	41477.1	SF

Surface Area Report for Reservoir Ditch A

Surface: Ditch A
Fence Mode: Ignore

True Area: sq ft	39176	SF
Planar Area: sq ft	37491.6	SF

Surface Area Report for Reservoir Ditch B

Surface: Ditch B
Fence Mode: Ignore

True Area: sq ft	70871	SF
Planar Area: sq ft	68994.3	SF

BCRS02 QUANTITIES COMPUTATIONS

Prepared by: Faye Leffler
Checked by: Laura Vanden Berg
Date Prepared: Sep-10
Date Checked: Oct-12

Item 000X - Clearing and Grubbing 60.57 AC

Assumptions: Area includes the reservoir, levee and PE Area

Total Area =

Item 000X - Reservoir Excavation Volume

Inroads Triangle Volume Report
Original Surface: BCRS02_topo
Design Surface: BCRS02_reservoi cu ft
Cut Factor: 1 cu ft
Fill Factor: 1 cu ft

Cut: 612548.8 cu yd
Fill: 5509.3 cu yd
Net: 607039.5 cu yd

Cut: 22687 22482.9 CY
Fill: 204
Net: 22482.9

Total Cut Volume =

Item 000X - Levee Fill Volume

Inroads Triangle Volume Report
Original Surface: BCRS02_topo
Design Surface: BCRS02_levee cu ft
Cut Factor: 1 cu ft
Fill Factor: 1 cu ft

Cut: 5294.1 cu yd
Fill: 1345686 cu yd
Net: -1340391.8 cu yd

Cut: 196.1 49840.2 CY
Fill: 49840.2
Net: -49644.1

Fill Volume =
Stripped Volume =

		3	FT
Item 000X Levee Trench Fill		5	FT
		7324.733	FT
Levee Trench		4069.29611	CY
Assumptions:	Width =		
	Depth =		
Length of Levee =			
Trench Fill/Excavation Volume =			

Check: Volume Report for both Reservoir and Levee

	Original Surface:	BCRS02_topo	Levee Fill =	-204	CY
	Design Surface:	BCRS02_reservoir	Reservoir Cut=	22883.1	
	Cut Factor:	1			
	Fill Factor:	1			
	Cut:	617845	cu ft		
	Fill:	1355800.6	cu ft		
	Net:	-737955.6	cu ft		
	Cut:	22883.1	cu yd		
	Fill:	50214.8	cu yd		
	Net:	-27331.7	cu yd		

Item 000X - Topsoil Stripping

Assumptions:	Topsoil will be stri	349322.5	SF
	Adjacent areas wil	135652.191	SF
	12" Topsoil will be	484974.691	SF
		233092	SF
Levee Planar Area =			
PE Area =		718066.691	SF
Levee + PE Area =			
Adjacent Areas =		26595.0626	CY

Total Stripping Area =

Topsoil Stripping Volume =

	150	LF

Item 000X - 18" RCP 5

Assumptions:	Length of pipe =	750	LF

No of pipes =

Total Length of Pipe =

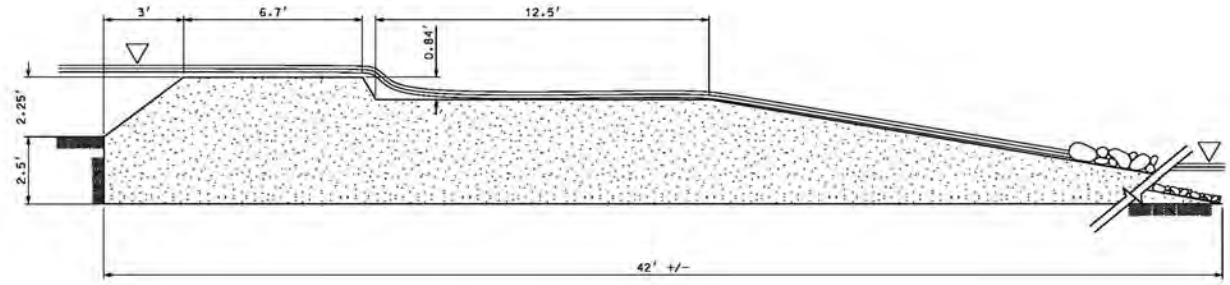
Item 000X - Seeding Area

Assumptions:	Seeded area inclu	364296.1	SF
	6" Topsoil will be p	135652.191	SF
		499948.291	SF
Levee		11.4772335	AC
Levee Surface Area =		9258.30168	CY
PE Area =			
Total Levee Seeding Area =			
		218118.4	SF
Topsoil Volume for Levee =		5.00730946	AC
		4039.22963	CY
Spoil			
Total Spoil Seeding Area =		718066.691	SF
Topsoil Volume for Spoil =			
		CY	
Total seeding area =			

Item 000X - Spoil Construction

Spoil Fill = 22482.9

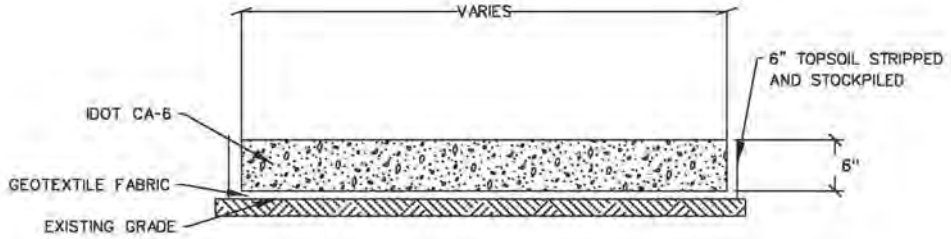
US Army Corps of Engineers® Chicago District	PROJECT TITLE: DP II – Feasibility Study	COMPUTED BY: MWC	DATE: 10/24/11	SHEET: 1 of 2
	COMPUTATION TITLE: Quantities for Dam No. 1 Removal	CHECKED BY: AK	DATE: 10/24/11	



DAM NO. 1 CROSS SECTION

- Width of the dam across the river is 127 ft
- Dam is made of reinforced concrete
- Total volume of concrete = (135.7 sq. ft)(127 ft)(1 CY/27 cu. Ft) = 638.3 CY

- The clearing and grubbing area is based on the staging/storage area layout and a small amount of clearing needed at the river bank to provide access into the river.
- The area for the access road and staging/storage area was measured in the site layout drawing file, Dam_No_1_Site_Plan_2D.dgn, stored in ProjectWise
- Clearing and grubbing area = 0.40 acres
- Landscape restoration is equal to the acres for clearing and grubbing = 0.40 acres
- Sediment removal is approx. 50 CY. The assumption was made that less sediment is present than at previously surveyed dams on the river such as Armitage dam.



DAM NO. 1 GRAVEL STAGING & STORAGE (TYP)
N.T.S.

- Stripping 6" of topsoil from the staging/storage area:

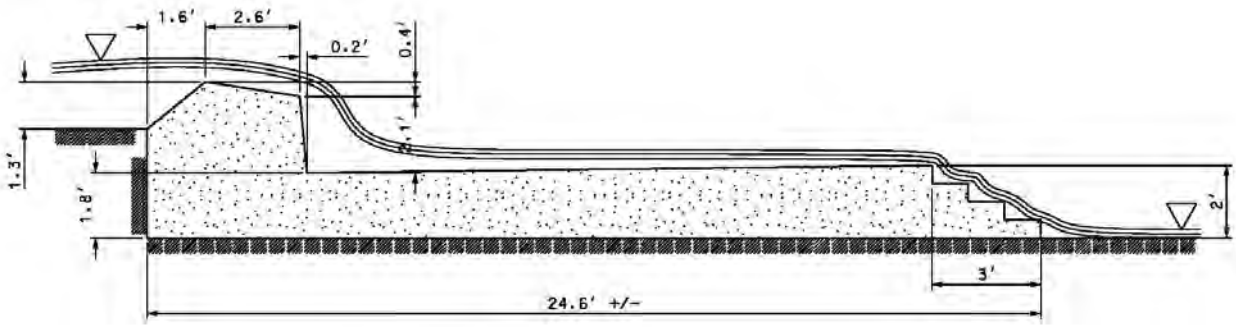
  = (17,569.9 sq. ft)(0.5 ft)(1 CY/27 cu. Ft) = 325.4 CY
- Unit weight of IDOT CA-6 stone is approx. 130 lb/cu. Ft
- IDOT CA-6 stone needed for temp. access road and staging/storage area

  = (17,569.9 sq. ft)(0.5 ft)(130 lb/cu. Ft)(1 ton/2,000 lb) = 571.0 tons

- Geotextile fabric for staging/storage area:

  = (17,569.9 sq. ft)(1 sq. ft/9 SY) = 1,952.2 SY
- Total temporary chain link fencing, 6 ft high = 756 ft
- The temporary fencing was measured along the work limits up to the approx. river edge seen in the aerial photo. 20 ft was deducted from the total fencing to allow for two gates at the site entrances.
- Two temporary 10 ft wide, 6 ft high gates at the site entrances are required.

US Army Corps of Engineers® Chicago District	PROJECT TITLE: DP II – Feasibility Study	COMPUTED BY: MWC	DATE: 10/20/11	SHEET: 1 of 2
	COMPUTATION TITLE: Quantities for Dam No. 2 Removal	CHECKED BY: AK	DATE: 10/20/11	



DAM NO. 2 CROSS SECTION

- Width of the dam across the river is 151 ft
- Dam is made of reinforced concrete
- Cross Sectional Area by Segments:

  (2.0 ft)(21.6 ft) = 43.2 sq. ft

  (0.5)(3.0 ft)(2.0 ft) = 3.0 sq. ft

  (1.2 ft)(4.4 ft) = 5.28 sq. ft

  (0.5)(1.6 ft)(1.3 ft) = 1.04 sq. ft

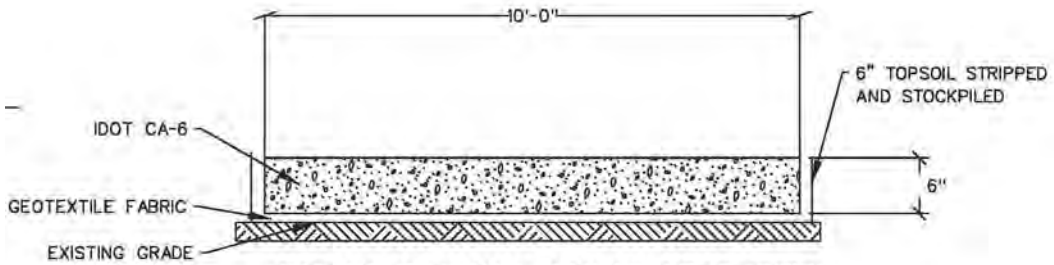
  (0.9 ft)(2.6 ft) = 2.34 sq. ft

  (0.5)(2.6 ft)(0.4 ft) = 0.52 sq. ft
- Total Concrete volume for the dam:

  = (43.2 sq. ft + 3.0 sq. ft + 5.28 sq. ft + 1.04 sq. ft + 2.34 sq. ft + 0.52 sq. ft)(151 ft)(1 CY/27 cu. Ft) = 309.7 CY

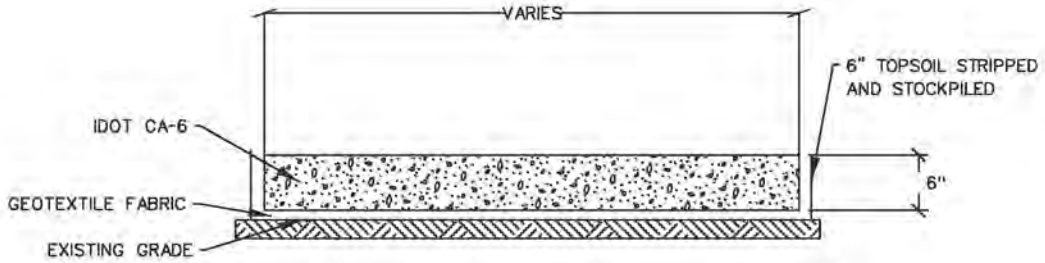
- The clearing and grubbing area is based on the temporary access road and staging/storage area layout.
- The area for the access road and staging/storage area was measured in the site layout drawing file, Dam_No_2_Site_Plan_2D.dgn, stored in ProjectWise
- Clearing and grubbing area = 0.34 acres
- Landscape restoration is equal to the acres for clearing and grubbing = 0.34 acres
- Sediment removal is approx. 50 CY. The assumption was made that less sediment is present than at previously surveyed dams on the river such as Armitage dam.

US Army Corps of Engineers® Chicago District	PROJECT TITLE: DPII – Feasibility Study	COMPUTED BY: MWC	DATE: 10/20/11	SHEET: 2 of 2
	COMPUTATION TITLE: Quantities for Dam No. 2 Removal	CHECKED BY: AK	DATE: 10/20/11	



DAM NO. 2 GRAVEL ACCESS ROAD (TYP)

N.T.S.



DAM NO. 2 GRAVEL STAGING & STORAGE (TYP)

N.T.S.

- Stripping 6" of topsoil from the temp. access road and staging/storage area

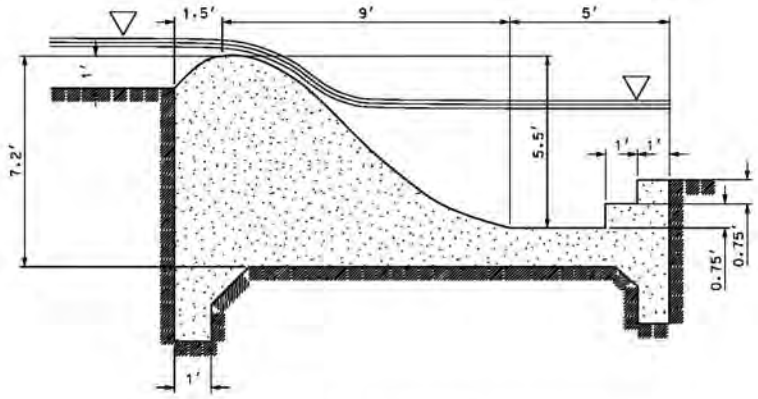
  = (14,734.8 sq. ft)(0.5 ft)(1 CY/27 cu. Ft) = 272.9 CY
- Unit weight of IDOT CA-6 stone is approx. 130 lb/cu. Ft
- IDOT CA-6 stone needed for temp. access road and staging/storage area

  = (14,734.8 sq. ft)(0.5 ft)(130 lb/cu. Ft)(1 ton/2,000 lb) = 478.9 tons
- Geotextile fabric for staging/storage area:

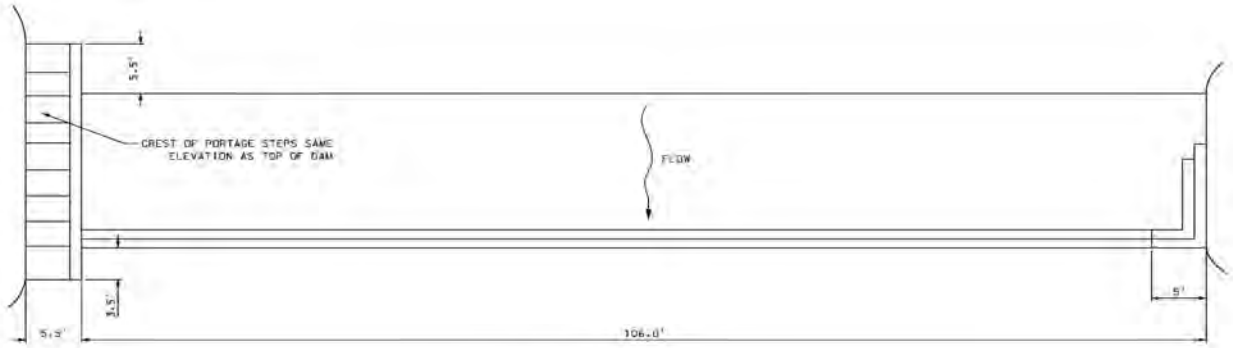
  = (125 ft)(85 ft)(1 sq. ft/9 SY) = 1,181 SY
- Geotextile fabric for temporary access road:

  = (4,110 sq. ft)(1 sq. ft/9 SY) = 457 SY
- Total temporary chain link fencing, 6 ft high = 2,231 ft
- The temporary fencing was measured along the work limits up to the approx. river edge seen in the aerial photo. 10 ft was deducted from the total fencing to allow for the gate at the site entrance
- One temporary 10 ft wide, 6 ft high gate at site entrance required

US Army Corps of Engineers® Chicago District	PROJECT TITLE: DP II – Feasibility Study	COMPUTED BY: MWC	DATE: 10/21/11	SHEET: 1 of 2
	COMPUTATION TITLE: Quantities for Dam No 4 Removal	CHECKED BY: AK	DATE: 10/21/11	



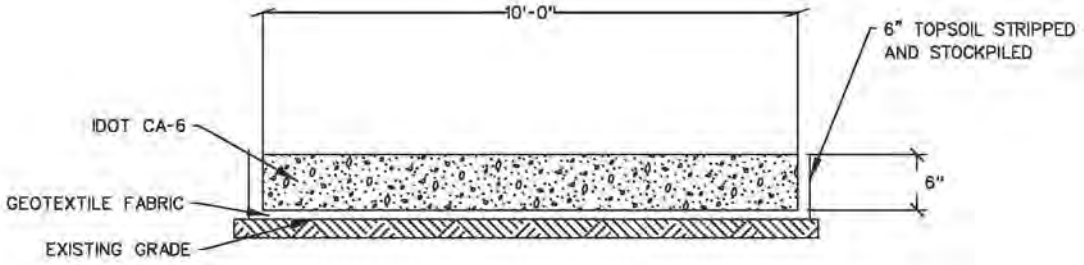
DAM NO. 4 CROSS SECTION



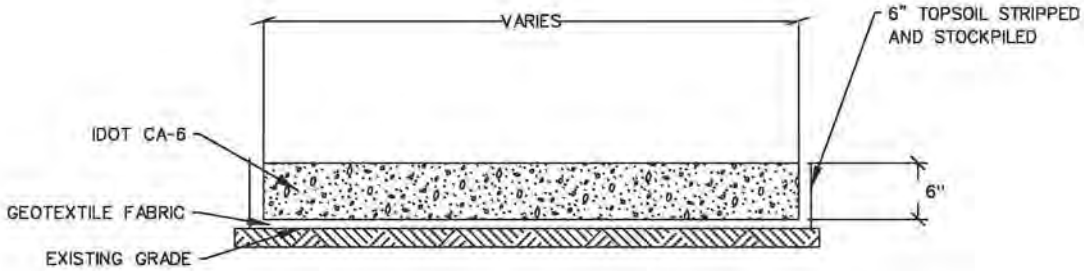
DAM NO. 4 PLAN VIEW

- The clearing and grubbing area is based on the temporary access road and staging/storage area layout.
- The area for the access road and staging/storage area was measured in the site layout drawing file, Dam_No_4_Site_Plan_2D.dgn, stored in ProjectWise
- Clearing and grubbing area = 15,905.4 sq. ft = 0.4 acres
- Landscape restoration is equal to the acres for clearing and grubbing = 0.4 acres
- Sediment removal is approx. 50 CY. The assumption was made that less sediment is present than at previously surveyed dams on the river such as Armitage dam.
- Total temporary chain link fencing, 6 ft high = 1,453 ft
- The temporary fencing was measured along the work limits up to the approx. river edge seen in the aerial photo. 10 ft was deducted from the total fencing to allow for the gate at the site entrance
- One temporary 10 ft wide, 6 ft high gate at site entrance required

US Army Corps of Engineers® Chicago District	PROJECT TITLE: DPII – Feasibility Study	COMPUTED BY: MWC	DATE: 10/21/11	SHEET: 2 of 2
	COMPUTATION TITLE: Quantities for Dam No 4 Removal	CHECKED BY: AK	DATE: 10/21/11	



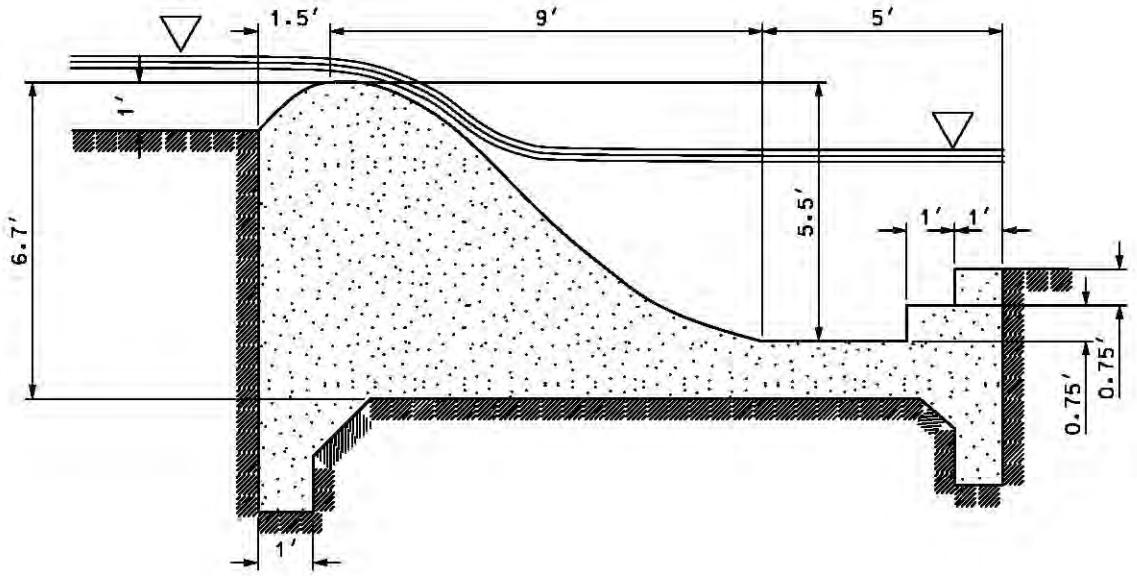
DAM NO. 4 GRAVEL ACCESS ROAD (TYP)
N.T.S.



DAM NO. 4 GRAVEL STAGING & STORAGE (TYP)
N.T.S.

- Stripping 6" of topsoil from the temp. access road and staging/storage area
  = (15,905.4 sq. ft)(0.5 ft)(1 CY/27 cu. Ft) = 294.5 CY
- Unit weight of IDOT CA-6 stone is approx. 130 lb/cu. Ft
- IDOT CA-6 stone needed for temp. access road and staging/storage area
  = (15,905.4 sq. ft)(0.5 ft)(130 lb/cu. Ft)(1 ton/2,000 lb) = 516.9 tons
- Geotextile fabric for staging/storage area:
  = (76 ft)(85 ft)(1 sq. ft/9 SY) = 717.8 SY
- Geotextile fabric for temporary access road:
  = (9,416.3 sq. ft)(1 sq. ft/9 SY) = 1,046.3 SY
- Dam is made of reinforced concrete
- Dam concrete volume = (58.2 sq. ft)(106.0 ft)(1 CY/27 cu. Ft) = 228.5 CY
- Take 25% of the dam volume for the wing walls and stairs = 57.1 CY
- Total Concrete volume for the dam = (228.5 CY + 57.1 CY) = 285.6 CY

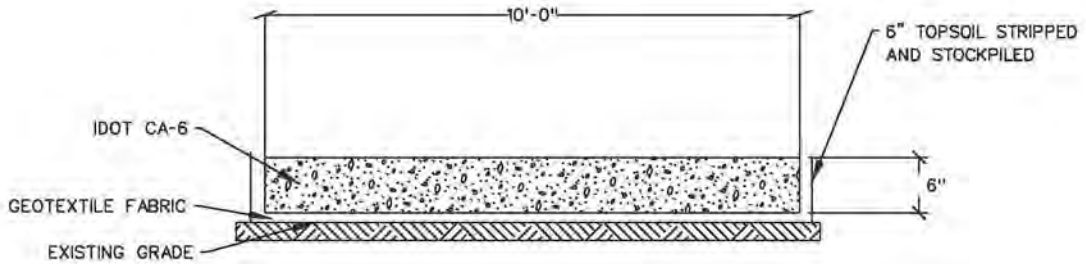
US Army Corps of Engineers® Chicago District	PROJECT TITLE: **DP II – Feasibility Study**	COMPUTED BY: **MWC**	DATE: **10/21/11**	SHEET: 1 of 2
	COMPUTATION TITLE: **Quantities for Dempster St Dam Removal**	CHECKED BY: **AK**	DATE: **10/24/11**	



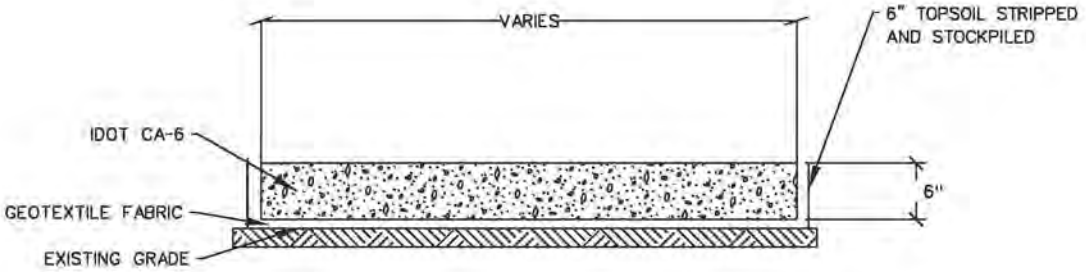
DEMPSTER STREET DAM CROSS SECTION

- The clearing and grubbing area is based on the temporary access road and staging/storage area layout.
- The area for the access road and staging/storage area was measured in the site layout drawing file, Dempster_Dam_Site_Plan_2D.dgn, stored in ProjectWise
- Clearing and grubbing area = 10,741.4 sq. ft = 0.25 acres
- Landscape restoration is equal to the acres for clearing and grubbing = 0.25 acres
- Sediment removal is approx. 50 CY. The assumption was made that less sediment is present than at previously surveyed dams on the river such as Armitage dam.
- Total temporary chain link fencing, 6 ft high = 1,152 ft
- The temporary fencing was measured along the work limits up to the approx. river edge seen in the aerial photo. 10 ft was deducted from the total fencing to allow for the gate at the site entrance
- One temporary 10 ft wide, 6 ft high gate at site entrance required

US Army Corps of Engineers® Chicago District	PROJECT TITLE: **DPII – Feasibility Study**	COMPUTED BY: **MWC**	DATE: **10/21/11**	SHEET: 2 of 2
	COMPUTATION TITLE: **Quantities for Dempster St Dam Removal**	CHECKED BY: **AK**	DATE: **10/24/11**	



DEMPSTER ST. DAM GRAVEL ACCESS ROAD (TYP)
N.T.S.



DEMPSTER ST. DAM GRAVEL STAGING & STORAGE (TYP)
N.T.S.

- Stripping 6" of topsoil from the temp. access road and staging/storage area
  = (10,741.4 sq. ft)(0.5 ft)(1 CY/27 cu. Ft) = 198.9 CY
- Unit weight of IDOT CA-6 stone is approx. 130 lb/cu. Ft
- IDOT CA-6 stone needed for temp. access road and staging/storage area
  = (10,741.4 sq. ft)(0.5 ft)(130 lb/cu. Ft)(1 ton/2,000 lb) = 349.1 tons
- Geotextile fabric for staging/storage area:
  = (6,473.8 sq. ft) (1 sq. ft/9 SY) = 719.3 SY
- Geotextile fabric for temporary access road:
  = (4,267.6 sq. ft)(1 sq. ft/9 SY) = 474.2 SY
- Dam is made of reinforced concrete
- Dam concrete volume = (58.2 sq. ft)(102.0 ft)(1 CY/27 cu. Ft) = 219.9 CY
- Take 25% of the dam volume for the wing walls and stairs = 55.0 CY
- Total Concrete volume for the dam = (219.9 CY + 55.0 CY) = 274.9 CY

US Army Corps of Engineers® Chicago District	PROJECT TITLE: DP II – Feasibility Study	COMPUTED BY: AGT	DATE: 4/06/10	SHEET: 1 of 1
	COMPUTATION TITLE: Quantities for Site DPBM01	CHECKED BY: LCV	DATE: 10/5/12	

Total pier extension length= 266.4 ft

Length was based on IDNR plate no backup

or reasoning provided.

Sheet Pile Height = 25 ft

Based on conservative assumption from

TS-DG

Clear and Grub Area = 79,109 SF

Measure from microstation

Excavation for Flow Improvement =

(5108 SF +3922 SF+17081 SF)*depth (22 ft)

574442 CF → 21,275 CY/2 BASED ON 1:1 SLOPES

For calculation purposes assume a river bed elevation of 596.0 ft at the base of pier extension. Assumption 25 ft deep sheet pile depth to anchor pier extension.

Assumption pier extension is 10 ft above water and 12 ft below water. For a total pier extension height of 22 ft.

Sq ft of SSP = (25 ft)(266.4 ft)=<u>6,160 S.F.</u>

Concrete Volume: width of wall = 1.17 ft

Total height of wall = 22 ft

Volume=[(1.17')(22')(266.4')]/27= <u>254 CY</u>

Perm. Easement Area = 26,111 SF land lost to river enlargement = .6 ACRES

Temp Easement Area = 52,998 SF =

DPBM04 QUANTITIES COMPUTATIONS

Prepared by: Laura Vanden Berg
Checked by: Matt Cunningham
Date Prepared: Oct-12
Date Checked: Nov-12

Item 0003 - Clearing & Grubbing

(1)Worklimits =	538311.9	SF
Clearing & Grubbing Area =	284604.8393	SF
	6.533628083	AC

Item 0004 & 0005 - Roadway Reconstruction

Number of Lanes =	4	
Lane width =	11	FT
Shoulder Width =	8	FT

Roadway Reconstruction Lengths

Location	(1)Length (FT)
North of Bridge 1st Ave	384
South of Bridge 1st Ave	2349.44
River Rd	865.7
Bridge	352.56
Total Length	3951.7

Total Roadway reconstruction length =	3599.14	LF/lane
	0.681655303	mi/Lane
Bridge Reconstruction Length =	352.56	LF/Lane
	0.066772727	mi/Lane
Roadway & Shoulder Area =	234630.1	SF
Bridge (including Approches) Area =	19076.9607	SF

Item 0006 - Seeding Area

Side Slope Fill Area =	93168.8	SF
Work Area =	203916.4393	SF
Total Area =	6.820138643	AC

Item 0007 - Roadraise Fill Volume

Inroads Triangle Volume Report

Original Surface:	DPBM04_topo
Design Surface:	Prop_Roadway
Cut Factor:	0
Fill Factor:	1

Cut:	4133.5	cu ft
Fill:	1189302.6	cu ft
Net:	-1185169	cu ft

Cut:	153.1	cu yd
Fill:	44048.3	cu yd
Net:	-43895.2	cu yd

Total Fill Volume =	44048.3	CY

(1) Lengths and area measurement performed in microstation using the measure tool.

DPBM13 QUANTITIES COMPUTATIONS

Prepared by:	Laura Vanden Berg
Checked by:	Matt Cunningham
Date Prepared:	Apr-12
Date Checked:	Oct-12

Existing Roadway Removal & Demolition

Item	Depth (ft)	Area (SF)	Volume (CY)
PCC Pavement & Bituminous Surface	1	103233.7	3823.5
Bridge Deck	0.58	14040	303.3
Bridge steel beams	3.5		0.0

Parapet Wall & Guardrail removal	472	LF
Curb Removal	4960	LF

Item 0004 & 0005 - Roadway Reconstruction

Roadway Reconstruction Lengths

Location	(1)Length (FT)
Route 120 west of bridge	718
Route 120 east of bridge	250
Bridge length	272
Total Length	1240

Item 0006 - Seeding Area

Side Slope & Median Fill Area =	60678.2	SF
Total Area =	1.39	AC

Item 0007 - Roadraise Fill Volume

Inroads Triangle Volume Report

Original Surface:	DPBM13_topo
Design Surface:	DPBM13_ProRoad_Route120
Cut Factor:	1
Fill Factor:	1

Cut:	1000	cu ft
Fill:	538356.5	cu ft
Net:	-537356.5	cu ft

Cut:	37	cu yd
Fill:	19939.2	cu yd
Net:	-19902.1	cu yd

Total Fill Volume =	19939.2	CY

Roadway Reconstruction

Material	Depth (ft)	Area (SF)	Volume (CY)
1.5" Bituminous Concrete Surface	0.125	103233.7	477.9
11.5" Bituminous Concrete Binder Mixture	1	103233.7	3823.5
12" Sub Base Granular Fill	1	103233.7	3823.5

Concrete Curb & Gutter Replacement

Total Length = 4960 LF

Bridge Modifications

Bridge Raise Height =	2.73	FT

	Thickness (FT)	Area (SF)	Volume (CY)	Weight (lbs)
Concrete Slab	0.583333333	14040	303.3333333	
Steel beams				38700

Extend Abutments & Pier Walls: Wall Length =	63	FT

DPLV01 QUANTITIES COMPUTATIONS

Prepared by: Faye Leffler
Date: Jan-11
Checked by: Laura Vanden Berg
Date: Oct-12

Total Length and Area of Roadraise

Location	Length (LF)	Area (SF)
Park Ln & Groveland Ave	1046.2	31983.7
Lincoln Ave	200.0	3483.9
Total	1246.2	35467.6

Existing Roadway Removal & Demolition

Roadway Stripping	Depth (ft)	Area (SF)	Volume (CY)
Bituminous Surface Course	0.25	35458.5	328.3
PCC Base Course	0.75	35458.5	985.0

Curb Removal	2492	LF

Clearing and Grubbing

Location	Area (SF)
At SSP wall	20859.0
At Floodwall	22698.1

Total =	43557	SF
	1.0	AC

Road Raise Fill

Triangle Volume Report for Road Raise Fill

Original Surface:	DPLV01_topo
Design Surface:	DPLV01_Roadraise
Cut Factor:	1
Fill Factor:	1

Cut:	0.1	cu ft
Fill:	133625.3	cu ft
Net:	-133625.2	cu ft

Cut:	0	cu yd
Fill:	4949.1	cu yd
Net:	-4949.1	cu yd

Total Fill Volume = 4949.1 CY

Roadway Reconstruction

Material	Depth (ft)	Area (SF)	Volume (CY)
Bituminous Surface Course	0.25	35467.6	328.4
PCC Base Course	0.75	35467.6	985.2
Sub Base Granular Fill	0.5	35467.6	656.8

Used same typical section as existing

Seeding

Roadraise Side Slope Area =	13277.1	SF
Seeding at SSP wall vicinity	20859.0	SF
Seeding at floodwall vicinity	22698.1	SF
Total	1.305	AC

Topsoil = 1052.485 CY

Concrete Curb & Gutter Replacement

Total Length = 2492 LF

Sheet Pile Wall at Groveland Ave

Sta. 0+00 to 8+67

Length of Sheet Pile =	867	LF
Depth of Sheet Pile =	20	FT
SSP Area =	17340	SF
SSP Cap Length =	867	LF

Floodwall

Sta. 9+05 to 16+24

Length of Floodwall =	719	LF
Depth of SSP =	20	FT
Depth of Concrete wall =	8	FT
SSP Area =	14380	SF
Concrete wall Area =	5752	SF
Concrete wall thickness =	1.167	FT
Concrete volume =	248.6	CY

US Army Corps of Engineers Chicago District	PROJECT TITLE: DPII - Site DPLV09 Segment 1	COMPUTED BY: FAYE LEFFLER	DATE: 6/11/2013
	COMPUTATION TITLE: QUANTITY COMPUTATIONS	CHECKED BY: ROBERT VANOER	DATE:

Bid Item 0001 - Mobilization and Demobilization

See Cost Appendix and MII estimates for mobilization and demolization assumptions.

Bid Item 0002 - Maintenance of Traffic

See Cost Appendix and MII estimates for Maintenance of Traffic assumptions

Bid Item 0003 - Clearing and Grubbing

The clearing and grubbing areas will include the worklimits (permanent easement) and staging areas (temporary easement).
The permanent easement (worklimit area) is 15 feet from the centerline of the floodwall.
The areas were computed in microstation.

Location	Area (AC)
Work Limits (Permanent Easement Area)	2.1
Staging Area	1

Total Clearing and Grubbing Area =	3.1	AC

Bid Item 0004 - Floodwall

Floodwall	Floodwall Length (FT)	*Concrete Height (FT)	**SSP Height (FT)	Concrete Width (FT)	Concrete Volume (CY)	*SSP Area (SF)
Sta. 0+00 to 0+80	80	10.4	25.2	1.167	35.960889	2176
Sta. 0+80 to 2+00	120	17	45	1.167	88.173333	5640
Sta. 2+00 to 7+00	500	3.6	0	1.167	77.8	0
Sta. 7+00 to 10+80	380	9.9	23.7	1.167	162.602	9766
Sta. 10+80 to 15+80	500	17.2	45.6	1.167	371.71111	23800
Sta. 15+80 to 26+80	1100	10.5	25.5	1.167	499.21667	30250
Sta. 26+80 to 30+20	340	14.6	37.8	1.167	214.55511	13532
Total	3020				1450.0191	85164

Total Concrete Volume (CY) =	1450.0	CY
Total SSP Area (SF) =	85164	SF

The floodwall top elevation is 634.6
The concrete height is relative to the existing grade and varies along the alignment and height was determined from the alignment profile.
*Concrete height includes the 2ft concrete embeddment. SSP area includes the 2 feet embeddment into the concrete.
**assumed 3 SSP to 1 concrete ratio

Bid Item 0005 - Road Closures

One road closure at Algonquin Rd, 4-lane road, length = 44 FT
Assumed each lane is 11 feet.

Bid Item 0006 - Retaining Wall Modifications

An existing retaining wall is supporting River Rd between Sta 2+00 and Sta. 7+00. The retaining wall will be raised to the design elevation and also act as a floodwall.

Approx. length of retaining wall =	500	LF
Assume wall is 3 feet above existing grade (628), top of wall EL =	631	EL
Levee/Floodwall Design EL =	634.6	EL
Existing retaining wall raise height =	3.6	FT

Bid Item 0007 - Interior Drainage

Interior drainage was not evaluated for the DPII study and will be evaluated during the PED phase.
From aerial views, there is an existing culvert at approx. Sta 13+00 (opposite from Oakwood Ave). There are also multiple outlets that discharges into the river.

The cost estimate for Interior Drainage was determined using Libertyville Estate levee/floodwall project.
The costs were developed using cost per linear foot of floodwall protection.
Total Length of Floodwall = 3020 FT

US Army Corps of Engineers® Chicago District	PROJECT TITLE: DP II – Feasibility Study	COMPUTED BY: MWC	DATE: 11/21/12	SHEET: 1 of 1
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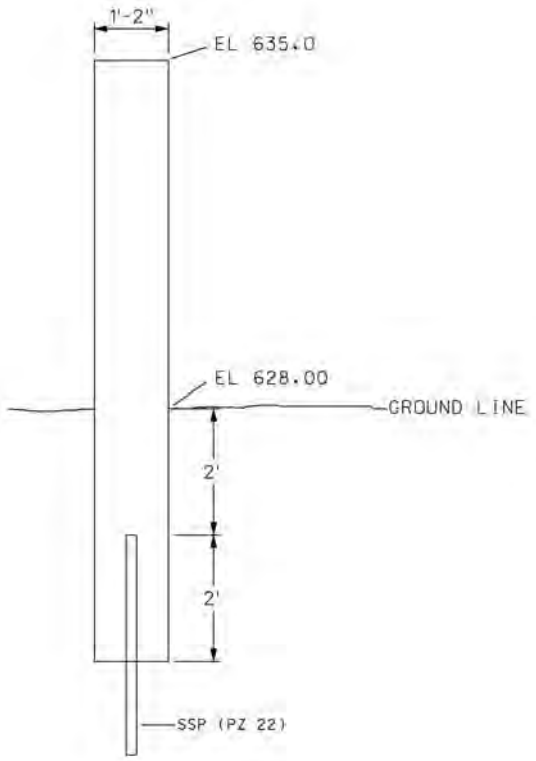

Average Ground Elevation = 628

Ground Elevation

Sta	EL
4+00	624
10+00	630
16+00	629
20+00	632
25+00	625
Average	628

Total Alignment length = 2,818 ft

Oakton St Closure Width = 100 ft

Floodwall length = 2,818 – 100

= 2,718 ft

SSP: 3 to 1 Ratio

7.0 ft of exposed concrete wall

(7.0)(3) = 21.0' deep

Sq. ft of SSP = (21.0)(2718) = 57,078 Sq. ft

Concrete Volume : width of wall = 1'-2" = 1.17'

Total height of wall = 11.0'

Area = (11.0)(1.17) = 12.87 sq. ft

Volume = (12.87)(2718)(1/27) = 1,296 CY

Recreational Trail:

Assumptions:

- 2,718 ft of trail
- Trail is on the landside of the floodwall
- Trail is placed 1 ft from the face of the floodwall
- Trail is 9 ft wide
- Geotextile fabric placed within excavated footprint of trail
- 6" of CA-7 stone placed and compacted for the base
- 3" of bituminous binder course
- 1.5" of bituminous surface course

Geotextile fabric needed:

= (10.75')(2718')(1 SY/9 SF) = 3,247 SY

Volume of CA-7 Stone Needed:

= (0.5')(9.0')(2,718')(1 CY/27 CF) = 453 CY

Area of Bituminous Binder Course (3" thickness):

= (9.0')(2,718')(1 SY/9 SF) = 2,718 SY

Area of Bituminous Surface Course (1.5" thickness):

= (9.0')(2,718')(1 SY/9 SF) = 2,718 SY

US Army Corps of Engineers Chicago District	PROJECT TITLE: DPII - Site DPLV09 Segment 3	COMPUTED BY: FAYE LEFFLER	DATE: 6/11/2013
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Bid Item 0001 - Mobilization and Demobilization

See Cost Appendix and MII estimates for mobilization and demolization assumptions.

Bid Item 0002 - Maintenance of Traffic

See Cost Appendix and MII estimates for Maintenance of Traffic assumptions

Bid Item 0003 - Clearing and Grubbing

The clearing and grubbing areas will include the worklimits (permanent easement) and staging areas (temporary easement).
The permanent easement (work limits) area is 15 feet from the toe of the levee or centerline line of the floodwall.
The areas were computed in microstation.

Location	Area (AC)
Work Limits (Permanent Easement Area)	4.3
Staging Area	2.4

Total Clearing and Grubbing Area =	6.7	AC

Bid Item 0004 - Floodwall

Floodwall	Floodwall Length (FT)	*Concrete Height (FT)	**SSP Height (FT)	Concrete Width (FT)	Concrete Volume (CY)	SSP Area (SF)
Sta. 0+00 to 2+25	225	6.4	13.2	1.167	62.24	3420
Sta. 2+25 to 11+95	970	12.5	31.5	1.167	524.06944	32495
Sta. 23+67 to 25+30	163	13.4	34.2	1.167	94.405978	5900.6
Sta. 25+30 to 30+75	545	17.3	45.9	1.167	407.52072	26105.5
Sta. 30+75 to 34+22	347	11.3	27.9	1.167	169.47866	10375.3
Total	2250				1257.7148	78296.4

Total Concrete Volume (CY) =	1257.7	CY
Total SSP Area (SF) =	78296.4	SF

The levee/floodwall top elevation: Sta 0+00 to 16+00, EL 633.7; Sta. 16+00 to 53+97, EL 633.4
The concrete height is relative to the existing grade and varies along the alignment and height was determined from the alignment profile.
*Concrete height includes the 2ft concrete embeddment. SSP area includes the 2 feet embeddment into the concrete.
**assumed 3 SSP to 1 concrete ratio

US Army Corps of Engineers Chicago District	PROJECT TITLE: DPII - Site DPLV09 Segment 3	COMPUTED BY: FAYE LEFFLER	DATE: 6/11/2013
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Bid Item 0005 - Levee

Stripping

The base of the levee will be stripped 1ft deep.
The base of the levee was determined by multipling the true area of the levee perimeter by 1ft.
The levee perimeter was developed from the levee surface inroads. The surface area was then computed in inroads using the levee perimeter and the existing grade surface.
The area provided in the table below was developed from an inroads surface area report (see earthwork computations).

Levee	Area (SF)	Depth (1FT)	Volume (CY)
Levee1	16020.6	1	593.3555556
Levee2	28751.8	1	1064.881481
Total			1658.237037

Imprevious Fill

The imprevious fill (levee fill) was computed using average end-area method in Inroads with cross-section cuts every 100 ft (see earthwork computations).
The levee is 10-feet wide at the top with 1(V):3(H) side slopes.
The total imprevious fill includes the volume of the levee fill and stripping.

Levee	Levee Volume (CY)	Strip Volume (CY)	Total
Levee1	1482.3	593.3555556	2075.655556
Levee2	3382.3	1064.881481	4447.181481
Total			6522.837037

Bid Item 0006 - Interior Drainage

Interior drainage was not evaluated for the DPII study and will be evaluated during the PED phase.
From aerial views, multiple outlets were observed that discharges into the river.

The cost estimate for Interior Drainage was determined using Libertyville Estate levee/floodwall project.
The costs were developed using cost per linear foot of floodwall protection.

Total Length of Floodwall =	2250	FT
Total Length of Levee =	3197	FT

US Army Corps of Engineers, Chicago District	PROJECT TITLE: DPII - Site DPLV09 Segment 3	COMPUTED BY: FAYE LEFFLER	DATE: 6/11/2013
	COMPUTATION TITLE: Earthwork Inroads Report	CHECKED BY: ROBERT VANOER	DATE:

Impervious Fill

ɔss Section Set Name: Levee 2
Alignment Name: Floodwall/Levee
Input Grid Factor: 1 **Note:** All units in this report are in feet, square feet and cubic yards unless specified otherwise.

Baseline Station	Station Quantities - Cut Factor	Area	Volume	Adjusted	Fill Factor	Area	Volume	Adjusted	Added Quantities - Cut Factor	Volume	Adjusted	Fill Factor	Volume	Adjusted	Mass Ordinate
34+00.00	1	0	0	0	1	0	0	0	1	0	0	1	0	0	0
35+00.00	1	0	0	0	1	212	392.7	392.7	1	0	0	1	0	0	-392.7
36+00.00	1	0	0	0	1	78.7	538.4	538.4	1	0	0	1	0	0	-931.1
37+00.00	1	0	0	0	1	72.2	279.5	279.5	1	0	0	1	0	0	-1210.6
38+00.00	1	0	0	0	1	71.8	266.7	266.7	1	0	0	1	0	0	-1477.3
39+00.00	1	0	0	0	1	71.3	265	265	1	0	0	1	0	0	-1742.3
40+00.00	1	0	0	0	1	72.2	265.8	265.8	1	0	0	1	0	0	-2008.1
41+00.00	1	0	0	0	1	72.2	267.5	267.5	1	0	0	1	0	0	-2275.6
42+00.00	1	0	0	0	1	66.6	257.2	257.2	1	0	0	1	0	0	-2532.7
43+00.00	1	0	0	0	1	41.2	199.8	199.8	1	0	0	1	0	0	-2732.5
44+00.00	1	0	0	0	1	18.9	111.3	111.3	1	0	0	1	0	0	-2843.8
45+00.00	1	0	0	0	1	15.2	63.2	63.2	1	0	0	1	0	0	-2907
46+00.00	1	0	0	0	1	15.2	56.4	56.4	1	0	0	1	0	0	-2963.4
47+00.00	1	0	0	0	1	15.2	56.4	56.4	1	0	0	1	0	0	-3019.8
48+00.00	1	0	0	0	1	1.8	31.5	31.5	1	0	0	1	0	0	-3051.3
49+00.00	1	0	0	0	1	4.7	12	12	1	0	0	1	0	0	-3063.3
50+00.00	1	0	0	0	1	15.2	36.9	36.9	1	0	0	1	0	0	-3100.2
51+00.00	1	0	0	0	1	15.2	56.4	56.4	1	0	0	1	0	0	-3156.6
52+00.00	1	0	0	0	1	15.2	56.4	56.4	1	0	0	1	0	0	-3213
53+00.00	1	0	0	0	1	38.1	98.8	98.8	1	0	0	1	0	0	-3311.8
53+97.35	1	4.7	8.5	8.5	1	0.9	70.5	70.5	1	0	0	1	0	0	-3373.8
Grand Total:			8.5	8.5			**3382.3**	**3382.3**		0	0		0	0	

ɔss Section Set Name: Levee 1
Alignment Name: Floodwall/Levee
Input Grid Factor: 1 **Note:** All units in this report are in feet, square feet and cubic yards unless specified otherwise.

Baseline Station	Station Quantities - Cut Factor	Area	Volume	Adjusted	Fill Factor	Area	Volume	Adjusted	Added Quantities - Cut Factor	Volume	Adjusted	Fill Factor	Volume	Adjusted	Mass Ordinate
12+00.00	1	0	0	0	1	56.2	0	0	1	0	0	1	0	0	0
13+00.00	1	0	0	0	1	38	174.6	174.6	1	0	0	1	0	0	-174.6
14+00.00	1	0	0	0	1	32	129.7	129.7	1	0	0	1	0	0	-304.2
15+00.00	1	0	0	0	1	43.5	139.7	139.7	1	0	0	1	0	0	-443.9
16+00.00	1	0	0	0	1	45.6	164.8	164.8	1	0	0	1	0	0	-608.7
17+00.00	1	0	0	0	1	30.3	140.4	140.4	1	0	0	1	0	0	-749.1
18+00.00	1	0	0	0	1	17.8	88.9	88.9	1	0	0	1	0	0	-838.1
19+00.00	1	0	0	0	1	15.2	61.1	61.1	1	0	0	1	0	0	-899.1
20+00.00	1	0	0	0	1	26.2	76.6	76.6	1	0	0	1	0	0	-975.8
21+00.00	1	0	0	0	1	41.2	124.8	124.8	1	0	0	1	0	0	-1100.5
22+00.00	1	0	0	0	1	41.2	152.7	152.7	1	0	0	1	0	0	-1253.2
23+00.00	1	0	0	0	1	41.2	152.7	152.7	1	0	0	1	0	0	-1405.9
24+00.00	1	0	0	0	1	0	76.3	76.3	1	0	0	1	0	0	-1482.3
Grand Total:			0	0			**1482.3**	**1482.3**		0	0		0	0	

US Army Corps of Engineers, Chicago District	PROJECT TITLE: DPII - Site DPLV09 Segment 3	COMPUTED BY: FAYE LEFFLER	DATE: 6/11/2013
	COMPUTATION TITLE: Earthwork Inroads Report	CHECKED BY: ROBERT VANOER	DATE:

US Army Corps of Engineers Chicago District	PROJECT TITLE: DPII - Site DPLV09 Segment 3	COMPUTED BY: FAYE LEFFLER	DATE: 6/11/2013
	COMPUTATION TITLE: Earthwork Inroads Report	CHECKED BY: ROBERT VANOER	DATE:

Stripping Surface Area

Surface Area Report for Levee 1

Surface: DPLV09 Existing Topo
Fence Mode: Inside

True Area: sq ft	16020.6	SF
Planar Area: sq ft	16019.6	SF

Surface Area Report for Levee 2

Surface: DPLV09 Existing Topo
Fence Mode: Inside

True Area: sq ft	28751.8	SF
Planar Area: sq ft	28681.2	SF

DPRS15-Option 1 QUANTITIES COMPUTATIONS

Prepared by: Damian Allen
Date Prepared: Jan-12
Checked by: Laura Vanden Berg
Date Checked: Oct-12

Item 0003 - Clearing and Grubbing Area

Location	Area (AC)
Work Limts Area =	93.16
Reservoir Area	28.6
Staging Area	0.7
Spoil Area	12.3

Total Clearing and Grubbing Area = 41.6 AC

1. The clearing areas includes the reservoir, spoil, and staging area.
2. Entire site area contains trees.

Item 0004 - Topsoil Stripping

Topsoil Strip Volume
Reservoir Area = 45697.99 CY

1. 12" Topsoil will be stripped within the reservoir footprint.
2. Adjacent areas will be stripped to get more topsoil needed for seeding.

Item 0005AA & AB - Reservoir Excavation/Fill Volume

Inroads Triangle Volume Report
Original Surface: DPLV7A_Topo
Design Surface: DPLV7A_Resvr
Cut Factor: 1
Fill Factor: 1

Reservoir Clay Cut:	457285.4	CY
Topsoil Strip:	45697.99	CY
Total Clay Cut =	411587.41	CY
Reservoir Fill:	5210	CY

1. Total Clay Cut = Clay Cut - Topsoil Strip
2. Clay Cut includes reservoir and drainage swale.
3. Total Fill =

Bid Item 005AC & AD Reservoir Respread/Seeding

Reservoir Area =	1245065	SF
	28.58	AC
Topsoil Respread =	23056.76	CY

1. Topsoil respread = 6"

Item 0006 - Spoil Placement

Approximate height = 12 FT
Side Slopes = 1(V):4(H)

Total Spoil Fill =		406377.41	CY
Spoil Seeding Area =		1204305.4	SF
		27.65	AC
Topsoil Respread =		602152.7	CF
		22301.95	CY

1. Total Spoil Fill = Inroads Fill Vol. - Spoil Tsoil Respread Vol.
2. Topsoil respread = 6"

Item 0007- Storm Drain Structures

Length of 30" RCP = 350 LF
Riprap = 1.85 CY

1. Pipe measured in microstation
2. Riprap placed at upstream/downstream invert of 30" outfall pipe.
3. Riprap assumes 1' deep x 5'x5' area.

Item 0009/00010 - Excess Material Haul-Off

<u>Topsoil Strip Volume</u>
Unused Clay = 0.00 CY
Unused Topsoil = 339.28 CY

1. Unused Clay = Total Reservoir Cut - Reservoir Fill - Spoil Fill
2. Unused Topsoil = Reservoir Tsoil Strip - Reservoir Tsoil Respread - Spoil Tsoil Respread

DPRS15 QUANTITIES COMPUTATIONS

Prepared by: Laura Vanden Berg
Date: 9/25/2012
Checked by: Matt Cunningham
Date: 10/17/2012

Item 0003 - Clearing and Grubbing Area

Location	Area (AC)
Work Limts Area =	93.16
Reservoir Area	55.2
Staging Area	0.7
Spoil Area	0.0

Total Clearing and Grubbing Area = 55.9 AC

1. The clearing areas includes the reservoir, spoil, and staging area.
2. Entire site area contains trees.

Item 0004 - Topsoil Stripping

Topsoil Strip Volume
Reservoir Area = 92365.33 CY

1. 12" Topsoil will be stripped within the reservoir footprint.
2. Adjacent areas will be stripped to get more topsoil needed for seeding.

Item 0005AA & AB - Reservoir Excavation/Fill Volume

Inroads Triangle Volume Report
Original Surface: DPLV7A_Topo
Design Surface: DPLV7A_Resvr
Cut Factor: 1
Fill Factor: 1

Reservoir Clay Cut:	1198770.9	CY
Topsoil Strip:	92365.33	CY
Total Clay Cut =	1106405.57	CY
Reservoir Fill:	3083	CY

1. Total Clay Cut = Clay Cut - Topsoil Strip
2. Clay Cut includes reservoir and drainage swale.
3. Total Fill =

Bid Item 005AC & AD Reservoir Respread/Seeding

Reservoir Area =	2507525.6	SF
	57.56	AC
Topsoil Respread =	46435.66	CY

1. Topsoil respread = 6"

Item 0009/00010 - Excess Material Haul-Off

Topsoil Strip Volume

Unused Clay =	1103322.57	CY
Unused Topsoil =	45929.67	CY

1. Unused Clay = Total Reservoir Cut - Reservoir Fill
2. Unused Topsoil = Reservoir Tsoil Strip - Reservoir Tsoil Respread

FDRS01 QUANTITIES COMPUTATIONS

Prepared by:	Adam Tennant	
Checked by:	Brian Kootstra	Laura Vanden Berg
Date:	Jan-10	Oct-12

Item 0003 - Clearing and Grubbing Area

Assumptions: Area includes the PE Area and spoil area

Location	Area (AC)
RES	335.3
Spoil Area	113.3
Total Area =	448.6

(1)Area calculated from Inroads
There areas are dense with trees

Item 0005 - Reservoir Excavation

Cut: 3234682.4 CY

(1)The total cut volume includes the cut volume for the levee.

Item 0007 AA - Levee Fill Volume

Inroads Triangle Volume Report for Levee Fill

Original Surface:	DPRS24_topo
Design Surface:	DPRS24_Levee
Cut Factor:	1
Fill Factor:	1

Cut:	3234682.4	cu yd
Fill:	68303.4	cu yd
Net:	3166379	cu yd

Fill Volume =		68303.4	CY

At a small portion of the levee alignment, the top of levee elevation is lower than the existing grade . Therefore, there are cut volumes in the levee volume report. The cut volume is considered under the reservoir excavation volume.

Item 0007 AB - Levee Trench Fill

Levee Trench

Assumptions:	Width =	3	FT
	Depth =	5	FT
Length of Levee =		15502.3	FT
Trench Fill/Excavation Volume =		8612.38889	CY

Item 0008 - Spoil Construction

(1)Spoil Fill Required =		3166379	CY
		1962.64	AC-FT
Available Spoil Fill =		3205682	CY
Spoil Seeding Area =		113.3	AC
		4936554.4	SF
(2)Topsoil =		2468277.2	CF
		91417.6741	CY

(1)Spoil Fill = Reservoir Excavated Vol - Levee Fill Vol
The trench fill volume in not include with the spoil volume, becauce the trench excavated material balances with the trench fill material from the reservoir excavated volume.

(2)Assumed 6" Topsoil

Item 0007 AD - Levee Seeding Area

	Topsoil Stripping		Seeding Area	
Location	Planar Area (SF)	Topsoil Stripping (CY)(1)	True Area (SF)	Topsoil Vol. (CY)(3)
Levee Footprint	545550.60	20205.5778	545550.60	10102.79
PE Area(2)	235707.52	8729.908	235707.52	4364.954
Total =	781258.116	28935.4858	781258.12	14467.74

Levee Seeding Area =	17.9352185	AC

(1)Use 12inches for the topsoil stripping depth
(2)Area between the PE line and Levee outer toe. Area determined in microstation
(3)Use 6" for topsoil placement

Item 0006 - Topsoil Stripping

Assumptions: Topsoil will be stripped within the levee footprint and the 15 FT permanent easement (PE) area.
Adjacent areas will be stripped to get more topsoil needed for seeding
12" Topsoil will be stripped.

Required Topsoil Volume

Levee Seeding =		14467.7429	CY
Spoil Areas =		91417.6741	CY
Total =		105885.417	CY

Available Topsoil Volume

Levee Footprint=		20205.5778	CY
PE Area =		8729.908	CY
Levee Footptint + PE =		28935.4858	CY
Adjacent Areas =		76949.9312	CY
Total Stripping Topsoil Vol =		105885.417	CY

Item 0009 - Pump Station.

Pumpstation

Flow =		?200	cfs
Pumping Days =		?2	Days
36" Inlet RCP =		252	LF
36" Outlet RCP =		83	LF
		335	LF

Item 0011AA - 24" RCP

24" Inlet RCP 347 LF

Item 0004 Concrete Spillway

Weir Length =		305	FT
Weir Top EL =		637.3	FT
Weir Ext Toe EL =		627	FT
Weir Int Toe EL =		628	FT
x-Area =		82	SF
concrete volume=		926.296296	CY

Item 0004 Concrete Spillway

Weir Length =	305	FT
Weir Width =	40	FT
Weir Top EL =	642.7	

FPCI01 QUANTITIES COMPUTATIONS

Prepared by: Faye Leffler
Checked by: Laura Vanden Berg
Date prepared: Apr-10
Date checked Oct-12

Clearing and Grubbing

North Area to be cleared =	27127.16	SF
South Area to be cleared =	20550.87	SF
Total Area =	47678.03	SF
	1.094537	AC

Earthwork

Triangle Volume Report for Pumpstation and pipe structures excavation
Original Surface: FPCI01_topo
Design Surface: FPCI01_Pipe_Excavation
Cut Factor: 1
Fill Factor: 1

Cut:	40282.7	cu ft
Fill:	0	cu ft
Net:	40282.6	cu ft
Cut:	1492	cu yd
Fill:	0	cu yd
Net:	1491.9	cu yd

Total Cut Volume =	1492	CY

Restoration Seeding

Excavated Area =	10603	SF
Pumpstation Area =	400	SF
Seeding Area =	10203	SF
	0.234229	AC

Storm Sewers

Pumpstation Intake Pipe Length (12" RCP) =	60	LF
Pumpstation 12" RCP outlet pipe (w/o pipe jacking) =	255	LF
Pumpstation 12" RCP outlet pipe (with pipe jacking) =	120	LF

Erosion Control

Riprap Area = 350 SF

Pumpstation

*Pumps = Two - 5 cfs pumps

*Pump design provided by IDNR

US Army Corps of Engineers® Chicago District	PROJECT TITLE: DP II – Feasibility Study	COMPUTED BY: MWC	DATE: 8/30/11	SHEET: 1 of 1
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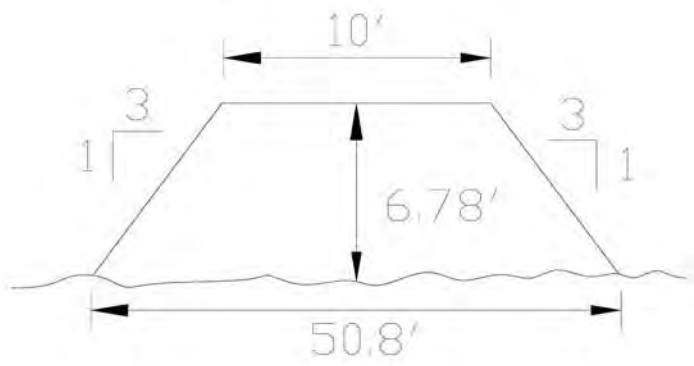
DPLV15

Levee Segment is 2,938 LF. Average height of the levee is 6.78 ft.



- Stripping 1ft of mat'l : [(50.8ft)(1ft)(2,938ft)]/27 = 5,528 CY
- Clay Needed for the Levee: 21,911 CY (from InRoads)
- Slit Trench: [(5 ft)(1.5 ft)(2,938 ft)]/27 = 816 CY
- 6" topsoil needed : [(53ft)(0.5ft)(2,938ft)]/27 = 2,884 CY
- Total clay needed: (21,911) + (5,528) - (2,884) + (816) = 25,371 CY

Permanent Easement Area = 6.8 acres

Temporary Easement Area = 2.2 acres

Total seeding = (6.8) + (2.2) = 9 acres

SCME02 QUANTITIES COMPUTATIONS

Prepared by: Faye Leffler
Checked by: Laura Vanden Berg
Prepared Date: Apr-10
Checked Date: Oct-12

Demolition

Items to be demolished		
Strip exising erosion cell grout at spillway, Area =	17987	SF
Demolition Spillway Inlet/headwall		
Remove 6" existing perforated underdrain pipe =	4400	LF
Remove 6" existing solid underdrain pipe =	1600	LF
Remove 12" existing solid underdrain pipe =	500	LF
Remove existing manholes and inlets		
Remove existng pumpstation intake inlet structure		

Reservoir Excavation Volume

Inroads Triangle Volume Report for East and West Reservoir Excavation
Original Surface: SCME02_topo
Design Surface: SCME02_PropReservoir
Cut Factor: 1
Fill Factor: 1

Cut:	5715824.2	cu ft
Fill:	2479.8	cu ft
Net:	5713344.5	cu ft
Cut:	211697.2	cu yd
Fill:	91.8	cu yd
Net:	211605.4	cu yd

Total Cut Volume = 211697.2 CY

Bid Item 0017 Reservoir Seeding

Reservoir Area =	722573.4	SF
	16.588	AC
Topsoil Vol =	13380.99	CY

Utility Modifications		
Existing Equalizer Pipe		
Fill Exising 60" equalizer pipe, Total length =	183	FT
Fill Volume =	133.0139	CY
Pumpstation Intake Pipe		
Extend intake pipe =	33	FT

Access Roadway		
Realigned Access Road Horizontal Length =	150	FT
Longitudinal Slope =	10	%
True Legnth =	150.7481	FT
Access Road Width =	16	FT
Roadway Area =	2411.97	SF

Modify Existing Spillway		
Extend Chute Spillway =	33	FT
Erosion Cell Grout =	18699.9	SF
Filter Fabric =	18699.9	SF

Equilizer Pipe

New Pipe Length = 240 FT

Item 0008 - Spoil Construction

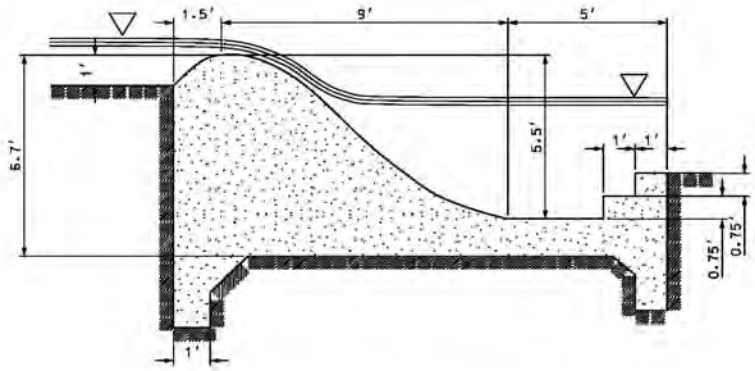
Spoil Height = 23 FT

Side Slopes = 1(V):5(H)

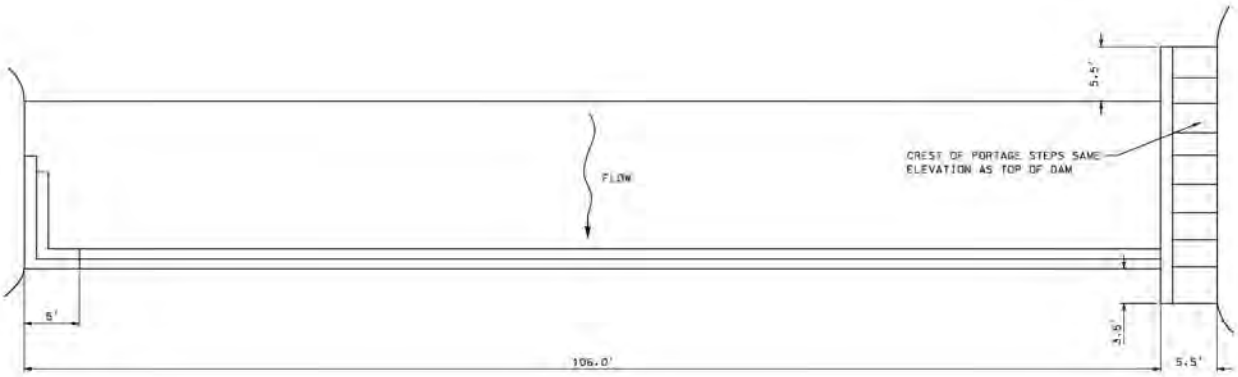
Spoil Fill Required =		211697.2	CY
		131.22	AC-FT
Available Spoil Fill #1 =		206542.8	CY
Spoil Seeding Area =		384983.9	SF
		8.8	AC
(1)Topsoil =		192492	CF
		7129.331	CY

(1)Assumed 6" Topsoil

US Army Corps of Engineers® Chicago District	PROJECT TITLE: **DP II – Feasibility Study**	COMPUTED BY: **MWC**	DATE: **10/20/11**	SHEET: 1 of 2
	COMPUTATION TITLE: **Quantities for Touhy Dam Removal**	CHECKED BY: **AK**	DATE: **10/21/11**	



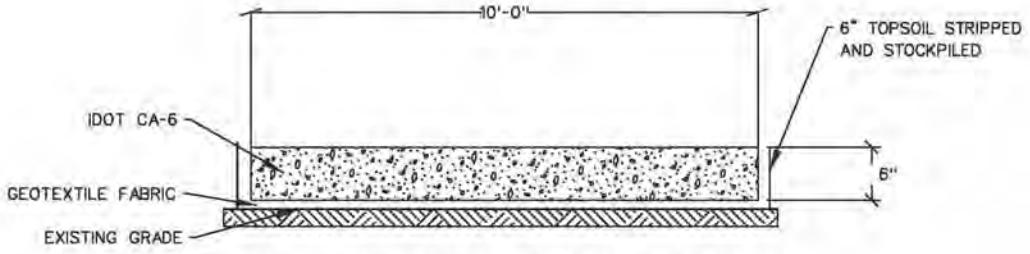
TOUHY AVENUE DAM CROSS SECTION



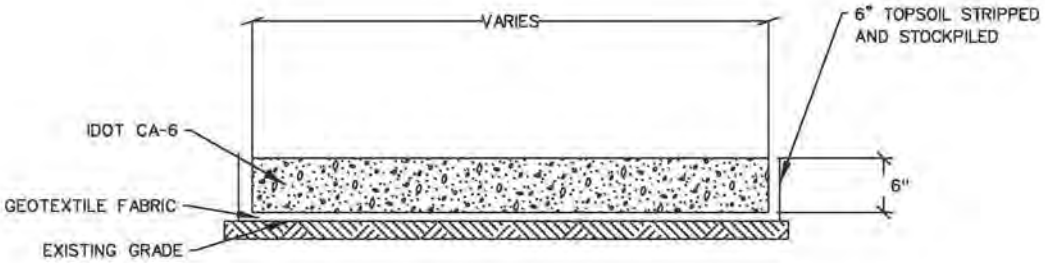
TOUHY AVENUE DAM PLAN VIEW

- The clearing and grubbing area is based on the temporary access road and staging/storage area layout.
- The area for the access road and staging/storage area was measured in the site layout drawing file, Touhy_Dam_Site_Plan_2D.dgn, stored in ProjectWise
- Clearing and grubbing area = 30,060.6 sq. ft = 0.7 acres
- Landscape restoration is equal to the acres for clearing and grubbing = 0.7 acres
- Sediment removal is approx. 50 CY. The assumption was made that less sediment is present than at previously surveyed dams on the river such as Armitage dam.
- Total temporary chain link fencing, 6 ft high = 2,181 ft
- The temporary fencing was measured along the work limits up to the approx. river edge seen in the aerial photo. 10 ft was deducted from the total fencing to allow for the gate at the site entrance
- One temporary 10 ft wide, 6 ft high gate at site entrance required

US Army Corps of Engineers® Chicago District	PROJECT TITLE: DPII – Feasibility Study	COMPUTED BY: MWC	DATE: 10/20/11	SHEET: 2 of 2
	COMPUTATION TITLE: Quantities for Touhy Dam Removal	CHECKED BY: AK	DATE: 10/21/11	



TOUHY DAM GRAVEL ACCESS ROAD (TYP)
N.T.S.



TOUHY DAM GRAVEL STAGING & STORAGE (TYP)
N.T.S.

- Stripping 6" of topsoil from the temp. access road and staging/storage area
  = (30,060.6 sq. ft)(0.5 ft)(1 CY/27 cu. Ft) = 556.7 CY
- Unit weight of IDOT CA-6 stone is approx. 130 lb/cu. Ft
- IDOT CA-6 stone needed for temp. access road and staging/storage area
  = (30,060.6 sq. ft)(0.5 ft)(130 lb/cu. Ft)(1 ton/2,000 lb) = 977.0 tons
- Geotextile fabric for staging/storage area:
  = (75 ft)(85 ft)(1 sq. ft/9 SY) = 708.3 SY
- Geotextile fabric for temporary access road:
  = (23,710.8 sq. ft)(1 sq. ft/9 SY) = 2,634.5 SY
- Dam is made of reinforced concrete
- Dam concrete volume = (58.2 sq. ft)(106.0 ft)(1 CY/27 cu. Ft) = 228.5 CY
- Take 25% of the dam volume for the wing walls and stairs = 57.1 CY
- Total Concrete volume for the dam = (228.5 CY + 57.1 CY) = 285.6 CY

WLME01 QUANTITIES COMPUTATIONS

Prepared by: Faye Leffler
Checked by: Laura Vanden Berg
Prepared Date: Apr-10
Checked Date: Oct-12

Demolition

Items to be demolished
Existing Pedestrian Bridge = 150 LF

Item 0003 - Clearing and Grubbing Area

Location	Area (AC)
Spoil Area 1	0.0
*Spoil Area 2	7.0
Total Area =	7.0

*Clearing and Grubbing Area = 3.5 AC

*Approximately half of the site at Spoil area 2 contains trees. Assume 50% of the site will be cleared.

Item 0004 - Reservoir Expansion Excavation Volume

Inroads Triangle Volume Report
Original Surface: WLME01_topo
Design Surface: WLME01_ReservoirExpansion
Cut Factor: 1
Fill Factor: 1

Cut:	7020614.7	cu ft
Fill:	178895.4	cu ft
Net:	6841719.3	cu ft

Cut:	260022.8	cu yd
Fill:	6625.8	cu yd
Net:	253397	cu yd

Total Cut Volume = 253397 CY

Items 0007 AA, 0007 AB and 0007 AC - Spoil Constructior

Spoil #1 Approximate Height = 14 FT
Spoil #1 Side Slopes = Varies from 1(V):6(H) to 1(V):12(H)
Spoil #2 Approximate Height = Varies from 18 to 28 feet
Spoil #2 Side Slopes = Varies from 1(V):2.5(H) to 1(V):5(H)

Spoil Fill Required =		253397	CY
		157.06	AC-FT
Available Spoil Fill #1 =		89321.8	CY
Available Spoil Fill #2 =		160194.2	CY
Total =		249516	CY
Seeding Area #1 =		296583.5	SF
Seeding Area #2 =		311234.4	SF
Total =		607817.9	SF
		14.0	AC
(1)Topsoil =		303908.95	CF
		11255.887	CY

(1)Assumed 6" Topsoil

Item 0005 - Topsoil Stripping

Assumptions: Topsoil will be stripped within the reservoir expanded area and spoil areas.
Topsoil willl be imported, if more topsoil is needed.
6" Topsoil will be stripped.

Required Topsoil Volume

Spoil Areas =		11255.887	CY
Reservoir =		8105.32037	CY
Total =		19361.2074	CY

Available Topsoil Volume

Spoil Area 1 =		5455.6537	CY
Spoil Area 2 =		5643.30741	CY
Expanded Reservoir Area =		7713.90185	CY
Available Topsoil Total =		18812.863	CY
Import Topsoil =		548.344444	CY
Total =		19361.2074	CY
Total Stripping Topsoil Vol =		19361.2074	CY

Bid Item 0011 Reservoir Seeding

Reservoir Area =	437687.3	SF
	10.0479178	AC
Topsoil Vol =	8105.32037	CY

Item 0010 - Storm Drainage Structures

18" Underdrain Storm System	1800	LF

US Army Corps of Engineers Chicago District	PROJECT TITLE: DPII - Site DPLV04	COMPUTED BY: FAYE LEFFLER	DATE: 6/11/2013
	COMPUTATION TITLE: QUANTITY COMPUTATIONS	CHECKED BY: ROBERT VANOER	DATE:

Bid Item 0001 - Mobilization and Demobilization

See Cost Appendix and MII estimates for mobilization and demolization assumptions.

Bid Item 0002 - Maintenance of Traffic

See Cost Appendix and MII estimates for Maintenance of Traffic assumptions

Bid Item 0003 - Clearing and Grubbing

The clearing and grubbing areas will include the worklimits (permanent easement) and staging areas (temporary easement).
The permanent easement (work limits) area is 15 feet from the toe of the levee or centerline line of the floodwall.
The areas were computed in microstation.

Location	Area (AC)
Work Limits (Permanent Easement Area)	6.8
Staging Area	4.6

Total Clearing and Grubbing Area =	11.4	AC

Bid Irem 0004 - Floodwall

Floodwall	Floodwall Length (FT)	*Concrete Height (FT)	**SSP Height (FT)	Concrete Width (FT)	Concrete Volume (CY)	SSP Area (SF)
Sta. 6+20 to 14+70	850	15.4	40.2	1.167	565.77889	35870
Sta. 34+00 to 47+40	1340	17.2	45.6	1.167	996.18578	63784
Total	2190				1561.9647	99654

Total Concrete Volume (CY) =	1562.0	CY
Total SSP Area (SF) =	99654	SF

The levee/floodwall top elevation: EL 628.39
The concrete height is relative to the existing grade and varies along the alignment and height was determined from the alignment profile.
*Concrete height includes the 2ft concrete embeddment. SSP area includes the 2 feet embeddment into the concrete.
**assumed 3 SSP to 1 concrete ratio

Bid Item 0005 - Road Closures

Road closure at W. Grand Ave, 4-lane road plus one turning lane, length =	55	FT
Road closure at River Rd, 4-lane road plus 8 ft wide median =	52	FT

Assumed each lane is 11 feet.

Bid Item 0006 - Levee

Stripping

The base of the levee will be stripped 1ft deep.
The base of the levee was determined by multipling the true area of the levee perimeter by 1ft.
The levee perimeter was developed from the levee surface inroads. The surface area was then computed in inroads using the levee perimeter and the existing grade surface.
The area provided in the table below was developed from an inroads surface area report (see earthwork computations).

Levee	Area (SF)	Depth (1FT)	Volume (CY)
Levee1	10830.3	1	401.1222222
Levee2	49324.4	1	1826.82963
Levee3	17382.7	1	643.8037037
Levee4	3428.6	1	126.9851852
Total			2998.740741

Imprevious Fill

The imprevious fill (levee fill) was computed using average end-area method in Inroads with cross-section cuts every 100 ft (see earthwork computations).
The levee is 10-feet wide at the top with 1(V):3(H) side slopes.
The total imprevious fill includes the volume of the levee fill and stripping.

Levee	Levee Volume (CY)	Strip Volume (CY)	Total
Levee1	2083.9	401.1222222	2485.022222
Levee2	16851.9	1826.82963	18678.72963
Levee3	2629.4	643.8037037	3273.203704
Levee4	76.7	126.9851852	203.6851852
Total			24640.64074

Bid Item 0007 - Road Raise at 5th Ave.

Existing Conditions:
Assumptions: 4-lane road, 11 feet wide lane, no shoulders
Total Width of Road: 44 feet

Design Parameters

Road raise elevation at levee =	628.39	
Longitudinal slope =	1%	
Cross slope =	1.50%	
Side Slopes =	1(V):2(H)	
Number of Lanes =	4	
Lane Width =	11	FT
No Shoulders		

Road Reconstruction

Road Reconstruction includes removal of existing roadway and curbs.
Assumed existing roadway depth is 1 foot. The surface area of the existing road is also the proposed road surface area and determined in inroads (see earthwork computation).

Roadway Demo	Depth (ft)	Area (SF)	Volume (CY)
Bituminous Surface Course & PCC Base Course	1	16409.7	607.8

Road Reconstruction	Depth (ft)	Area (SF)	Volume (CY)
PCC Base Course	0.8125	16409.7	493.8
Sub Base Granular Fill	0.5	16409.7	303.9

Assumed portland cement concrete pavement will be placed:

Road Fill

The road fill was computed using average end-area method in Inroads with cross-section cuts every 50 ft (see earthwork computations).

Road Fill =	583.9 CY

Bid Item 0007 - Interior Drainage

Interior drainage was not evaluated for the DPII study and will be evaluated during the PED phase.
From aerial views, multiple outlets were observed that discharges into the river.

The cost estimate for Interior Drainage was determined using Libertyville Estate levee/floodwall project.
The costs were developed using cost per linear foot of floodwall protection.

Total Length of Floodwall =	2190	FT
Total Length of Levee =	4240	FT

US Army Corps of Engineers Chicago District	PROJECT TITLE: DPII - Site DPLV04	COMPUTED BY: FAYE LEFFLER	DATE: 6/11/2013
	COMPUTATION TITLE: EARTHWORK INROADS REPORT	CHECKED BY: ROBERT VANOER	DATE:

Impervious Fill

ss Section Set Name: Levee 1
Alignment Name: Levee/Floodwall
Input Grid Factor: 1 **Note:** All units in this report are in feet, square feet and cubic yards unless specified otherwise.

Baseline Station	Station Quantities - Cut Factor	Cut Area	Cut Volume	Cut Adjusted	Fill Factor	Fill Area	Fill Volume	Fill Adjusted	Added Quantities - Cut Factor	Cut Volume	Cut Adjusted	Fill Factor	Fill Volume	Fill Adjusted	Mass Ordinate
0+00.00	1	6.1	0	0	1	0	0	0	1	0	0	1	0	0	0
1+00.00	1	0	11.3	11.3	1	53.4	98.8	98.8	1	0	0	1	0	0	-87.5
2+00.00	1	0	0	0	1	232	528.4	528.4	1	0	0	1	0	0	-615.9
3+00.00	1	0	0	0	1	72.3	563.5	563.5	1	0	0	1	0	0	-1179.3
4+00.00	1	0	0	0	1	59.9	244.9	244.9	1	0	0	1	0	0	-1424.2
5+00.00	1	0	0	0	1	67.3	235.7	235.7	1	0	0	1	0	0	-1659.9
6+00.00	1	0	0	0	1	77.8	268.7	268.7	1	0	0	1	0	0	-1928.6
7+00.00	1	0	0	0	1	0	144	144	1	0	0	1	0	0	-2072.6
Grand Total:			11.3	11.3			**2083.9**	**2083.9**		0	0		0	0	

ss Section Set Name: Levee 2
Alignment Name: Levee/Floodwall
Input Grid Factor: 1 **Note:** All units in this report are in feet, square feet and cubic yards unless specified otherwise.

Baseline Station	Station Quantities - Cut Factor	Cut Area	Cut Volume	Cut Adjusted	Fill Factor	Fill Area	Fill Volume	Fill Adjusted	Added Quantities - Cut Factor	Cut Volume	Cut Adjusted	Fill Factor	Fill Volume	Fill Adjusted	Mass Ordinate
15+00.00	1	0	0	0	1	0	0	0	1	0	0	1	0	0	0
16+00.00	1	0	0	0	1	168.2	311.5	311.5	1	0	0	1	0	0	-311.5
17+00.00	1	0	0	0	1	185.5	655.1	655.1	1	0	0	1	0	0	-966.6
18+00.00	1	0	0	0	1	256	817.6	817.6	1	0	0	1	0	0	-1784.2
19+00.00	1	0	0	0	1	220.9	883.2	883.2	1	0	0	1	0	0	-2667.4
20+00.00	1	0	0	0	1	244.6	862.1	862.1	1	0	0	1	0	0	-3529.5
21+00.00	1	0	0	0	1	266.4	946.2	946.2	1	0	0	1	0	0	-4475.7
22+00.00	1	0	0	0	1	273.5	999.7	999.7	1	0	0	1	0	0	-5475.4
23+00.00	1	0	0	0	1	277.9	1021.1	1021.1	1	0	0	1	0	0	-6496.5
24+00.00	1	0	0	0	1	292.9	1057	1057	1	0	0	1	0	0	-7553.6
25+00.00	1	0	0	0	1	253.2	1011.3	1011.3	1	0	0	1	0	0	-8564.9
26+00.00	1	0	0	0	1	220.9	878.1	878.1	1	0	0	1	0	0	-9442.9
27+00.00	1	0	0	0	1	218.1	812.9	812.9	1	0	0	1	0	0	-10255.9
28+00.00	1	0	0	0	1	244.1	855.8	855.8	1	0	0	1	0	0	-11111.7
29+00.00	1	0	0	0	1	252.4	919.4	919.4	1	0	0	1	0	0	-12031.1
30+00.00	1	0	0	0	1	261.7	952.1	952.1	1	0	0	1	0	0	-12983.2
31+00.00	1	0	0	0	1	259.5	965.2	965.2	1	0	0	1	0	0	-13948.4
32+00.00	1	0	0	0	1	264.9	971	971	1	0	0	1	0	0	-14919.4
33+00.00	1	0.1	0.1	0.1	1	269.8	990.1	990.1	1	0	0	1	0	0	-15909.3
34+00.00	1	0	0.1	0.1	1	239.1	942.4	942.4	1	0	0	1	0	0	-16851.6
Grand Total:			0.3	0.3			**16851.9**	**16851.9**		0	0		0	0	

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	COMPUTATION TITLE: EARTHWORK INROADS REPORT	CHECKED BY: ROBERT VANOER	DATE:

ɔss Section Set Name: Levee 3
Alignment Name: Levee/Floodwall
Input Grid Factor: 1 **Note:** All units in this report are in feet, square feet and cubic yards unless specified otherwise.

Baseline Station	Station Quantities								Added Quantities						Mass Ordinate
	Cut				Fill				Cut			Fill			
	Factor	Area	Volume	Adjusted	Factor	Area	Volume	Adjusted	Factor	Volume	Adjusted	Factor	Volume	Adjusted	
48+00.00	1	0	0	0	1	0	0	0	1	0	0	1	0	0	0
49+00.00	1	0	0	0	1	193.4	358.1	358.1	1	0	0	1	0	0	-358.1
50+00.00	1	0	0	0	1	89.4	523.7	523.7	1	0	0	1	0	0	-881.8
51+00.00	1	0	0	0	1	77	308.2	308.2	1	0	0	1	0	0	-1190
52+00.00	1	0	0	0	1	60	253.7	253.7	1	0	0	1	0	0	-1443.6
53+00.00	1	0	0	0	1	55.9	214.7	214.7	1	0	0	1	0	0	-1658.3
54+00.00	1	0	0.1	0.1	1	42.7	182.7	182.7	1	0	0	1	0	0	-1841
55+00.00	1	0	0.1	0.1	1	59.9	190.1	190.1	1	0	0	1	0	0	-2031
56+00.00	1	0	0	0	1	56	214.7	214.7	1	0	0	1	0	0	-2245.7
57+00.00	1	6.9	12.8	12.8	1	33.1	164.9	164.9	1	0	0	1	0	0	-2397.8
58+00.00	1	7.3	26.3	26.3	1	33.4	123.1	123.1	1	0	0	1	0	0	-2494.6
59+00.00	1	11.9	35.6	35.6	1	15.1	89.9	89.9	1	0	0	1	0	0	-2548.9
59+20.00	1	0	4.4	4.4	1	0	5.6	5.6	1	0	0	1	0	0	-2550.1
Grand Total:			79.3	79.3			**2629.4**	**2629.4**		0	0		0	0	

ɔss Section Set Name: Levee 4
Alignment Name: Levee/Floodwall
Input Grid Factor: 1 **Note:** All units in this report are in feet, square feet and cubic yards unless specified otherwise.

Baseline Station	Station Quantities								Added Quantities						Mass Ordinate
	Cut				Fill				Cut			Fill			
	Factor	Area	Volume	Adjusted	Factor	Area	Volume	Adjusted	Factor	Volume	Adjusted	Factor	Volume	Adjusted	
58+80.00	1	0	0	0	1	0	0	0	1	0	0	1	0	0	0
59+00.00	1	0	0	0	1	0	0	0	1	0	0	1	0	0	0
60+00.00	1	0	0	0	1	4	7.4	7.4	1	0	0	1	0	0	-7.4
61+00.00	1	0	0	0	1	9.2	24.4	24.4	1	0	0	1	0	0	-31.8
62+00.00	1	0	0	0	1	4	24.4	24.4	1	0	0	1	0	0	-56.2
63+00.00	1	0	0	0	1	3.5	14	14	1	0	0	1	0	0	-70.2
64+00.00	1	4.7	8.7	8.7	1	0	6.6	6.6	1	0	0	1	0	0	-68
Grand Total:			8.7	8.7			**76.7**	**76.7**		0	0		0	0	

US Army Corps of Engineers Chicago District	PROJECT TITLE: DPII - Site DPLV04	COMPUTED BY: FAYE LEFFLER	DATE: 6/11/2013
	COMPUTATION TITLE: EARTHWORK INROADS REPORT	CHECKED BY: ROBERT VANOER	DATE:

Stripping

Surface Area Report for Levee 1

Surface: DPLV04_1ft_Contours
Fence Mode: Inside

True Area:	10830.3	SF
Planar Area:	10770.6	SF

Surface Area Report for Levee 2

Surface: DPLV04_1ft_Contours
Fence Mode: Inside

True Area: sq ft	49324.4	SF
Planar Area: sq ft	49061.7	SF

Surface Area Report for Levee 3

Surface: DPLV04_1ft_Contours
Fence Mode: Inside

True Area: sq ft	17382.7	SF
Planar Area: sq ft	17340.9	SF

Surface Area Report for Levee 4

Surface: DPLV04_1ft_Contours
Fence Mode: Inside

True Area: sq ft	3428.6	SF
Planar Area: sq ft	3427.5	SF

Roadraise Fill

ss Section Set Name: 5thAve_roadEdge
Alignment Name: 5thAve_roadEdge
Input Grid Factor: 1 **Note:** All units in this report are in feet, square feet and cubic yards unless specified otherwise.

Baseline Station	Station Quantities								Added Quantities						Mass Ordinate
	Cut				Fill				Cut			Fill			
	Factor	Area	Volume	Adjusted	Factor	Area	Volume	Adjusted	Factor	Volume	Adjusted	Factor	Volume	Adjusted	
4+50.00	1	0	0	0	1	0	0	0	1	0	0	1	0	0	0
4+84.08	1	0.2	0.1	0.1	1	19.9	12.6	12.6	1	0	0	1	0	0	-12.5
5+00.00	1	0	0	0	1	25.9	13.5	13.5	1	0	0	1	0	0	-25.9
5+50.00	1	0	0	0	1	36.1	57.5	57.5	1	0	0	1	0	0	-83.4
6+00.00	1	0	0	0	1	50.3	80.1	80.1	1	0	0	1	0	0	-163.5
6+50.00	1	0	0	0	1	70.4	111.8	111.8	1	0	0	1	0	0	-275.2
6+50.79	1	0	0	0	1	70.3	2.1	2.1	1	0	0	1	0	0	-277.3
6+90.79	1	0	0	0	1	68	102.5	102.5	1	0	0	1	0	0	-379.8
7+00.00	1	0	0	0	1	66.1	22.9	22.9	1	0	0	1	0	0	-402.6
7+50.00	1	0	0	0	1	44.5	102.4	102.4	1	0	0	1	0	0	-505
8+00.00	1	0	0	0	1	20.7	60.4	60.4	1	0	0	1	0	0	-565.4
8+37.54	1	0.4	0.3	0.3	1	4.3	17.3	17.3	1	0	0	1	0	0	-582.5
8+50.00	1	0	0.1	0.1	1	0	1	1	1	0	0	1	0	0	-583.3
Grand Total:			0.5	0.5			**583.9**	**583.9**		0	0		0	0	

US Army Corps of Engineers Chicago District	PROJECT TITLE: DPII - Site DPLV04	COMPUTED BY: FAYE LEFFLER	DATE: 6/11/2013
	COMPUTATION TITLE: EARTHWORK INROADS REPORT	CHECKED BY: ROBERT VANOER	DATE:

Roadraise Surface Area

Surface Area Report for proposed road raise surface

Surface: 5th Ave RoadRaise
Fence Mode: Inside

True Area: sq ft	16409.7	SF
Planar Area: sq ft	16156.7	SF

US Army Corps of Engineers Chicago District	PROJECT TITLE: DPII - Site DPLV05 (Alignment 3)	COMPUTED BY: FAYE LEFFLER	DATE: 6/11/2013
	COMPUTATION TITLE: QUANTITY COMPUTATIONS	CHECKED BY: ROBERT VANOER	DATE:

Bid Item 0001 - Mobilization and Demobilization

See Cost Appendix and MII estimates for mobilization and demolization assumptions.

Bid Item 0002 - Maintenance of Traffic

See Cost Appendix and MII estimates for Maintenance of Traffic assumptions

Bid Item 0003 - Clearing and Grubbing

The clearing and grubbing areas will include the worklimits (permanent easement) and staging areas (temporary easement).
The permanent easement (work limits) area is 15 feet from the toe of the levee or centerline line of the floodwall.
The areas were computed in microstation.

Location	Area (AC)
Work Limits (Permanent Easement Area)	8.2
Staging Area	5.6

Total Clearing and Grubbing Area =	13.8	AC

Bid Item 0004 - Floodwall

Floodwall	Floodwall Length (FT)	*Concrete Height (FT)	**SSP Height (FT)	Concrete Width (FT)	Concrete Volume (CY)	SSP Area (SF)
Sta. 53+73 to 55+41	168	16.3	42.9	1.167	118.35973	7543.2
Sta. 55+41 to 55+64	23	20.3	54.9	1.167	20.180456	1308.7
Sta. 55+64 to 60+23	459	17.3	45.9	1.167	343.2147	21986.1
Sta. 60+23 to 60+64	41	19.3	51.9	1.167	34.201744	2209.9
Sta. 60+64 to 61+68	104	16.2	42.6	1.167	72.8208	4638.4
Sta. 61+68 to 62+22	54	11.2	27.6	1.167	26.1408	1598.4
Sta. 68+70 to 73+50	480	3.3	3.9	1.167	68.464	2832
Sta. 73+50 to 77+88	438	3	3	1.167	56.794	2190
Sta. 78+34 to 78+49	15	2.5	1.5	1.167	1.6208333	52.5
Total	1782				741.79707	44359.2

Total Concrete Volume (CY) =	741.8	CY
Total SSP Area (SF) =	44359.2	SF

The levee/floodwall top elevation: EL 629.31
The concrete height is relative to the existing grade and varies along the alignment and height was determined from the alignment profile.
*Concrete height includes the 2ft concrete embeddment. SSP area includes the 2 feet embeddment into the concrete.
**assumed 3 SSP to 1 concrete ratio

Bid Item 0005 - Road Closures

Road closure at Irving Park Rd, 4-lane road plus one turning lane, length =	55	FT
Road closure at River Rd, 4-lane road, Length =	44	FT
Road closure at River Rd, 4-lane road plus one turning lane, Length =	55	FT

Assumed each lane is 11 feet.

Bid Item 0006 - Levee

Stripping

The base of the levee will be stripped 1ft deep.
The base of the levee was determined by multipling the true area of the levee perimeter by 1ft.
The levee perimeter was developed from the levee surface inroads. The surface area was then computed in inroads using the levee perimeter and the existing grade surface.
The area provided in the table below was developed from an inroads surface area report (see earthwork computations).

Levee	Area (SF)	Depth (1FT)	Volume (CY)
Levee1	4504.8	1	166.8444444
Levee2	3898.3	1	144.3814815
Levee3	101714.1	1	3767.188889
Levee4	4583.7	1	169.7666667
Total			4248.181481

Imprevious Fill

The imprevious fill (levee fill) was computed using average end-area method in Inroads with cross-section cuts every 100 ft (see earthwork computations).
The levee is 10-feet wide at the top with 1(V):3(H) side slopes.
The total imprevious fill includes the volume of the levee fill and stripping.

Levee	Levee Volume (CY)	Strip Volume (CY)	Total
Levee1	182.3	166.8444444	349.1444444
Levee2	732.2	144.3814815	876.5814815
Levee3	28694.5	3767.188889	32461.68889
Levee4	115.8	169.7666667	285.5666667
Total			33972.98148

Bid Item 0007 - Interior Drainage

Interior drainage was not evaluated for the DPII study and will be evaluated during the PED phase.
From aerial views, multiple outlets were observed that discharges into the river.

The cost estimate for Interior Drainage was determined using Libertyville Estate levee/floodwall project.
The costs were developed using cost per linear foot of floodwall protection.

Total Length of Floodwall =	1782	FT
Total Length of Levee =	5576	FT

Bid Item 0008 - Retaining Wall Modifications

An existing retaining wall is supporting River Rd between Sta 62+22 and Sta. 63+44. The retaining wall will be raised to the design elevation and also act as a floodwall.

Approx. length of retaining wall =	122	LF
Assume wall is 3 feet above existing grade (623), top of wall EL =	626	EL
Levee/Floodwall Design EL =	629.31	EL
Existing retaining wall raise height =	3.31	FT

US Army Corps of Engineers Chicago District	PROJECT TITLE: DPII - Site DPLV05 (Alignment 3)	COMPUTED BY: FAYE LEFFLER	DATE: 6/11/2013
	COMPUTATION TITLE: Earthwork Inroads Report	CHECKED BY: ROBERT VANOER	DATE:

Impervious Fill

Levee 3
oss Section Set Name: Levee/Floodwall Alignment 3
Alignment Name: Levee/Floodwall Alignment 3
Input Grid Factor: 1 **Note:** All units in this report are in feet, square feet and cubic yards unless specified otherwise.

Baseline Station	Station Quantities								Added Quantities						Mass Ordinate
	Cut				Fill				Cut			Fill			
	Factor	Area	Volume	Adjusted	Factor	Area	Volume	Adjusted	Factor	Volume	Adjusted	Factor	Volume	Adjusted	
8+20.00	1	0	0	0	1	54.1	0	0	1	0	0	1	0	0	0
9+00.00	1	0	0	0	1	138.8	285.8	285.8	1	0	0	1	0	0	-285.8
10+00.00	1	0	0	0	1	117.3	474.3	474.3	1	0	0	1	0	0	-760.1
11+00.00	1	0	0	0	1	167.7	527.7	527.7	1	0	0	1	0	0	-1287.8
12+00.00	1	0	0	0	1	202.2	685	685	1	0	0	1	0	0	-1972.7
13+00.00	1	0	0	0	1	213.2	769.3	769.3	1	0	0	1	0	0	-2742
14+00.00	1	0	0	0	1	216.5	795.8	795.8	1	0	0	1	0	0	-3537.8
15+00.00	1	0	0	0	1	204.6	779.8	779.8	1	0	0	1	0	0	-4317.6
16+00.00	1	0	0	0	1	212.2	771.8	771.8	1	0	0	1	0	0	-5089.4
17+00.00	1	0	0	0	1	204.4	771.5	771.5	1	0	0	1	0	0	-5860.9
18+00.00	1	0	0	0	1	232.7	809.6	809.6	1	0	0	1	0	0	-6670.5
19+00.00	1	0	0	0	1	360.4	1098.4	1098.4	1	0	0	1	0	0	-7768.8
20+00.00	1	0	0	0	1	147.7	940.8	940.8	1	0	0	1	0	0	-8709.7
21+00.00	1	0	0	0	1	97.9	454.8	454.8	1	0	0	1	0	0	-9164.4
22+00.00	1	0	0	0	1	62.4	296.8	296.8	1	0	0	1	0	0	-9461.2
23+00.00	1	0	0	0	1	70.7	246.4	246.4	1	0	0	1	0	0	-9707.7
24+00.00	1	0	0	0	1	70.7	261.9	261.9	1	0	0	1	0	0	-9969.6
25+00.00	1	0	0	0	1	88	293.9	293.9	1	0	0	1	0	0	-10263.5
26+00.00	1	0	0	0	1	106.5	360.2	360.2	1	0	0	1	0	0	-10623.7
27+00.00	1	0	0	0	1	100.7	383.7	383.7	1	0	0	1	0	0	-11007.4
28+00.00	1	0	0	0	1	111.7	393.4	393.4	1	0	0	1	0	0	-11400.8
29+00.00	1	0	0	0	1	103.4	398.3	398.3	1	0	0	1	0	0	-11799.1
30+00.00	1	0	0	0	1	107.4	390.3	390.3	1	0	0	1	0	0	-12189.4
31+00.00	1	0	0	0	1	112.2	406.6	406.6	1	0	0	1	0	0	-12596
32+00.00	1	0	0	0	1	110.2	411.8	411.8	1	0	0	1	0	0	-13007.7
33+00.00	1	0	0	0	1	313.1	783.8	783.8	1	0	0	1	0	0	-13791.5
34+00.00	1	0	0	0	1	93.6	753.1	753.1	1	0	0	1	0	0	-14544.6
35+00.00	1	0	0	0	1	75	312.2	312.2	1	0	0	1	0	0	-14856.8
36+00.00	1	0	0	0	1	75.7	279.1	279.1	1	0	0	1	0	0	-15135.9
37+00.00	1	0	0	0	1	64.9	260.4	260.4	1	0	0	1	0	0	-15396.3
38+00.00	1	0	0	0	1	71.3	252.2	252.2	1	0	0	1	0	0	-15648.5
39+00.00	1	0	0	0	1	167.4	442.1	442.1	1	0	0	1	0	0	-16090.6
40+00.00	1	0	0	0	1	355.4	968.3	968.3	1	0	0	1	0	0	-17058.9
41+00.00	1	0	0	0	1	169.9	972.9	972.9	1	0	0	1	0	0	-18031.8
42+00.00	1	0	0	0	1	213.5	710	710	1	0	0	1	0	0	-18741.8
43+00.00	1	0	0	0	1	217.3	797.7	797.7	1	0	0	1	0	0	-19539.5
44+00.00	1	0	0	0	1	216.8	803.9	803.9	1	0	0	1	0	0	-20343.4
45+00.00	1	0	0	0	1	214.2	798.1	798.1	1	0	0	1	0	0	-21141.5
46+00.00	1	0	0	0	1	242.4	845.5	845.5	1	0	0	1	0	0	-21986.9
47+00.00	1	0	0	0	1	243.2	899.2	899.2	1	0	0	1	0	0	-22886.1
48+00.00	1	0	0	0	1	228.1	872.8	872.8	1	0	0	1	0	0	-23758.9
49+00.00	1	0	0	0	1	263.3	910	910	1	0	0	1	0	0	-24668.9
50+00.00	1	0	0	0	1	219	893.2	893.2	1	0	0	1	0	0	-25562.1
51+00.00	1	0	0	0	1	227.8	827.4	827.4	1	0	0	1	0	0	-26389.5
52+00.00	1	0	0	0	1	221.2	831.5	831.5	1	0	0	1	0	0	-27221
53+00.00	1	0	0	0	1	220.4	817.8	817.8	1	0	0	1	0	0	-28038.8
53+72.86	1	0	0	0	1	265.5	655.7	655.7	1	0	0	1	0	0	-28694.5
Grand Total:			0	0			**28694.5**	**28694.5**		0	0		0	0	

US Army Corps of Engineers Chicago District	PROJECT TITLE: DPII - Site DPLV05 (Alignment 3)	COMPUTED BY: FAYE LEFFLER	DATE: 6/11/2013
	COMPUTATION TITLE: Earthwork Inroads Report	CHECKED BY: ROBERT VANOER	DATE:

Levee 4
oss Section Set Name: Levee/Floodwall Alignment 3_1
Alignment Name: Levee/Floodwall Alignment 3
Input Grid Factor: 1 **Note:** All units in this report are in feet, square feet and cubic yards unless specified otherwise.

Baseline Station	Station Quantities								Added Quantities						Mass Ordinate
	Cut				Fill				Cut			Fill			
	Factor	Area	Volume	Adjusted	Factor	Area	Volume	Adjusted	Factor	Volume	Adjusted	Factor	Volume	Adjusted	
64+00.00	1	0	0	0	1	37.8	0	0	1	0	0	1	0	0	0
65+00.00	1	0	0	0	1	9.2	87	87	1	0	0	1	0	0	-87
66+00.00	1	0	0	0	1	3.2	22.9	22.9	1	0	0	1	0	0	-110
67+00.00	1	6.9	12.8	12.8	1	0	5.9	5.9	1	0	0	1	0	0	-103
68+00.00	1	6.9	25.6	25.6	1	0	0	0	1	0	0	1	0	0	-77.5
68+43.17	1	3.3	8.1	8.1	1	0	0	0	1	0	0	1	0	0	-69.3
Grand Total:			46.5	46.5			**115.8**	**115.8**		0	0		0	0	

Levee 1
oss Section Set Name: Levee/Floodwall Alignment 3_2
Alignment Name: Levee/Floodwall Alignment 3
Input Grid Factor: 1 **Note:** All units in this report are in feet, square feet and cubic yards unless specified otherwise.

Baseline Station	Station Quantities								Added Quantities						Mass Ordinate
	Cut				Fill				Cut			Fill			
	Factor	Area	Volume	Adjusted	Factor	Area	Volume	Adjusted	Factor	Volume	Adjusted	Factor	Volume	Adjusted	
0+00.00	1	4.1	0	0	1	0	0	0	1	0	0	1	0	0	0
1+00.00	1	0	7.6	7.6	1	12.1	22.4	22.4	1	0	0	1	0	0	-14.8
2+00.00	1	0	0	0	1	14.3	48.8	48.8	1	0	0	1	0	0	-63.6
3+00.00	1	0	0	0	1	26.4	75.4	75.4	1	0	0	1	0	0	-139
Grand Total:			7.6	7.6			**146.5**	**146.5**		0	0		0	0	

Stripping Surface Area

Surface Area Report for Levee 3

Surface: DPLVxx_1ft_Contours
Fence Mode: Inside

True Area: sq ft	101714.1	SF
Planar Area: sq ft	101347.6	SF

Surface Area Report for Levee 4

Surface: DPLVxx_1ft_Contours
Fence Mode: Inside

True Area: sq ft	4583.7	SF
Planar Area: sq ft	4580.3	SF

US Army Corps of Engineers Chicago District	PROJECT TITLE: DPII - Site DPLV02	COMPUTED BY: FAYE LEFFLER	DATE: 6/11/2013
	COMPUTATION TITLE: QUANTITY COMPUTATIONS	CHECKED BY: ROBERT VANOER	DATE:

Bid Item 0001 - Mobilization and Demobilization

See Cost Appendix and MII estimates for mobilization and demolization assumptions.

Bid Item 0002 - Maintenance of Traffic

See Cost Appendix and MII estimates for Maintenance of Traffic assumptions

Bid Item 0003 - Clearing and Grubbing

The clearing and grubbing areas will include the worklimits (permanent easement) and staging areas (temporary easement).
The permanent easement (work limits) area is 15 feet from the toe of the levee or centerline line of the floodwall.
The areas were computed in microstation.

Location	Area (AC)
Work Limits (Permanent Easement Area)	4
Staging Area	2.2

Total Clearing and Grubbing Area =	6.2	AC

Bid Item 0004 - Road Closures

Road closure at Lake St., 4-lane road, length = 44 FT
Assumed each lane is 11 feet.

Bid Item 0005 - Levee

Stripping
The base of the levee will be stripped 1ft deep.
The base of the levee was determined by multipling the true area of the levee perimeter by 1ft.
The levee perimeter was developed from the levee surface inroads. The surface area was then computed in inroads using the levee perimeter and the existing grade surface.
The area provided in the table below was developed from an inroads surface area report (see earthwork computations).

Levee	Area (SF)	Depth (1FT)	Volume (CY)
Levee1	84636.6	1	3134.688889
Total			3134.688889

Imprevious Fill
The imprevious fill (levee fill) was computed using average end-area method in Inroads with cross-section cuts every 100 ft (see earthwork computations).
The levee is 10-feet wide at the top with 1(V):3(H) side slopes.
The total imprevious fill includes the volume of the levee fill and stripping.

Levee	Levee Volume (CY)	Strip Volume (CY)	Total
Levee1	9280.2	3134.688889	12414.88889
Total			12414.88889

Bid Item 0006 - Interior Drainage

Interior drainage was not evaluated for the DPII study and will be evaluated during the PED phase.
From aerial views, multiple outlets were observed that discharges into the river.

The cost estimate for Interior Drainage was determined using Libertyville Estate levee/floodwall project.
The costs were developed using cost per linear foot of floodwall protection.
Total Length of Levee = 2329 FT

US Army Corps of Engineers, Chicago District	PROJECT TITLE: DPII - Site DPLV02	COMPUTED BY: FAYE LEFFLER	DATE: 6/11/2013
	COMPUTATION TITLE: EARTHWORK INROADS REPORT	CHECKED BY: ROBERT VANOER	DATE:

Impervious Fill

ss Section Set Name: DPLV02-Leve ver 2
Alignment Name:
Input Grid Factor: 1 **Note:** All units in this report are in feet, square feet and cubic yards unless specified otherwise.

Baseline Station	Station Quantities - Cut Factor	Cut Area	Cut Volume	Cut Adjusted	Fill Factor	Fill Area	Fill Volume	Fill Adjusted	Added Quantities - Cut Factor	Cut Volume	Cut Adjusted	Fill Factor	Fill Volume	Fill Adjusted	Mass Ordinate
0+00.00	1	3.1	0	0	1	0.1	0	0	1	0	0	1	0	0	0
1+00.00	1	0	5.7	5.7	1	48.3	89.7	89.7	1	0	0	1	0	0	-84
2+00.00	1	0	0	0	1	48.4	179.1	179.1	1	0	0	1	0	0	-263.1
3+00.00	1	0	0	0	1	64.7	209.3	209.3	1	0	0	1	0	0	-472.4
4+00.00	1	0	0	0	1	77.8	263.7	263.7	1	0	0	1	0	0	-736.1
5+00.00	1	0	0	0	1	105.8	339.9	339.9	1	0	0	1	0	0	-1076
6+00.00	1	0	0	0	1	102.4	385.5	385.5	1	0	0	1	0	0	-1461.5
7+00.00	1	0	0	0	1	109.3	392	392	1	0	0	1	0	0	-1853.6
8+00.00	1	0	0	0	1	106.9	400.3	400.3	1	0	0	1	0	0	-2253.9
9+00.00	1	0	0	0	1	91.5	367.4	367.4	1	0	0	1	0	0	-2621.3
10+00.00	1	0	0	0	1	71.1	301.2	301.2	1	0	0	1	0	0	-2922.5
11+00.00	1	0	0	0	1	54.7	233.1	233.1	1	0	0	1	0	0	-3155.5
12+00.00	1	0	0	0	1	47.1	188.7	188.7	1	0	0	1	0	0	-3344.2
13+00.00	1	0	0	0	1	42.7	166.4	166.4	1	0	0	1	0	0	-3510.6
14+00.00	1	0	0	0	1	61.4	192.8	192.8	1	0	0	1	0	0	-3703.4
15+00.00	1	0	0	0	1	100.3	299.5	299.5	1	0	0	1	0	0	-4002.9
16+00.00	1	0	0	0	1	35.7	252	252	1	0	0	1	0	0	-4254.9
17+00.00	1	0	0	0	1	374	758.8	758.8	1	0	0	1	0	0	-5013.7
18+00.00	1	0	0	0	1	559.6	1729	1729	1	0	0	1	0	0	-6742.8
19+00.00	1	0	0	0	1	28.5	1089.1	1089.1	1	0	0	1	0	0	-7831.8
20+00.00	1	5.3	9.9	9.9	1	0	52.7	52.7	1	0	0	1	0	0	-7874.6
21+00.00	1	0	9.9	9.9	1	164.6	304.8	304.8	1	0	0	1	0	0	-8169.5
22+00.00	1	0.9	1.6	1.6	1	88	467.7	467.7	1	0	0	1	0	0	-8635.6
23+00.00	1	1.1	3.6	3.6	1	122.7	390.2	390.2	1	0	0	1	0	0	-9022.2
24+00.00	1	12.1	24.4	24.4	1	0	227.3	227.3	1	0	0	1	0	0	-9225.1
24+29.35	1	10.1	12	12	1	0	0	0	1	0	0	1	0	0	-9213
Grand Total:			67.2	67.2			**9280.2**	**9280.2**		0	0		0	0	

Stripping

Surface Area Report for Levee Perimeter

Surface: DPLV02_1ft_Contours
Fence Mode: Inside

True Area: sq ft	84636.6	SF
Planar Area: sq ft	83599.6	SF

US Army Corps of Engineers Chicago District	PROJECT TITLE: DPII - Site DPLV11	COMPUTED BY: FAYE LEFFLER	DATE: 6/11/2013
	COMPUTATION TITLE: QUANTITY COMPUTATIONS	CHECKED BY: ROBERT VANOER	DATE:

Bid Item 0001 - Mobilization and Demobilization

See Cost Appendix and MII estimates for mobilization and demolization assumptions.

Bid Item 0002 - Maintenance of Traffic

See Cost Appendix and MII estimates for Maintenance of Traffic assumptions

Bid Item 0003 - Clearing and Grubbing

The clearing and grubbing areas will include the worklimits (permanent easement) and staging areas (temporary easement).
The permanent easement (work limits) area is 15 feet from the toe of the levee or centerline line of the floodwall.
The areas were computed in microstation.

Location	Area (AC)
Work Limits (Permanent Easement Area)	6
Staging Area	3

Total Clearing and Grubbing Area =	9	AC

Bid Item 0004 - Floodwall

Floodwall	Floodwall Length (FT)	*Concrete Height (FT)	**SSP Height (FT)	Concrete Width (FT)	Concrete Volume (CY)	*SSP Area (SF)
Sta. 0+00 to 10+50	1050	17	45	1.167	771.51667	49350
Sta. 10+50 to 17+00	650	11.4	28.2	1.167	320.27667	19630
Sta. 25+00 to 37+20	1220	19.2	51.6	1.167	1012.4373	65392
Sta. 38+00 to 47+00	900	19.2	51.6	1.167	746.88	48240
Sta. 62+50 to 66+30	350	19.2	51.6	1.167	290.45333	18760
Sta. 66+30 to 68+00	170	5.16	9.48	1.167	37.914533	1951.6
Sta. 69+20 to 72+00	280	5.16	9.48	1.167	62.447467	3214.4
Total	4620				3241.926	206538

Total Concrete Volume (CY) =	3241.9	CY
Total SSP Area (SF) =	206538	SF

The levee/floodwall top elevation: EL 637.16
The concrete height is relative to the existing grade and varies along the alignment and height was determined from the alignment profile.
*Concrete height includes the 2ft concrete embeddment. SSP area includes the 2 feet embeddment into the concrete.
**assumed 3 SSP to 1 concrete ratio

Bid Item 0005 - Road Closures

Road closure at Rand Rd, 4-lane road, length =	44	FT
Road closure at River Rd, 4-lane road plus one turning lane, Length =	55	FT

Assumed each lane is 11 feet.

Bid Item 0006 - Pumpstation

Weller creek crosses the line of protection at the south end of the project site. A pumpstation will be placed at this location.
The pumpstation is assumed to be of similar capacity with Farmer Prairie Creek Pumpstation for cost estimating.

US Army Corps of Engineers Chicago District	PROJECT TITLE: DPII - Site DPLV11	COMPUTED BY: FAYE LEFFLER	DATE: 6/11/2013
	COMPUTATION TITLE: QUANTITY COMPUTATIONS	CHECKED BY: ROBERT VANOER	DATE:

Bid Item 0007 - Levee

Stripping

The base of the levee will be stripped 1ft deep.
The base of the levee was determined by multipling the true area of the levee perimeter by 1ft.
The levee perimeter was developed from the levee surface inroads. The surface area was then computed in inroads using the levee perimeter and the existing grade surface.
The area provided in the table below was developed from an inroads surface area report (see earthwork computations).

Levee	Area (SF)	Depth (1FT)	Volume (CY)
Levee1	42573.5	1	1576.796296
Levee2	136947.6	1	5072.133333
Total			6648.92963

Imprevious Fill

The imprevious fill (levee fill) was computed using average end-area method in Inroads with cross-section cuts every 100 ft (see earthwork computations).
The levee is 10-feet wide at the top with 1(V):3(H) side slopes.
The total imprevious fill includes the volume of the levee fill and stripping.

Levee	Levee Volume (CY)	Strip Volume (CY)	Total
Levee1	6472.3	1576.796296	8049.096296
Levee2	38309.7	5072.133333	43381.83333
Total			51430.92963

US Army Corps of Engineers, Chicago District	PROJECT TITLE: DPII - Site DPLV11	COMPUTED BY: FAYE LEFFLER	DATE: 6/11/2013
	COMPUTATION TITLE: Earthwork Inroads Report	CHECKED BY: ROBERT VANOER	DATE:

Impervious Fill

oss Section Set Name: Levee2
Alignment Name: Levee/Floodwall
Input Grid Factor: 1 **Note:** All units in this report are in feet, square feet and cubic yards unless specified otherwise.

Baseline Station	Station Quantities - Cut Factor	Cut Area	Cut Volume	Cut Adjusted	Fill Factor	Fill Area	Fill Volume	Fill Adjusted	Added Quantities - Cut Factor	Cut Volume	Cut Adjusted	Fill Factor	Fill Volume	Fill Adjusted	Mass Ordinate
47+00.00	1	0	0	0	1	465.8	0	0	1	0	0	1	0	0	0
48+00.00	1	0.1	0.2	0.2	1	485.3	1761.2	1761.2	1	0	0	1	0	0	-1761.1
49+00.00	1	0	0.2	0.2	1	529	1878.3	1878.3	1	0	0	1	0	0	-3639.2
50+00.00	1	0	0	0	1	521.9	1946.1	1946.1	1	0	0	1	0	0	-5585.3
51+00.00	1	0	0	0	1	527.2	1942.7	1942.7	1	0	0	1	0	0	-7527.9
52+00.00	1	0.9	1.7	1.7	1	502.6	1907	1907	1	0	0	1	0	0	-9433.2
53+00.00	1	11.5	23.1	23.1	1	485.5	1829.8	1829.8	1	0	0	1	0	0	-11239.9
54+00.00	1	9.5	39	39	1	528.9	1878.5	1878.5	1	0	0	1	0	0	-13079.5
55+00.00	1	1.9	21.1	21.1	1	567	2029.3	2029.3	1	0	0	1	0	0	-15087.7
56+00.00	1	0	3.5	3.5	1	659.9	2271.9	2271.9	1	0	0	1	0	0	-17356.1
57+00.00	1	17.5	32.4	32.4	1	689.1	2498	2498	1	0	0	1	0	0	-19821.8
58+00.00	1	29.9	87.7	87.7	1	831.6	2816.1	2816.1	1	0	0	1	0	0	-22550.2
59+00.00	1	0	55.3	55.3	1	933.3	3268.4	3268.4	1	0	0	1	0	0	-25763.3
60+00.00	1	0	0	0	1	1034.6	3644.3	3644.3	1	0	0	1	0	0	-29407.5
61+00.00	1	1.4	2.6	2.6	1	841.1	3473.6	3473.6	1	0	0	1	0	0	-32878.6
62+00.00	1	0.4	3.4	3.4	1	969.5	3353	3353	1	0	0	1	0	0	-36228.2
62+50.00	1	0	0.4	0.4	1	986.8	1811.3	1811.3	1	0	0	1	0	0	-38039.1
Grand Total:			270.5	270.5			**38309.7**	**38309.7**		0	0		0	0	

oss Section Set Name: Levee1
Alignment Name: Levee/Floodwall
Input Grid Factor: 1 **Note:** All units in this report are in feet, square feet and cubic yards unless specified otherwise.

Baseline Station	Station Quantities - Cut Factor	Cut Area	Cut Volume	Cut Adjusted	Fill Factor	Fill Area	Fill Volume	Fill Adjusted	Added Quantities - Cut Factor	Cut Volume	Cut Adjusted	Fill Factor	Fill Volume	Fill Adjusted	Mass Ordinate
17+00.00	1	0	0	0	1	139.1	0	0	1	0	0	1	0	0	0
18+00.00	1	0	0	0	1	172.3	576.5	576.5	1	0	0	1	0	0	-576.5
19+00.00	1	0	0	0	1	182.3	656.5	656.5	1	0	0	1	0	0	-1233
20+00.00	1	0.3	0.6	0.6	1	220	745	745	1	0	0	1	0	0	-1977.5
21+00.00	1	0	0.6	0.6	1	225.4	824.9	824.9	1	0	0	1	0	0	-2801.8
22+00.00	1	0	0	0	1	225.4	834.9	834.9	1	0	0	1	0	0	-3636.7
23+00.00	1	0	0	0	1	225.4	834.9	834.9	1	0	0	1	0	0	-4471.5
24+00.00	1	2.1	3.9	3.9	1	266.1	910.1	910.1	1	0	0	1	0	0	-5377.7
25+00.00	1	0	3.9	3.9	1	322.2	1089.5	1089.5	1	0	0	1	0	0	-6463.3
Grand Total:			9	9			**6472.3**	**6472.3**		0	0		0	0	

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Stripping Surface Area

Surface Area Report for Levee 1

Surface: DPLV11 Existing Topo
Fence Mode: Inside

True Area:	42573.5	SF
Planar Area:	42509.3	SF

Surface Area Report for Levee 2

Surface: DPLV11 Existing Topo
Fence Mode: Inside

True Area: sq ft	136947.6	SF
Planar Area: sq ft	136881.3	SF