Clark Dietz
ENGINEERS

Effluent Discharge Line Basis of Design Report for the Illinois Central Spring Treatment Facility Bloomington, Indiana

Prepared for

CBS Corporation, Inc.

January 29, 2010

Prepared by

Clark Dietz, Inc.

Effluent Discharge Line Basis of Design Report for the Illinois Central Spring Treatment Facility Bloomington, Indiana

CDI Project No. C0850030

Prepared for

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January 29, 2010

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APPENDICES

Chapter 1 INTRODUCTION

Clark Dietz, Inc. has prepared this Basis of Design Report for the CBS Corporation to document the design basis for the proposed effluent discharge line to serve the Illinois Central Spring (ICS) treatment facility.

The Illinois Central Spring emerges down gradient of the Lemon Lane Landfill. The spring water has been shown to have elevated concentrations of PCBs that were likely associated with electrical capacitors disposed at the landfill from the Westinghouse Bloomington plant from 1958 to 1964.

The existing ICS facility consists of a 1,000 gallon per minute (gpm) polychlorinated biphenyls (PCB) removal system. The existing facility was designed by Earth Tech for the United States Environmental Protection Agency (USEPA) and has been in continuous operation since May 2000. The plant was designed to treat solids and PCBs for the 25 year, 6 hour storm event. Flow that is not immediately treated in the system is currently accumulated in two 600,000 gallon storage tanks. Approximately four times per year the ICS treatment facility reportedly receives flows in excess of the capacity of the existing plant. When this occurs, storm-enhanced contaminated spring water overflows the storage tanks and is discharged to the receiving stream.

Two of the actions that CBS has agreed to perform in accordance with a Consent Decree Amendment (CDA) effective July 24, 2009, are to:

- Expand the existing ICS treatment facility by designing, constructing, and operating a storage tank overflow water treatment system
- Install a new effluent line to handle treated water discharged from the combined treatment systems at the ICS treatment facility.

Currently, effluent from the treatment facility is discharged to a receiving stream located south of the facility. Uncontaminated stormwater from north of the railroad tracks is piped through the facility site, bypassing the treatment facility and discharging to this receiving stream. In addition, the Spring Receiving Sump emergency bypass and the overflow weirs on the Excess Flow Storage Tanks discharge to the receiving stream. In accordance with the CDA, a new effluent discharge line will be constructed to bypass this area and transport treated effluent directly into the receiving storm sewer.

This report outlines the basis of design for installing the new effluent discharge line. The CDA requires that CBS extend the existing plant discharge line a distance of approximately 1,000 feet to an existing 36-inch storm sewer. The preliminary design of this discharge line is due to the USEPA by January 24, 2010, with installation and start-up complete by December 4, 2010. A Basis of Design for the expansion of the ICS treatment facility for treatment of storage tank overflows will be submitted to the USEPA in a separate report.

Chapter 2 SITE HYDROLOGY AND HYDRAULICS

Inflow to the ICS treatment facility site comes from the Spring Emergence Area, located north of the railroad tracks, upgradient of the facility. Groundwater flows to this area from the northwest. The topography of the site would allow uncontaminated surface runoff from the nearby cemetery to combine with flow from the spring if not for a berm that separates the uncontaminated flow from the contaminated flow area.

2.1 Uncontaminated Area Drainage

The uncontaminated drainage area is comprised of 18.75 acres of a partly wooded cemetery. An existing 26-inch storm sewer (at 3.39% slope) crosses the railroad tracks to the south and transports the uncontaminated flow to the treatment facility site. The uncontaminated flow is not treated at the ICS facility and will discharge directly into the proposed effluent discharge line.

To determine if the existing 26-inch sewer is adequately sized, the Rational Formula was used to determine peak flows from the 26-inch storm sewer as follows:

Rational Formula:	$Q = CiA$
Rational Formula Constant:	$C = 0.5$ (conservative C for surface conditions)
Area (ac):	18.75 acres
Rainfall Intensity (in/hr):	3.13 in/hr for the 100-year storm
Adjustment Factor for Q_{100}:	1.25
Q_{100} (cfs*):	36.7 cfs*
Pipe Flow Capacity (cfs):	$Q_{cap} = \frac{1.486}{n} \times A \times R_h^{2/3} \times \sqrt{S}$
n:	0.016
A (ft^2) = πr^2:	3.69 ft^2
R_h (ft) = $\frac{A}{P}$:	0.54 ft
Slope:	0.0339 ft/ft
Q_{cap} (cfs*):	41.84 cfs*

** cubic feet per second*

It was concluded that the existing storm sewer was sized to convey peak flows greater than the 100-year storm event.

2.2 Contaminated Area Drainage

Contaminated flow from the Spring Emergence Area is primarily transported to the spring receiving sump building at the treatment facility through an existing 24-inch pipe located under the railroad tracks. An older culvert also crosses the railroad tracks from the contaminated area at a higher elevation than the 24-inch storm line. It is our understanding that the older 24-inch culvert has been plugged and is not used to convey flow.

As determined by the USEPA, the treatment facility will be upgraded to produce a maximum discharge of 6,000 gpm (13.4 cfs). The flow scenarios for the existing system are summarized in Table 2.1.

Table 2.1 Proposed Flow Distribution

Mode	Flow	Treatment
1	≤1,000 gpm	Treated in the ICS Treatment Facility
2	1,000 gpm to 6,000 gpm with total volume of excess ≤1.2 million gallons	1,000 gpm treated in the ICS Treatment Facility, excess flow stored and treated after inflow drops below 1,000 gpm
3	1,000 gpm to 6,000 gpm with total volume of excess ≥1.2 million gallons	1,000 gpm treated in the ICS Treatment Facility, excess flow stored until 1.2 million gallons, overflows treated in the new excess flow treatment system with capacity of 5,000 gpm. Water stored in the storage tanks treated in the main treatment system after inflow drops below 1,000 gpm
4	Flow greater than 6,000 gpm or loss of capacity in the treatment pumps	1,000 gpm treated in the ICS Treatment Facility, excess flow stored until 1.2 million gallons then 5,000 gpm treated in the excess flow treatment facility. Flows greater than 6,000 gpm overflows through a window in the side of the Spring Receiving Sump.

2.3 Treatment Facility Emergency Bypasses

Currently, the treatment facility is designed so that flow beyond the capacity of the Excess Flow Storage Tanks is bypassed using overflow weirs in the tanks and discharged to the receiving stream. Proposed facility improvements to increase treatment capacity will eliminate these bypasses and reroute overflow to a new 5,000 gpm excess flow treatment system. The excess flow treatment system will have an emergency overflow in the event of blinding of the proposed GAC treatment. Overflow from the proposed excess flow treatment system will be discussed in greater detail in a separate Basis of Design Report, which is anticipated to be submitted in the middle of March 2010.

Chapter 3 **SYSTEM INFRASTRUCTURE**

3.1 Combined Discharge

The proposed effluent discharge line will be required to convey the combined flows from the uncontaminated area storm sewer and contaminated area discharge. Based on the flows discussed in Chapter 2, the line will be sized for 50.1 cfs conveyance capacity. This total flow rate is the sum of 36.7 cfs from uncontaminated area drainage and 13.4 cfs from the contaminated area drainage.

Multiple scenarios were evaluated to determine pipe diameter, material, and slope combinations that would be possible given the proposed downstream sewer invert, sewer size, and upstream hydraulic conditions. Slopes examined are the minimum slopes required to adequately drain the peak storm flow and process discharge without producing hydraulic restrictions along the new discharge line. At least one drop structure is required along the proposed alignment to minimize sewer depth and discharge to the receiving sewer. These calculations are summarized below:

36-inch (RCP, polypropylene)

Pipe Flow Capacity (cfs):	$Q_{cap} = \frac{1.486}{n} \times A \times R_h^{2/3} \times \sqrt{S}$
n:	0.013
A (ft^2) = πr^2:	7.068 ft^2
R_h (ft) = $\frac{A}{P}$:	0.75 ft
Slope:	0.008 ft/ft
Q_{cap} (cfs):	59.65cfs

30-inch (PVC, HDPE)

Pipe Flow Capacity (cfs):	$Q_{cap} = \frac{1.486}{n} \times A \times R_h^{2/3} \times \sqrt{S}$
n:	0.010
A (ft^2) = πr^2:	4.909 ft^2
R_h (ft) = $\frac{A}{P}$:	0.625 ft
Slope:	0.008 ft/ft
Q_{cap} (cfs):	47.70 cfs

Since the 100-year peak flow is 50.1 cfs, a 30-inch storm sewer will be slightly pressurized during the 100-year event. The frequency of to 50.1 cfs flow events are expected to be infrequent and short in duration. The consequences of a pressurized pipe will be that there are several inches of water above the top of storm pipe in manholes ST MH 1 and ST MH 2. Therefore, using a 30-inch pipe at a 0.008 ft/ft slope is sufficient to carry all expected storm events without overflows or disruptions to the treatment systems.

3.2 Other Design Considerations

Although the proposed discharge line will be a privately-owned line, the design will conform to specifications and requirements of the City of Bloomington Utilities. Additional design considerations include:

- The discharge line alignment will be outside the understood limits of potentially-contaminated areas wherever possible. It is not possible to remain outside of the limits of the potentially contaminated area where the discharge line will cross the existing stream area in the vicinity of the Spring Receiving Sump. The limits of the potentially contaminated area were not prepared or reviewed by Clark Dietz, but were obtained from the *Remedial Design/Remedial Action Work Plan, Operable Units 2 and 3, Site Groundwater and Sediments, Lemon Lane Landfill Site, Bloomington, Monroe County, Indiana*, prepared by the CBS Corporation in September 2009.
- To minimize infiltration of potentially-contaminated groundwater into the effluent discharge line and recontamination by exfiltration from the discharge line to the surrounding soil, pipe joints will be designed to have a greater degree of water-tightness, above what is typically used for storm sewers.
- The anticipated design life of the infrastructure will be 30 years.
- The effluent discharge line may have significant traffic loads when granular activated carbon (GAC) and materials for the ICS treatment system upgrade are delivered. Significant loads may also be applied during removal of contaminated soil. The new pipeline will be constructed with a depth of cover, backfill material, and backfill method that is sufficient to accommodate anticipated traffic loads.

Chapter 4 INSTALLATION ALTERNATIVES

4.1 Exposed Installation

At the request of the client, installing the discharge line above grade was evaluated. Because of soils conditions in the area, this alternative would potentially provide savings in the installation as costly excavation through bedrock would be avoided.

The design team has several reservations about leaving such a pipeline exposed. Disadvantages of this method include:

- Potential for accidental damage or deliberate vandalism
- Travel encumbrance across the pipe alignment
- Potential for issues from ground and pipe settlement
- Costs for the installation of concrete collars at pipe joints, which would be required to maintain the integrity of the line, could be higher than that of rock excavation
- Exposure to the environment could accelerate pipe deterioration
- Potential for difficulties obtaining necessary permit approvals

4.2 Microtunneling Installation

The second installation method examined was microtunneling. The major benefit of this method is the avoidance of excavating possibly-contaminated soil and, therefore, reducing cost and effort of disposal or treatment of the soil. Also, because the spoils of microtunneling would be much less than the open-cut option, the alignment could be adjusted to a slightly straighter option, thus creating a cost savings in reduced pipe materials. Although microtunneling seems advantageous, the savings created by these factors does not nearly offset the large cost of microtunneling for this project, due to the relatively shallow depth of the proposed pipe profile.

4.3 Open-Cut Installation

Lastly, open-cut installation was analyzed. Advantages of this method include:

- Very common and straight-forward type of installation
- Pipe profile is relative shallow and easily accessible by construction equipment
- Allows for easy inspection and testing of all pipe and joints during installation
- Very cost-effective for shallow pipe installation

Because the soil downstream of the treatment facility is possibly contaminated, an open-cut installation for this project is potentially more complicated than others. If the selected alignment is through the potentially-contaminated area, open-cutting for the installation could create the need to dispose of contaminated soils. Given the design

objective of establishing an alignment away from the understood limits of the potentially-contaminated areas, cost for disposal of spoils is not anticipated to offset the factors described above.

Because of the concerns associated with an exposed installation and the cost ineffectiveness of microtunneling, the design team recommends installing the new discharge line by open-cut installation, while selecting an alignment that avoids the understood limits of the potentially-contaminated areas.

Chapter 5 ALIGNMENT ALTERNATIVES

Alignment alternatives for the proposed effluent discharge line were developed referencing *Remedial Design/Remedial Action Work Plan, Operable Units 2 and 3, Site Groundwater and Sediments, Lemon Lane Landfill Site, Bloomington, Monroe County, Indiana* (CBS Corporation, September 2009) as well as geotechnical information prepared by Earth Exploration in December 1998. Since the soil borings were not located along the proposed alignments, the information provided was used to generally characterize soil conditions in the area. This characterization was used to identify Alignment Alternatives 1 and 2, described below. Additional geoprobe investigations were performed in January 2010 along the proposed alignments to better estimate the amount of rock removal anticipated for each alternative.

The alignments discussed below take into consideration the limits of potentially-contaminated areas as described in the *Remedial Design/Remedial Action Work Plan (*CBS Corporation, September 2009). Efforts were made during the design phase to minimize the potential of encountering contaminated areas, and additional sampling/removal of soils may be done if the line crosses known areas of contamination. Additionally, it will be written into the Construction Contract Documents that if Contractor encounters contaminated or possibly contaminated soil during construction, work will be halted and procedures outlined in the Contract Documents will be followed.

The design of the proposed effluent discharge line will take into consideration the City of Bloomington's design standards and construction specifications. In some instances, the design team has elected to be more conservative than the City's standards, given specific conditions at the site. When discrepancies occur, the more-conservative approach will be used.

5.1 Alternative 1: Southern Route

The first alignment analyzed, Alternative 1, follows the southern fence line as shown in Appendix A, Figure 1. This alignment consists of approximately 1,080 feet of new effluent discharge line and 9 new manhole structures. As shown on Sheet PR-2, Appendix B, the deepest section of the proposed alignment is approximately 15 feet deep to the pipe crown, while the majority of the line is less than 10 feet deep to the top of pipe. Based on the geoprobe investigations performed in January 2010, approximately 540 cubic yards of rock removal will be required. Costs for the installation of the improvements using this alignment are described in Chapter 7. The access road will be kept in service during construction. To accomplish this, flowable fill will be used rather than granular backfill in the roadway.

5.2 Alternative 2: Northern Route

The second alignment alternative is shown in Appendix A, Figure 2. This alignment follows the existing access drive along the east side of the project area. The alignment consists of approximately 1,230 feet of effluent discharge line and 9 new manhole

structures. The majority of this alignment has a depth of 10-15 feet to the pipe crown. Based on the information provided in the January 2010 geoprobe investigations, preliminary estimates indicate approximately 640 cubic yards of rock removal will be required. As described above, the access road needs to be kept in service during construction and therefore flowable fill will be used instead of granular backfill. Since Alternative 2 includes more work in the roadway, a proportionally larger amount of the backfill would be flowable fill than in Alternative 1.

Due to the difference in anticipated rock removal, the cost of installing flowable fill under a greater length of the access drive, and the shorter alignment, the design team recommends proceeding with Alignment Alternative 1: Southern Route. This recommendation is made based on the understanding that the proposed alignment is located mostly outside of the limits of potentially-contaminated areas (Appendix A, Figure 3). Costs for contaminated soil remediation are not included in this analysis.

Chapter 6 MATERIAL ALTERNATIVES

Four material alternatives for the proposed effluent discharge line were evaluated: reinforced concrete pipe (RCP), polyvinyl chloride pipe (PVC), high density polyethylene pipe (HDPE), and polypropylene pipe. The materials were evaluated for hydraulic characteristics, water-tightness, material and installation costs, life expectancy, ease of installation, availability.

6.1 Reinforced Concrete Pipe (RCP)

RCP is a common choice for many stormwater, drinking water, and wastewater applications. Based on field data, it has the longest life expectancy, with some installations showing over 100 years of use. Because it is manufactured from aggregate and Portland cement, it is typically the strongest pipe available for projects such as this. Its strength is derived from the pipe design, so in many circumstances native soils can be used for backfilling around the pipe. RCP is heavier than plastic pipes, resulting in shorter pipe lengths and a greater number of pipe joints. The heavier material can also lead to higher installation costs, as larger construction machinery may be required.

For design purposes, a Manning's number of 0.13 is commonly used, resulting in the requirement for a 36-inch diameter line for this project. To ensure a watertight seal, pipe joints would be O-ring gaskets conforming to *ASTM C 361: Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.* Each joint will have an external sealing band, conforming to *ASTM C 877: Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections.* The Contractor will also be required to perform an integrity test at each joint prior to acceptance. Discussions with concrete pipe manufacturers indicate a purchase price of approximately $52 per linear foot of RCP, excluding installation and bedding costs.

6.2 Polyvinyl Chloride Pipe (PVC)

PVC is a flexible plastic pipe that is also commonly used in stormwater, drinking water, and wastewater applications. PVC gains the majority of its strength from the compacted surrounding soils, often times leading to higher bedding costs. Although it is newer to the industry than RCP, PVC has a long life expectancy, estimated to be between 50 and 100 years for buried installations. The lighter material results in easier installation and longer pipe lengths as compared to RCP. Joints seal tighter than that of RCP, and the longer pipe lengths lead to a fewer number of joints. As a result, PVC can typically achieve a higher level of water-tightness than RCP.

Because of its smooth interior, a Manning's number of 0.009 is typically used in design, resulting in a 30-inch diameter line for this project. PVC is available in a variety of grades and wall thicknesses. For this application, the A-2000, manufactured by CONTECH Construction Products Inc., was evaluated. The A-2000 is a corrugated PVC pipe with a smooth interior, conforming to ASTM F949, *Standard Specification for Polyvinyl Chloride (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings.* The patented elastomeric gasket seals provided with the A-2000 conforms

with ASTM F477, *Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe* to provide a water-tight seal. To allow for competitive pricing, specifications will be written to allow consideration of other proprietary PVC pipe that is comparable to the A-2000. Material cost for the A-2000 is approximately $37 per linear foot.

6.3 High Density Polyethylene Pipe (HDPE)

Like PVC, HDPE is a flexible plastic pipe that gains the majority of its strength from the surrounding backfill. It shares many of the same advantages with PVC with respect to lighter pipe material, ease of installation and water-tight joints. As with PVC, a Manning's number of 0.009 is typically used in design, resulting in a 30-inch diameter line for this project. Conversely, HDPE is more flexible than PVC, particularly with larger diameter lines, resulting in the need for thicker-walled HDPE pipe as compared to PVC. Based on the site conditions and discussions with HDPE pipe manufacturers, 30-inch diameter HDPE DR 11 was determined to be the most appropriate plastic pipe for this application. The approximate material price for this is approximately $125 per linear foot of HDPE, excluding installation and bedding costs, making it cost-prohibitive for this application.

6.4 Polypropylene Pipe

The polypropylene pipe is a relatively new proprietary product provided by ADS/Hancor Corporation. According to ADS, it has the strength of concrete pipe at the material cost of plastic pipe. Because it is a new product it has not been approved for use by governmental agencies in Indiana, such as the Indiana Department of Environmental Management (IDEM) or the Indiana Department of Transportation (INDOT), who are typically leaders in new product acceptance. In addition, the City of Bloomington's standards do not currently include polypropylene pipe. Based on data provided by ADS, the design Manning's number of 0.013 was used, resulting in a 36-inch diameter line. The material cost for polypropylene pipe is approximately $40 per linear foot.

Based on the discussion above, PVC and RCP are both viable alternatives for the proposed effluent discharge line material. A further comparison of costs is discussed in Chapter 7 below.

Chapter 7 PRELIMINARY OPINION OF PROBABLE COSTS

Preliminary opinions of probable costs were prepared for the selected alignment using RCP and PVC as the pipe materials. The costs are summarized in Tables 7.1 and 7.2, below.

Based on the Opinion of Probable Costs, the recommended design for this project is 30" diameter PVC effluent discharge line following Alignment Alternative 1: Southern Route.

Table 7.1: Alignment Alternative 1 with RCP
Recommended Upgrades
January 2010

	Quantity	Unit	Unit Price	Total	1
Rock Removal	540	cy	$ 250	$ 135,000	
36" RCP Effluent Discharge Line, Materials	1,074	lf	$ 52	$ 56,000	
36" RCP Effluent Discharge Line, Installation	1,074	lf	$ 17	$ 18,000	2
Effluent Line Bedding Material	740	ton	$ 16	$ 12,000	2
Effluent Line Flowable Fill	300	cy	$ 55	$ 17,000	
Manhole Structures, Installed	9	ea	$ 7,000	$ 63,000	
Outfall Structure	1	ls	$ 20,000	$ 20,000	
24" Culvert Replacement	1	ls	$ 8,000	$ 8,000	
Subtotal				**$ 329,000**	
Contingency	10%			$ 33,000	
Construction Bonds	1%			$ 3,000	3
Taxes	7%			$ 23,000	
CONSTRUCTION TOTAL				**$ 388,000**	

Notes:

1. Line items have been rounded to the nearest $1,000. All costs assumed to be in 2010 dollars.
2. This estimate assumes that excavated soil for the effluent discharge line will not have to be tested and can be used as backfill material. Cost also assumes that any backfill taken off-site will not have to be disposed of as a hazardous waste.
3. Performance & payment bonds add one percent to contractor costs.

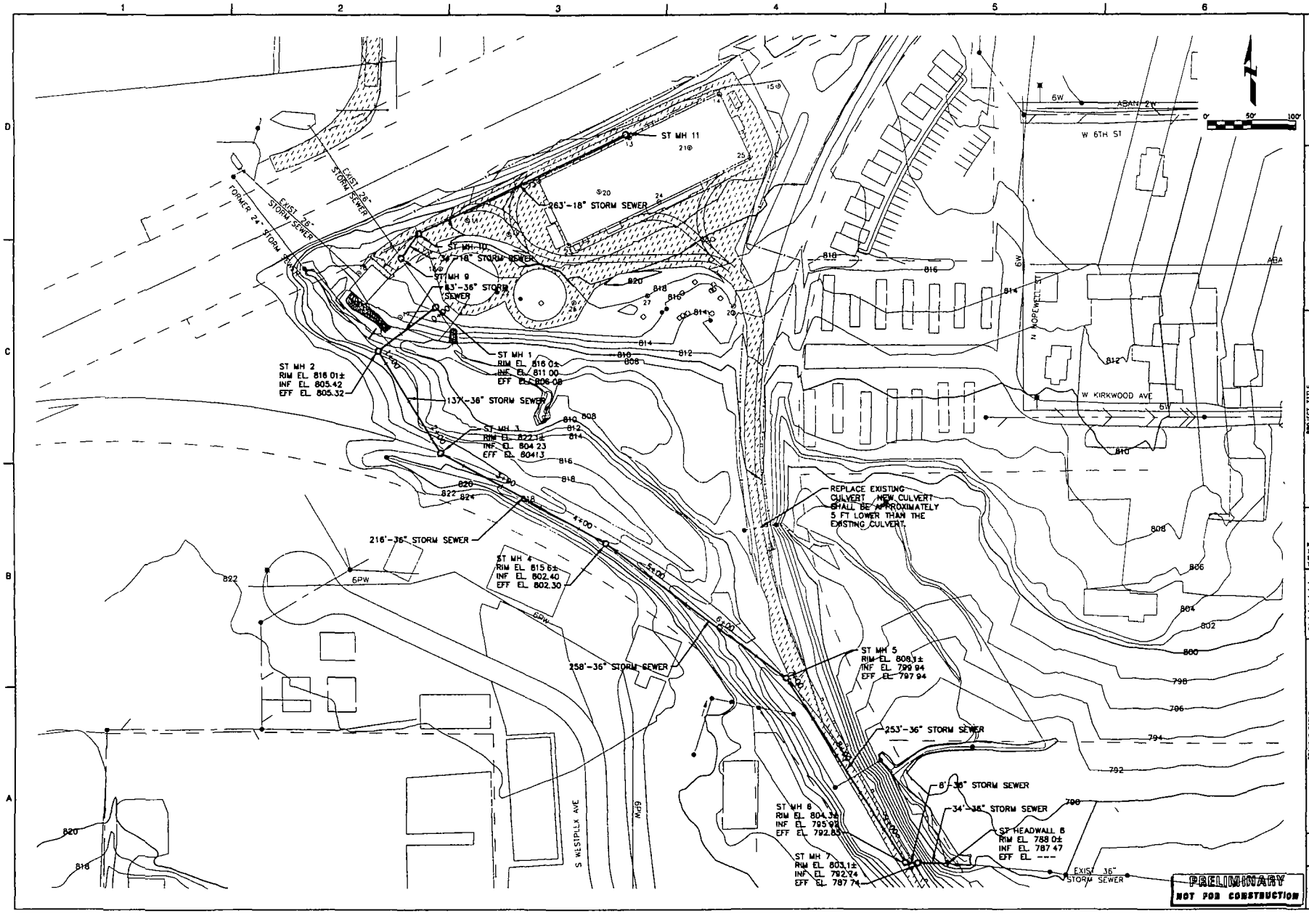
Table 7.2: Alignment Alternative 1 with PVC Recommended Upgrades January 2010

	Quantity	Unit	Unit Price	Total	
Rock Removal	540	cy	$ 250	$ 135,000	
30" PVC Effluent Discharge Line, Materials	1,074	lf	$ 36	$ 39,000	
30" PVC Effluent Discharge Line, Installation	1,074	lf	$ 12	$ 13,000	2
Effluent Line Bedding Material	740	ton	$ 16	$ 12,000	2
Effluent Line Flowable Fill	300	cy	$ 55	$ 17,000	
Manholes	9	ea	$ 7,000	$ 63,000	
Outfall Structure	1	ls	$ 20,000	$ 20,000	
24" Culvert Replacement	1	ls	$ 8,000	$ 8,000	
Subtotal				**$ 307,000**	
Contingency	10%			$ 31,000	
Construction Bonds	1%			$ 3,000	3
Taxes	7%			$ 21,000	
CONSTRUCTION TOTAL				**$ 362,000**	

Notes

1. Line items have been rounded to the nearest $1,000. All costs assumed to be in 2010 dollars.
2. This estimate assumes that excavated soil for the effluent discharge line will not have to be tested and can be used as backfill material. Cost also assumes that any backfill taken off-site will not have to be disposed of as a hazardous waste.
3. Performance & payment bonds add one percent to contractor costs.

Appendix A
Figures



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PROJECT TITLE
ILLINOIS CENTRAL SPRING
BLOOMINGTON, IN
EFFLUENT DISCHARGE PIPE

DESIGNED BY	ANB
DRAWN BY	DSH
CHECKED BY	TSG
DATE CHECKED	12/08

NOTE DIMENSIONAL DATA IS NOT TO BE OBTAINED BY SCALING ANY PORTION OF THIS DRAWING

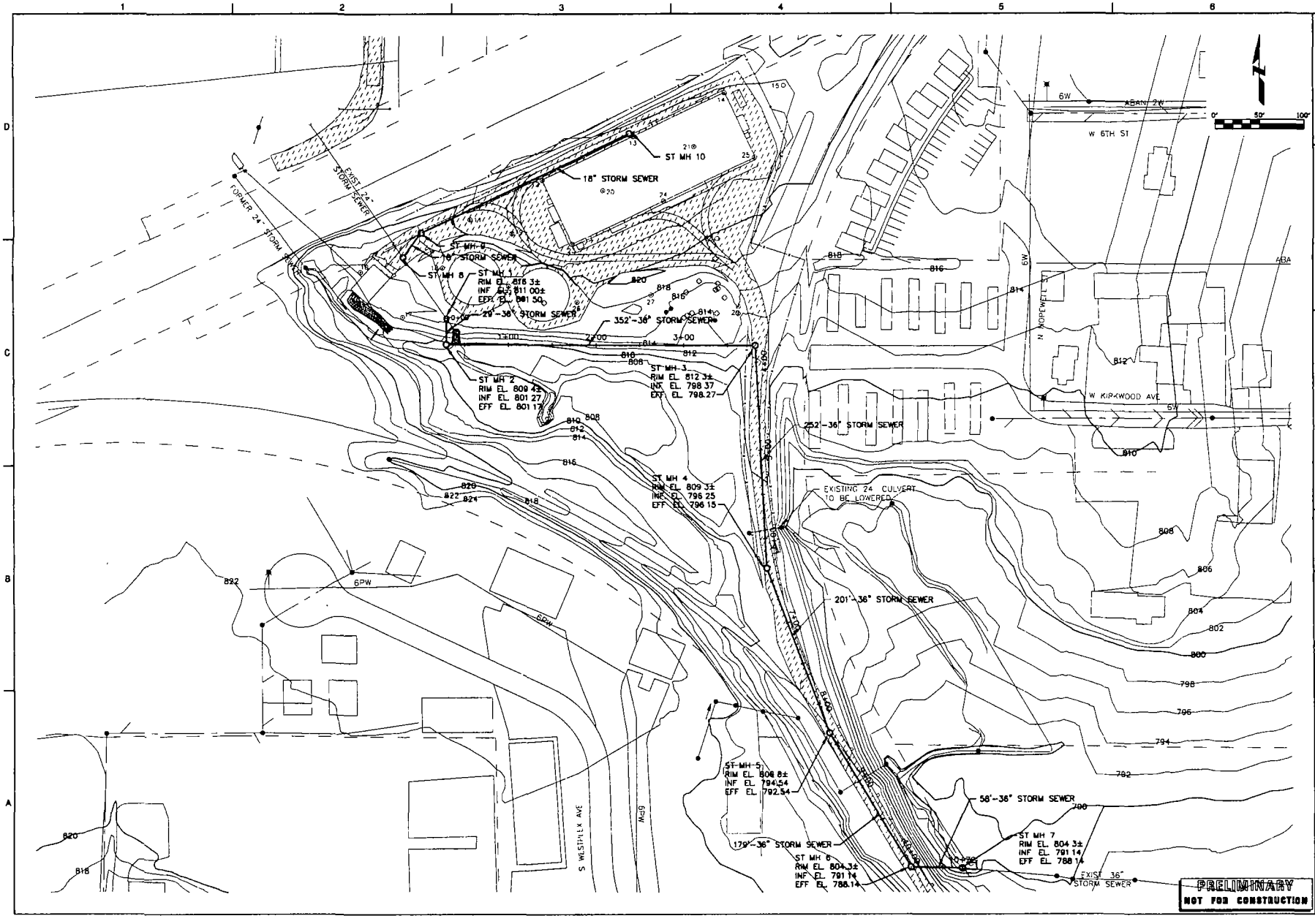
DATE	REVISION

DRAWING TITLE
OVERALL SITE PLAN -
ALTERNATE 1 ALIGNMENT

PROJECT NO
C0850030

DRAWING No
FIG 1

DRAWING 1 OF 8 DRAWINGS



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PROJECT TITLE
ILLINOIS CENTRAL SPRING
BLOOMINGTON, IN
EFFLUENT DISCHARGE PIPE

DESIGNED BY	ABB
DRAWN BY	CBL
CHECKED BY	TSP
DATE CHECKED	12/7/05

NOTE DIMENSIONAL DATA IS NOT TO BE OBTAINED BY SCALING ANY PORTION OF THIS DRAWING

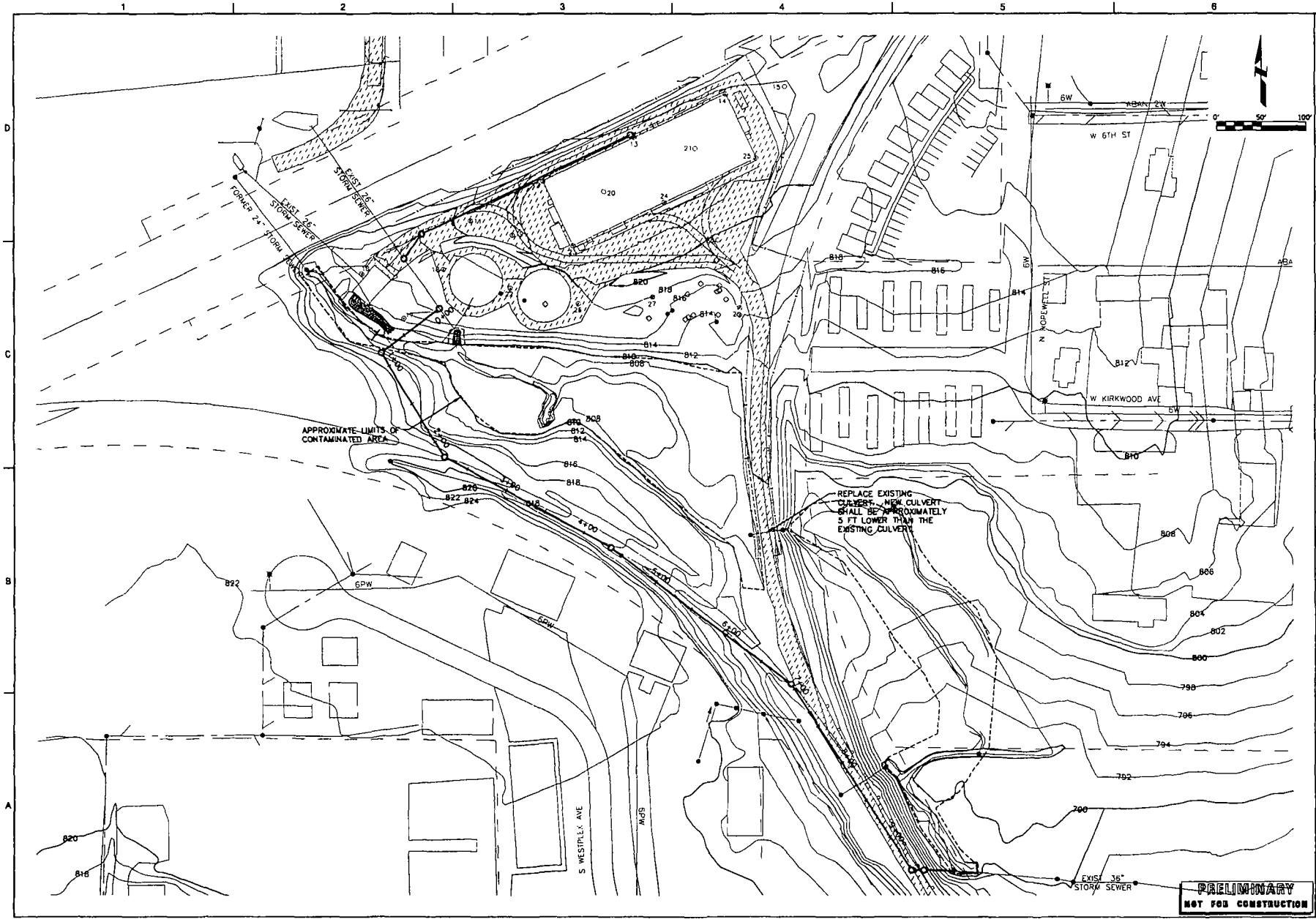
DATE	REVISION

DRAWING TITLE
OVERALL SITE PLAN -
ALTERNATE 2 ALIGNMENT

PROJECT No
C0850030

DRAWING No
FIG 2

DRAWING 2 OF 3 DRAWINGS



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PROJECT TITLE
ILLINOIS CENTRAL SPRING
BLOOMINGTON, IN
EFFLUENT DISCHARGE PIPE

DESIGNED BY
DRAWN BY
CHECKED BY
DATE CHECKED 12/09

NOTE DIMENSIONAL DATA IS NOT TO BE OBTAINED BY SCALING ANY PORTION OF THIS DRAWING

DATE REVISION

DRAWING TITLE
APPROXIMATE BOUNDARY
OF CONTAMINATED AREA

PROJECT NO
C0850030

DRAWING NO
FIG 3

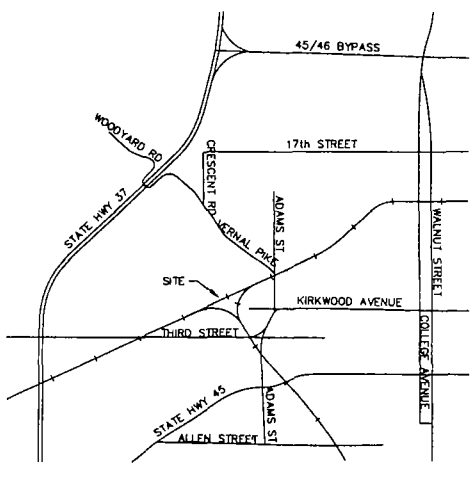
DRAWING 3 OF 3 DRAWINGS

Appendix B
Preliminary Drawings

ILLINOIS CENTRAL SPRING
BLOOMINGTON, INDIANA
EFFLUENT DISCHARGE PIPE

JANUARY 2010

GENERAL LOCATION MAP



PROJECT LOCATION MAP

PRELIMINARY
NOT FOR CONSTRUCTION

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PROJECT TITLE
ILLINOIS CENTRAL SPRING
BLOOMINGTON, IN
EFFLUENT DISCHARGE PIPE

DESIGNED BY AMB
DRAWN BY CRL
CHECKED BY TCB
DATE CHECKED: 12/09

NOTE DIMENSIONAL DATA IS NOT TO BE OBTAINED BY SCALING ANY PORTION OF THIS DRAWING

DATE REVISION

DRAWING TITLE
COVER

PROJECT No
C0850030

DRAWING No
G-1

DRAWING G-1 OF DRAWINGS

DRAWING INDEX	
DRAWING NUMBER	DRAWING TITLE
GENERAL	
G-1	COVER
G-2	GENERAL NOTES AND DRAWING INDEX
G-3	SOIL BORING LOGS
G-4	SOIL BORING LOGS
PLAN & PROFILES	
PR-1	OVERALL SITE PLAN
PR-2	STORM SEWER PLAN AND PROFILE
PR-3	DETAILS

GENERAL NOTES

1 NOT ALL OF THE GAS, POWER TELEPHONE LINES OR PLANT PIPING WHETHER ABOVE OR BELOW GROUND, HAVE BEEN SHOWN ON THE DRAWINGS THE CONTRACTOR MUST REALIZE THAT THE ACTUAL LOCATIONS OF THE UTILITIES SHOWN ON THE DRAWINGS MAY BE DIFFERENT FROM THE LOCATIONS INDICATED

2 THE LOCATIONS OF THE EXISTING YARD PIPING, SUCH AS RAW SEWAGE LINES, DRAIN LINES, NON-POTABLE WATER LINES, ETC., AS SHOWN ON THE DRAWINGS, HAVE BEEN DETERMINED FROM PLANS FOR THE EXISTING FACILITIES AND ARE GIVEN FOR THE CONVENIENCE OF THE CONTRACTOR THE CONTRACTOR MUST ASSUME RESPONSIBILITY FOR ALL PIPING AND MUST REALIZE THAT THE ACTUAL LOCATIONS MAY BE DIFFERENT FROM THOSE INDICATED ON THE DRAWINGS.

3 IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN IN SERVICE THE WASTEWATER TREATMENT FACILITY, ALL EXISTING PROCESS PIPING, AND ALL EXISTING UTILITIES ENCOUNTERED DURING CONSTRUCTION UNLESS OTHERWISE INDICATED IN THE DRAWINGS ANY PIPING WHICH CAN BE REMOVED DURING CONSTRUCTION WITHOUT UNDUE INTERRUPTION OF SERVICE MAY BE REMOVED AND REPLACED BY THE CONTRACTOR WITH THE PERMISSION OF THE OWNER

4 BEFORE WORKING WITH OR AROUND EXISTING UTILITIES, THE APPLICABLE UTILITY COMPANY SHALL BE CONTACTED BY THE CONTRACTOR

5 THE CONTRACTOR SHALL PRESERVE AND PROTECT PROPERTY MARKERS, SECTION CORNERS, SURVEY MARKS AND CITY BENCH MARKS, SUCH AS STONES, PIPES, OR OTHER MONUMENTS ENCOUNTERED IF THE CONTRACTOR MUST RELOCATE THE PROPERTY MARKERS OR MONUMENTS, THEIR LOCATION SHALL BE REFERENCED BY A REGISTERED LAND SURVEYOR AND THE OWNER NOTIFIED BEFORE MOVING ALL PROPERTY MARKERS AND MONUMENTS RELOCATED DURING CONSTRUCTION SHALL BE RE-ESTABLISHED BY A REGISTERED LAND SURVEYOR AT THE CONTRACTOR'S EXPENSE.

6 THE CONTRACTOR SHALL FAMILIARIZE HIMSELF WITH THE AREA AND NO EXTRA COMPENSATION CONNECTED WITH OVERHEAD UTILITIES WILL BE ALLOWED

7 THE CONTRACTOR IS RESPONSIBLE FOR DUST AND MUD CONTROL.

8 ROADWAY SURFACING AND BASE MATERIALS, OR ANY OTHER PROPERTY REMOVED OR DAMAGED, SHALL BE REPLACED OR REPAIRED AS PROVIDED FOR IN THE SPECIFICATIONS OR OTHER CONTRACT DOCUMENTS.

9 THE CONTRACTOR IS RESPONSIBLE FOR ALL CONSTRUCTION TRAFFIC CONTROL.

10 THE CONTRACTOR IS SOLELY AND COMPLETELY RESPONSIBLE FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING EROSION CONTROL AND THE SAFETY OF ALL PERSONS AND PROPERTY. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND THE ENGINEER HARMLESS FROM ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OR WORK ON THE PROJECT EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER

11 INFORMATION ON DETAIL DRAWINGS TAKES PRIORITY OVER ALL GENERAL DRAWINGS AND SCHEDULES CONFLICTS SHALL BE RESOLVED ACCORDINGLY

12 THE COST OF ABIDING BY THE PROVISIONS OF PERMITS ISSUED BY VARIOUS AGENCIES SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT ALL ASSOCIATED BONDING REQUIREMENTS AND COSTS ARE INCIDENTAL TO THE CONTRACT

PRELIMINARY
NOT FOR CONSTRUCTION

Clark Dietz ENGINEERS
8900 KEYSTONE CROSSING
SUITE 800
INDIANAPOLIS, IN 46240
PHONE 317 844 8800
FAX : 317 844 8186

PROJECT TITLE
ILLINOIS CENTRAL SPRING
BLOOMINGTON, IN
EFFLUENT DISCHARGE PIPE

DESIGNED BY
DRAWN BY
CHECKED BY
DATE CHECKED: 12/08

NOTE DIMENSIONAL DATA IS NOT TO BE OBTAINED BY SCALING ANY PORTION OF THIS DRAWING

DATE REVISION

DRAWING TITLE
GENERAL NOTES AND DRAWING INDEX

PROJECT NO
C0850030

DRAWING NO
G-2

DRAWING G 2 OF DRAWINGS

LOG OF TEST BORING

Earth Exploration — Project: ICS Treatment Facility — Location: Bloomington, Indiana — Client: Earth Tech

Boring B-10

DESCRIPTION/CLASSIFICATION and REMARKS
TOPSOIL
CL, LEAN CLAY little to some sand, trace gravel, stiff, brown (fill)
WEATHERED LIMESTONE, gray
End of Boring at 6.5
Auger refusal at 6.5

Boring B-11

DESCRIPTION/CLASSIFICATION and REMARKS
TOPSOIL
CL, LEAN CLAY little sand, trace gravel, hard, brown
CH, FAT CLAY trace to little sand, trace gravel, hard to very stiff, brown, occasional rock fragments (residual soil)
WEATHERED LIMESTONE, gray
End of Boring at 14.3
Auger refusal at 14.3

Boring B-12

DESCRIPTION/CLASSIFICATION and REMARKS
TOPSOIL
CL, LEAN CLAY little sand, very stiff brown
CH, FAT CLAY trace to little sand, hard to stiff, brown to reddish-brown, occasional rock fragments (residual soil)
WEATHERED LIMESTONE, gray
End of Boring at 19
Auger refusal at 19

Boring B-13

DESCRIPTION/CLASSIFICATION and REMARKS
CL, LEAN CLAY little sand, very stiff brown
CH, FAT CLAY trace to little sand, hard brown to reddish-brown (residual soil)
SP FINE SAND, medium dense, moist, brown (residual soil)
WEATHERED LIMESTONE, gray
End of Boring at 12
Auger refusal at 12 Sealing Instrument

Boring B-14

DESCRIPTION/CLASSIFICATION and REMARKS
TOPSOIL
CL, LEAN CLAY little sand, very stiff brown
CH, FAT CLAY trace to little sand, hard to very stiff, brown to reddish-brown, occasional rock fragments (residual soil)
LIMESTONE, few bedding planes, hard, medium grained, gray, brown from 18.5 to 18.7', clay seam from 14.6 to 14.8', small vugs from 18.8 to 19', fossiliferous
End of Boring at 19
Auger refusal at 14. Rock core obtained from 14 to 19'

Boring B-17

DESCRIPTION/CLASSIFICATION and REMARKS
TOPSOIL
CL, LEAN CLAY trace to some sand, soft, moist, dark brown to brown
WEATHERED LIMESTONE, gray
End of Boring at 5
Auger refusal at 5 Sealing Instrument.

Boring B-18

DESCRIPTION/CLASSIFICATION and REMARKS
TOPSOIL
CH, FAT CLAY with ROCK FRAGMENTS, hard to very stiff, reddish-brown (residual soil)
WEATHERED LIMESTONE, gray
End of Boring at 10'
Auger refusal at 10'

Boring B-19

DESCRIPTION/CLASSIFICATION and REMARKS
CL, LEAN CLAY trace sand, stiff brown
CH, FAT CLAY trace to little sand, hard to very stiff, brown to reddish-brown, occasional rock fragments (residual soil)
WEATHERED LIMESTONE, gray
End of Boring at 19
Auger refusal at 19

PRELIMINARY
NOT FOR CONSTRUCTION

ClarkDietz ENGINEERS
8900 KEYSTONE CROSSING SUITE 900 INDIANAPOLIS, IN 46240 PHONE 317 844 8900 FAX 317 844 8168

PROJECT TITLE: ILLINOIS CENTRAL SPRING BLOOMINGTON, IN EFFLUENT DISCHARGE PIPE

DESIGNED BY: AMB
DRAWN BY: DRL
CHECKED BY: TKB
DATE CHECKED: 12/08

NOTE: DIMENSIONAL DATA IS NOT TO BE OBTAINED BY SCALING ANY PORTION OF THIS DRAWING

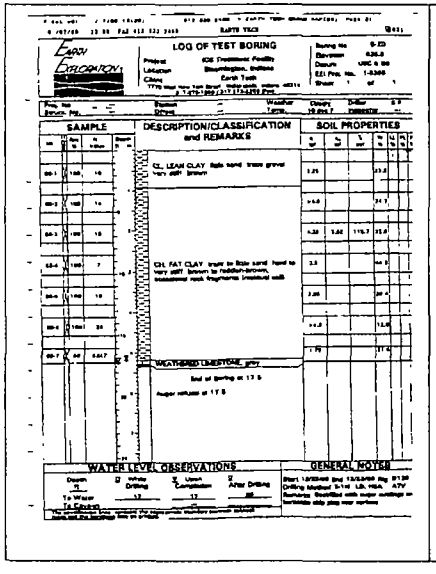
DATE	REVISION

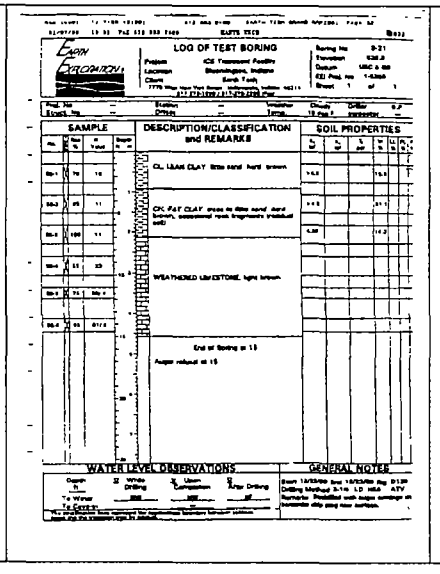
DRAWING TITLE: SOIL BORING LOGS

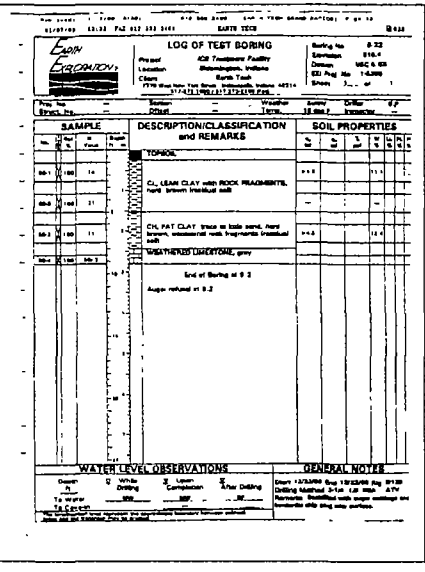
PROJECT No: C0850030

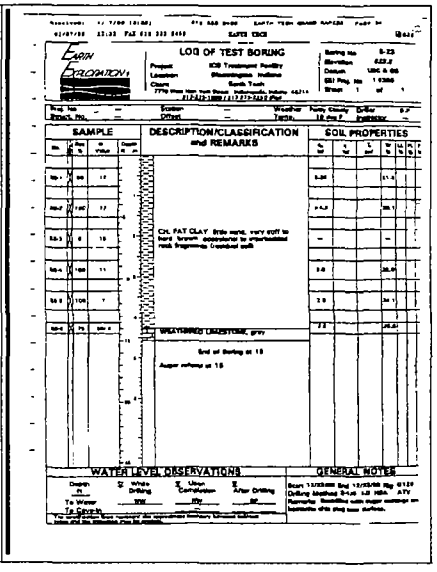
DRAWING No: G-3

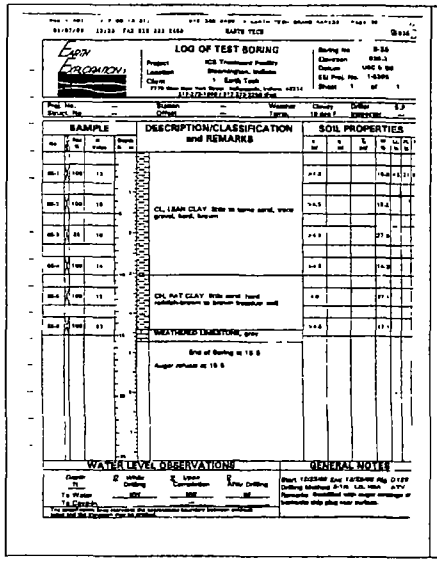
DRAWING 8 3 OF DRAWINGS

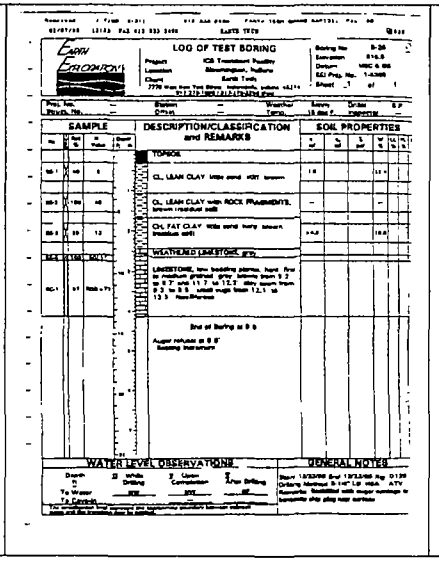


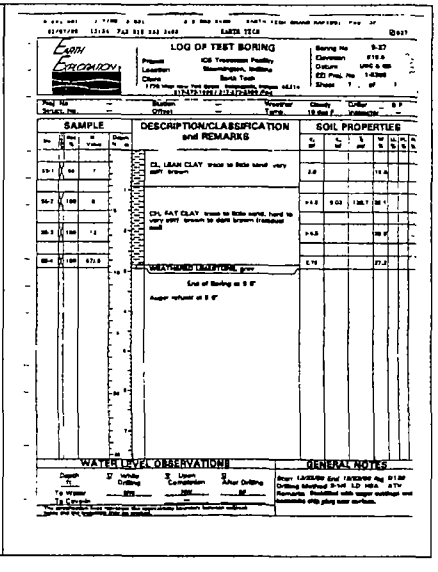












PRELIMINARY
NOT FOR CONSTRUCTION

Clark Dietz ENGINEERS
8900 KEYSTONE CROSSING
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INDIANAPOLIS, IN 46240
PHONE 317 844 6900
FAX 317 844 9158

PROJECT TITLE
ILLINOIS CENTRAL SPRING
BLOOMINGTON, IN
EFFLUENT DISCHARGE PIPE

DESIGNED BY AMB
DRAWN BY DK
CHECKED BY TVB
DATE CHECKED 12/08

NOTE DIMENSIONAL DATA IS NOT TO BE OBTAINED BY SCALING ANY PORTION OF THIS DRAWING

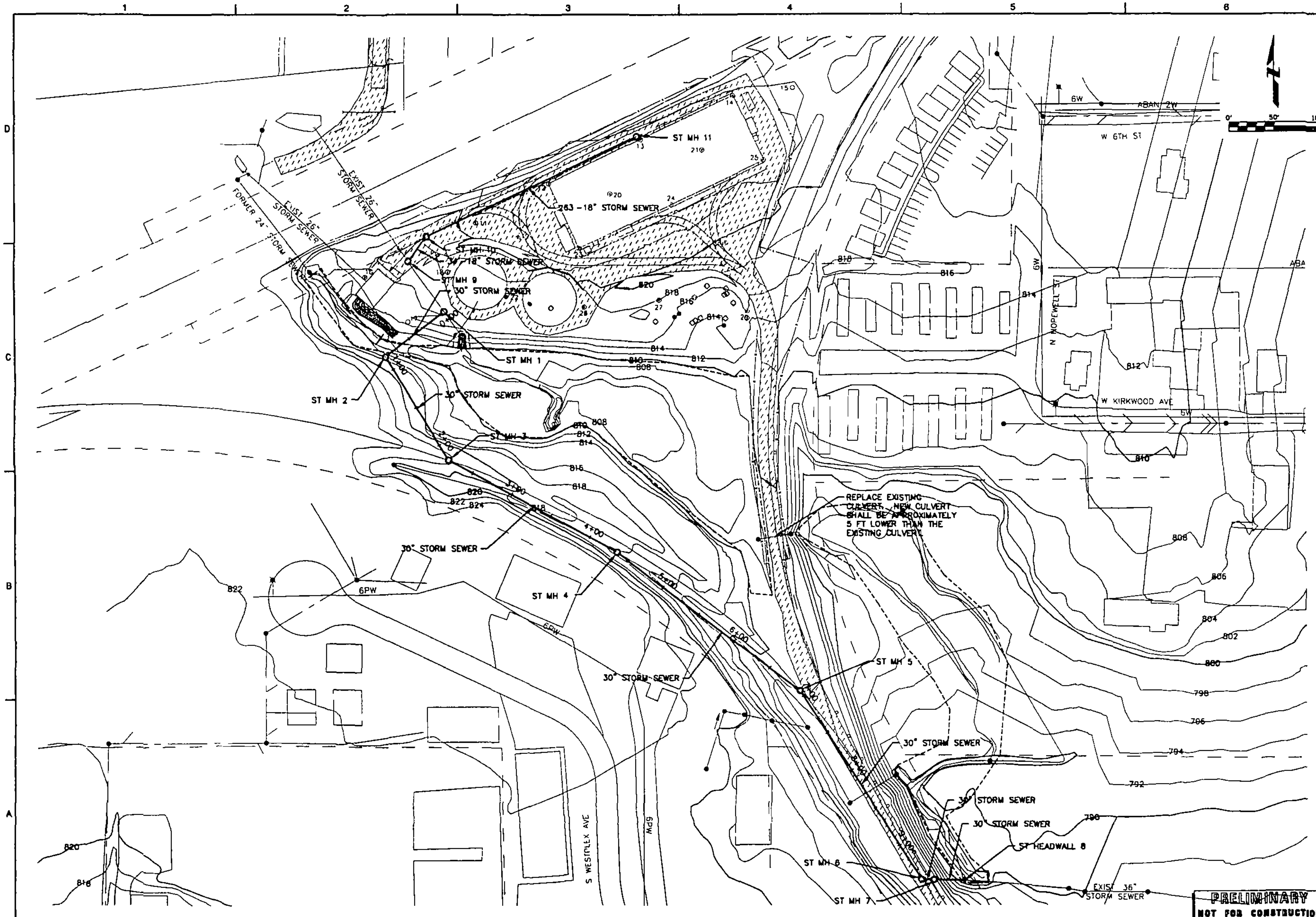
DATE REVISION

DRAWING TITLE
SOIL BORING LOGS

PROJECT No
C0850030

DRAWING No
G-4

DRAWING 6 OF DRAWINGS



Cla[redacted]etz ENGINEERS

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PHONE 317 844 8900
FAX : 317 844 8158

PROJECT TITLE

ILLINOIS CENTRAL SPRING
BLOOMINGTON, IN
EFFLUENT DISCHARGE PIPE

DESIGNED BY: ARB
DRAWN BY CBH
CHECKED BY TKB
DATE CHECKED: 12/08

NOTE DIMENSIONAL DATA IS NOT TO BE OBTAINED BY SCALING ANY PORTION OF THIS DRAWING

DATE	REVISION

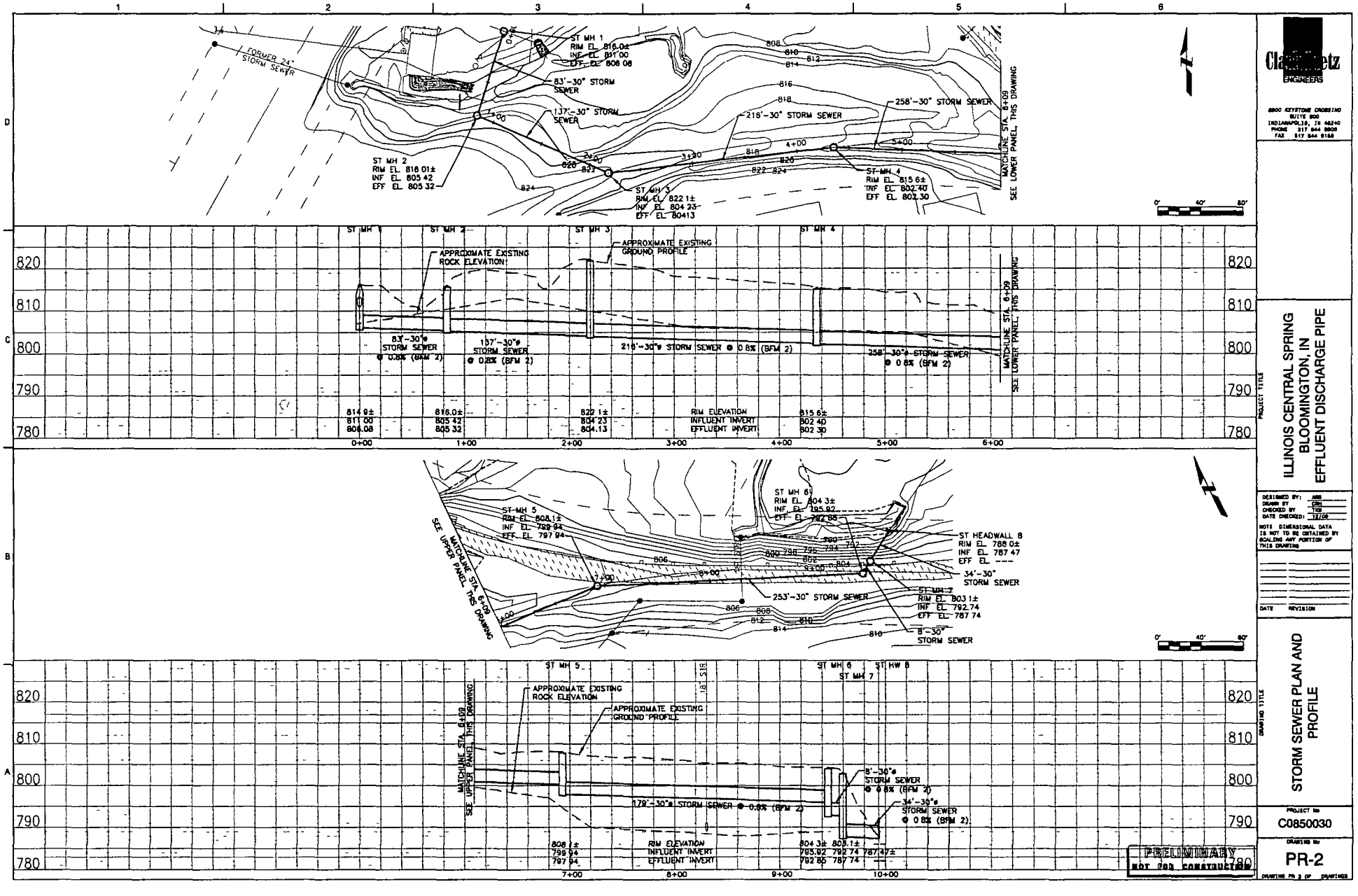
DRAWING TITLE

OVERALL SITE PLAN

PROJECT No
C0850030

DRAWING No
PR-1

DRAWING PR 1 OF DRAWINGS



Clark Dietz ENGINEERS

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PHONE 317 844 8900
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PROJECT TITLE

ILLINOIS CENTRAL SPRING
BLOOMINGTON, IN
EFFLUENT DISCHARGE PIPE

DESIGNED BY: ABB
DRAWN BY CRH
CHECKED BY TKB
DATE CHECKED: 12/06

NOTE: DIMENSIONAL DATA IS NOT TO BE OBTAINED BY SCALING ANY PORTION OF THIS DRAWING

DATE REVISION

DRAWING TITLE

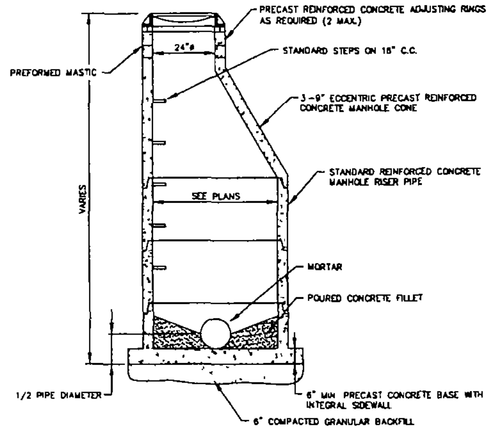
STORM SEWER PLAN AND PROFILE

PROJECT No
C0850030

DRAWING No
PR-2

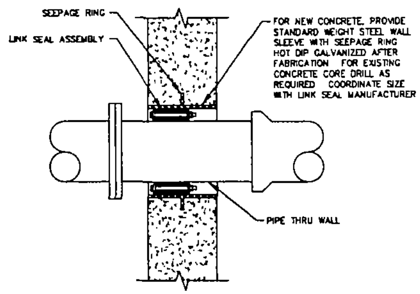
DRAWING PR 2 OF DRAWINGS

PRELIMINARY
NOT FOR CONSTRUCTION

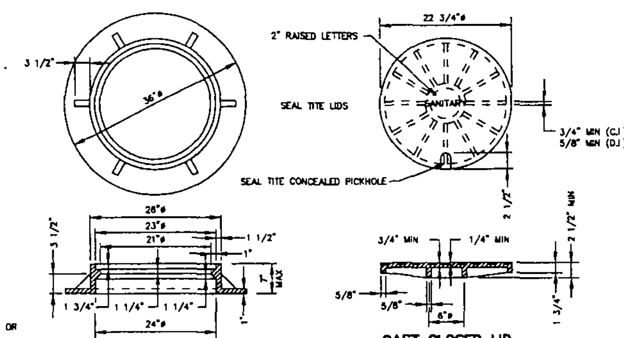


NOTES.
1 ALTERNATE MANHOLE BOTTOM PRECAST REINFORCED CONCRETE BASE.
2. CONCRETE FILLETS SHALL BE MADE WITH ADDITIONAL MORTAR TO PROVIDE A SMOOTH TRANSITION BETWEEN THE CASTING AND ADJUSTING RING (OR TOP OF STRUCTURE)
3. CONCRETE BLOCK CONSTRUCTION IS NOT PERMITTED
4 MAXIMUM PERMISSIBLE PIPE SIZE SHALL BE 20"
5 THE JOINTS BETWEEN SECTIONS SHALL CONFORM TO A.S.T.M. C-443
6 "DRESS-UP" INTERIOR JOINTS WITH HYDRAULIC CEMENT APPLY A CONTINUOUS LAYER OF NON-HARDENING PREFORMED BUTYL MASTIC MATERIAL E-Z STICK OR EQUAL APPROVED BY THE OWNER TO EACH JOINT TO PREVENT INFLOW

TYPICAL MANHOLE
SCALE NONE



WALL PENETRATION DETAIL
SCALE NONE

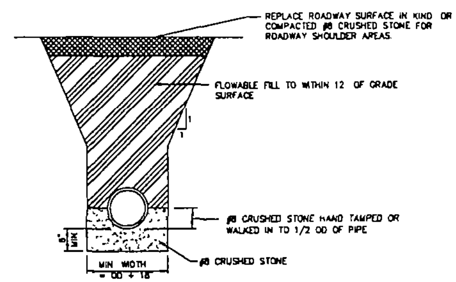


CAST FRAME

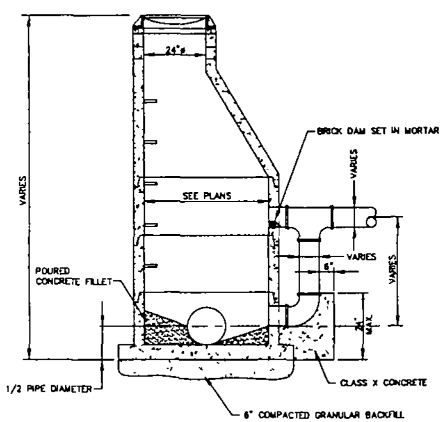
CAST CLOSED LID
(SEAL TITE CONCEALED PICKHOLE)

NOTES.
1 DUCTILE IRON CASTINGS SHALL BE GRADE 60-40-18 AND SHALL BE TESTED IN ACCORDANCE WITH FEDERAL SPECIFICATIONS.
2. ALL FRAMES AND COVERS SHALL HAVE MACHINED HORIZONTAL AND VERTICAL BEARING SURFACES. PICK HOLES SHALL NOT CREATE OPENINGS IN THE COVER
3. THE MANHOLE COVERS SHALL HAVE RAISED LETTERS AS SHOWN
4 ALTERNATIVE TO DUCTILE IRON LID GRAY IRON LID MAY BE USED
5 MINIMUM WEIGHTS FOR CASTINGS AS SHOWN
6 DIMENSIONS FOR CASTINGS ARE COMPARABLE TO EAST JORDAN #1022-HD OR NEENAH FOUNDARY 1722-C

MANHOLE FRAME AND COVER
SCALE NONE

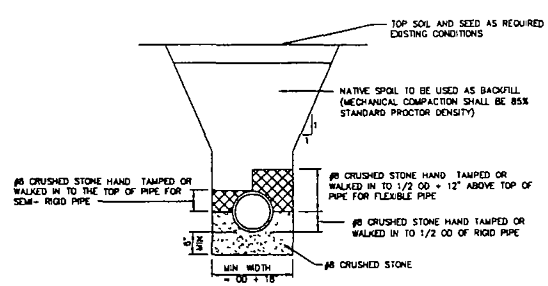


ROADWAY TRENCH SECTION
FOR TRENCHES LOCATED WITHIN 5' EDGE OF PAVEMENT
SCALE NONE

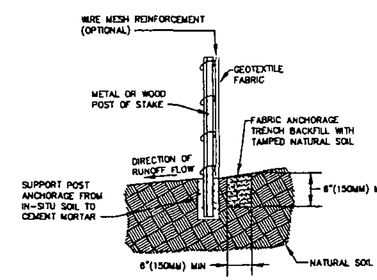


NOTES.
1 FOR CONSTRUCTION OF MANHOLE SEE TYPICAL MANHOLE DETAIL THIS DRAWING.
2. INVERT OF DROP SEWER TO BE AT SAME ELEVATION AS ℄ OF EFFLUENT PIPE
3 FOR INCOMING SEWERS SMALLER THAN 12" USE VERTICAL PIPE OF SAME DIAMETER AS INCOMING SEWER. FOR INCOMING SEWERS 12" OR LARGER USE 12" MIN. VERTICAL PIPE.
4 DROP MANHOLE SHALL BE REQUIRED WHEN THE DIFFERENCE IN ELEVATION OF INVERTS OF TWO INTERSECTING CONDUITS IS GREATER THAN 24 INCHES.
5. PIPE AND FITTINGS USED IN DROP CONNECTION TO BE PVC PIPE.

DROP MANHOLE DETAIL
SCALE NONE



GRASS AREA TRENCH SECTION
FOR TRENCHES LOCATED MORE THAN 5' OUTSIDE EDGE OF PAVEMENT
SCALE NONE



NOTE.
DEPENDING UPON THE CONFIGURATION ATTACH FABRIC TO WIRE MESH WITH HOG RINGS, STEEL POST WITH TIE WIRES, WOOD POST WITH NAILS

TYPICAL SILT FENCE CONSTRUCTION
SCALE NONE

PRELIMINARY
NOT FOR CONSTRUCTION

ENGINEERS
8900 KEYSTONE CROSSING
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FAX : 317 844 9180

PROJECT TITLE
ILLINOIS CENTRAL SPRING
BLOOMINGTON, IN
EFFLUENT DISCHARGE PIPE

DESIGNED BY AMB
DRAWN BY CHL
CHECKED BY TCB
DATE CHECKED: 12/09

NOTE DIMENSIONAL DATA IS NOT TO BE OBTAINED BY SCALING ANY PORTION OF THIS DRAWING

DATE	REVISION

DRAWING TITLE
DETAILS

PROJECT No
C0850030

DRAWING No
PR-3
DRAWING PR 3 OF DRAWINGS

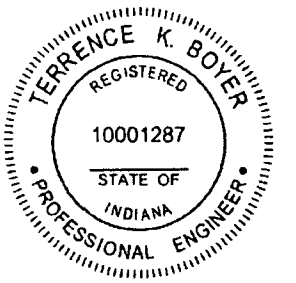
Appendix C
Draft Project Manual

DRAFT

Project Manual

Effluent Discharge Line Improvements

Illinois Central Springs Treatment Facility
in Bloomington, Indiana
for CBS Corporation



January 2010

Design Firm
Registration No.: 184-00450

TECHNICAL SPECIFICATIONS
TABLE OF CONTENTS

Illinois Central Spring
Bloomington, Indiana
Effluent Discharge

CBS Corporation, Inc.

SECTION 01010

SUMMARY OF WORK

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

A. The WORK to be performed under this Contract shall consist of furnishing tools, equipment, materials, supplies, and manufactured articles, and furnishing all labor, transportation, and services, including fuel, power, water, and essential communications, and performing all work or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. The WORK shall be complete, and all work, materials, and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the WORK in good faith shall be provided by the CONTRACTOR as though originally so indicated, at no increase in cost to the OWNER.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The WORK of this Contract comprises the construction of the new 30-inch discharge line for the Illinois Central Spring, Bloomington, Indiana, Effluent Discharge. The discharge line includes 9 manholes and 1 outfall structure at the downstream end of the line, which is to be tied into an existing stormwater sewer.

B. The WORK for the construction of the Illinois Central Spring, Bloomington, Indiana, Effluent Discharge is located at 1550 W Third Street, Bloomington, Indiana 47403.

1.3 CONTRACT METHOD

A. The WORK hereunder will be constructed under a lump sump contract per the Contract Documents.

1.4 WORK BY OTHERS

A. Where two or more contracts are being performed at one time on the same Site or adjacent land in such manner that work under one contract may interfere with work under another, the OWNER will determine the sequence and order of the WORK in either or both contracts. When the Site of one contract is the necessary or convenient means of access for performance of work under another, the OWNER may grant privilege of access or other reasonable privilege to the CONTRACTOR so desiring, to the extent, amount, and in manner and at time that the OWNER may determine. No OWNER determination of method or time or sequence or order of the work or access privilege shall be the basis for a claim for delay or damage except under provisions of the General Conditions for temporary suspensions of the work. The CONTRACTOR shall conduct its operations so as to cause a minimum of interference with the work of such other contractors, and shall cooperate fully with such contractors to allow continued safe access to their respective portions of the Site, as required to perform work under their respective contracts.

C. Interference With Work On Utilities: The CONTRACTOR shall cooperate fully with all utility forces of the OWNER or forces of other public or private agencies engaged in the relocation, altering, or otherwise rearranging of any facilities which interfere with the progress of the WORK, and shall schedule the WORK so as to minimize interference with said relocation, altering, or other rearranging of facilities.

1.5 WORK SEQUENCE

A. The CONTRACTOR's construction activities shall be limited to the hours and days stipulated in the Contract Documents.

B. Where the WORK requires modifications to existing facilities or construction of new facilities and connection of new facilities to existing facilities, the CONTRACTOR shall submit a detailed written plan and schedule for the WORK a minimum of two [2] weeks in advance of the time that such WORK is planned. Any modifications to the plan requested by the ENGINEER shall be resubmitted in writing by the CONTRACTOR. No such WORK shall begin until the CONTRACTOR receives written approval for the WORK from the ENGINEER.

C. The overall project is defined as the WORK contained in the Contract Documents with specific completion requirements and Liquidated Damages as provided for in the Agreement. Construction of the Work is expected to occur in the following assumed general sequence:

1. Following the receipt of the Notice to Proceed, the CONTRACTOR will begin the Work and move onto the sites per its schedule developed for the Project. It is solely the CONTRACTOR's responsibility to coordinate activities within the project site between CONTRACTOR's employees and Subcontractors.

2. The CONTRACTOR shall provide security fence around the entire work site prior to any demolition work or construction. The CONTRACTOR shall maintain security fencing to protect the Work and the public safety at both sites throughout the duration of the Project. The ENGINEER may direct the CONTRACTOR to relocate or remove various sections of fencing to allow or prevent public use of portions of the park or of the Work. This will be at no additional cost to the OWNER.

3. Construction of the effluent discharge line shall proceed after schedules and submittals are approved and site security is installed. Shutdown of the existing 36" storm sewer for tie in to the new effluent discharge line shall be limited to 4 hours. Shutdown of the existing 26" storm sewer for tie in to the new effluent discharge line shall occur after the tie into the 36" storm sewer and shall be limited to 4 hours. Shutdowns shall be coordinated with the OWNER; if inclement weather is likely, the OWNER may require the shutdown be rescheduled at no additional cost. The OWNER must have access to the ICS treatment buildings at all times therefore the access road must remain passable to vehicular traffic during construction.

4. All landscaping and surface restoration shall be completed after the effluent discharge line is installed.

1.6 CONTRACTOR USE OF SITE

A. The CONTRACTOR's use of the Site shall be limited to its construction operations, including on-Site storage of materials, on-Site fabrication facilities, and field offices.

B. The CONTRACTOR shall limit activities to within the physical boundaries shown in the Drawings.

1.7 OWNER USE OF THE SITE

A. The OWNER may utilize all or part of the existing Site and access existing facilities during the entire period of construction for the conduct of the OWNER's normal operations and maintenance activities. The CONTRACTOR shall cooperate and coordinate with the OWNER and ENGINEER to facilitate the OWNER's operations and to minimize interference with the CONTRACTOR's operations at the same time. In any event, the OWNER shall be allowed access to the Site during the period of construction.

1.8 PROJECT MEETINGS

A. Preconstruction Conference

1. Prior to the commencement of WORK at the Site, a preconstruction conference will be held at a mutually agreed time and place. The conference shall be attended by the CONTRACTOR's Project Manager, its superintendent, and its subcontractors as the CONTRACTOR deems appropriate. Other attendees will be:

   a. ENGINEER and the Resident Project Representative.

   b. Representatives of OWNER.

   c. Governmental representatives as appropriate.

   d. Others as requested by CONTRACTOR, OWNER, or ENGINEER.

2. The CONTRACTOR shall bring the preconstruction conference submittals in accordance with General Conditions 6.22.

3. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The complete agenda will be furnished to the CONTRACTOR prior to the meeting date. However, the CONTRACTOR should be prepared to discuss all of the items listed below.

   a. Status of CONTRACTOR's insurance and bonds.

   b. CONTRACTOR's tentative schedules.

   c. Transmittal, review, and distribution of CONTRACTOR's submittals.

   d. Processing applications for payment.

e. Maintaining record documents.

f. Critical work sequencing.

g. Field decisions and Change Orders.

h. Use of Site, office and storage areas, security, housekeeping, and OWNER's needs.

i. Major equipment deliveries and priorities.

j. CONTRACTOR's assignments for safety and first aid.

k. Daily Report Form which the ENGINEER will furnish.

l. Submittal Transmittal Form which the ENGINEER will furnish.

4. The ENGINEER will preside at the preconstruction conference and will arrange for keeping and distributing the minutes to all persons in attendance.

5. The CONTRACTOR and its subcontractors should plan on the conference taking up to 6 hours.

B. Progress Meetings

1. The ENGINEER will schedule and hold regular on-Site progress meetings at least weekly and at other times as requested by OWNER, CONTRACTOR or as required by progress of the WORK. The CONTRACTOR, ENGINEER, and all subcontractors active on the Site shall attend each meeting. CONTRACTOR may at its discretion request attendance by representatives of its suppliers, manufacturers, and other subcontractors. OWNER's attendance will be discretionary, however no meeting shall be held without the OWNER's knowledge and opportunity to attend. Every reasonable effort shall be made by the CONTRACTOR to accommodate the OWNER's schedule so that meetings may be attended.

2. The ENGINEER will preside at the progress meetings and will arrange for keeping and distributing the minutes. The purpose of the meetings is to review the progress of the WORK, maintain coordination of efforts, discuss changes in scheduling, and resolve other problems which may develop. During each meeting, the CONTRACTOR shall present any issues that may impact its progress with a view to resolve these issues expeditiously.

1.10 LOCAL REQUIREMENTS

A. All storm water drainage facilities shall comply, at a minimum, with the Construction Specifications for City of Bloomington Utilities, current edition. This manual is available online at the following internet address:
http://bloomington.in.gov/media/media/application/pdf/4566.pdf.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

- END OF SECTION -

SECTION 01310

SCHEDULES, REPORTS, PAYMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Specification sections, apply to work of this section.

1.2 COORDINATION

A. Coordinate both the listing and timing of activities required by provisions of this and other sections, so as to provide consistency and logical coordination between activities. Provide close coordination of the progress schedule, listing of subcontracts, schedule of submittals, progress reports, and payment requests.

1.3 PROGRESS SCHEDULE

A. The CONTRACTOR shall submit a bar-chart type preliminary progress schedule with their bid.

B. Within seven (7) days after the Contract Award the CONTRACTOR shall submit an updated progress schedule. On the schedule, indicate a time bar for each major category or unit of work to be performed.

1. Submittal Tabulation: With the bar-chart submittal, submit a tabulation, by date, of the submittals required during the Construction Time. At the CONTRACTOR's option, submittal dates may be shown on the bar-chart schedule, in lieu of being tabulated.

C. The first Payment Request shall not be submitted prior to submittal of a progress schedule acceptable to the OWNER and ENGINEER.

D. The CONTRACTOR shall update the progress schedule and submit it to the OWNER and ENGINEER every time the substantial completion date changes by more than seven (7) days.

1.4 PROGRESS MEETINGS, REPORTING

A. General: In addition to an initial progress meeting, and other regular project meetings held for other purposes, a general progress meeting with the OWNER and ENGINEER will be held each week to:

1. Review each entity's present and future needs including interface requirements, time, sequences, deliveries, access, site utilization, temporary facilities and services, hours of work, hazards and risks, housekeeping, change orders, and documentation of information for payment requests.
2. Discuss whether each element of current work is ahead of schedule, on time, or behind schedule in relation with updated progress schedule.
3. Determine how behind-schedule work will be expedited, and secure commitments from entities involved in doing so.
4. Discuss whether schedule revisions are required to ensure that current work and subsequent work will be completed within Contract Time.
5. Review everything of significance which could affect progress of the work.

B. Initial Progress Meeting: Schedule initial progress meeting, recognized as "Pre-Construction Meeting", for a date not more than 10 days before date of commencement of the work. Use it as an organizational meeting, and review reponsibilities and personnel assignments.

C. Reporting: Within 5 days after each progress meeting date, distribute copies of minutes-of-the-meeting to each entity present and to others who should have been present. Include brief summary (in narrative form) of progress of the work since previous meeting and report.

D. Schedule Updating: Immediately following each progress meeting, where revisions to progress schedule have been made or recognized, revise progress schedule. Reissue revised schedule concurrently with report of each meeting.

E. Daily Reports: Prepare a daily report, recording the following information concerning events at the site; and submit duplicate copies to OWNER at regular intervals not exceeding weekly intervals:

1. List of subcontractors at the site.
2. Approximate count of personnel at the site.
3. High/low temperatures, general weather conditions.
4. Accidents (refer to accident reports).
5. Meetings and significant decisions.
6. Unusual events (refer to special reports).
7. Stoppages, delays, shortages, losses.
8. Emergency procedures, field orders.
9. Orders/requests by governing authorities.
10. Change orders received, implemented.
11. Substantial completions authorized.

1.5 PAYMENT REQUESTS

A. General: Except as otherwise indicated, the progress payment cycle is to be regular. Each application must be consistent with previous applications and payments. Certain applications for payment, such as the initial application, the application at substantial completion, and the final payment application involve additional requirements.

1. Waivers of Lien: For each payment application, submit waivers of lien from every entity (including CONTRACTOR) who could lawfully and possibly file a lien in excess of $1000 arising out of the Contract, and related to work covered by the payment. Submit partial waivers for the amount requested, prior to deduction or retainage, on each item. When the application shows completion of an item, submit final or full waivers. The OWNER reserves the right to designate which entities involved in the work must submit waivers.

2. Waiver Delays: Each progress payment must be submitted with CONTRACTOR's waiver for the period of construction covered by the application. At the CONTRACTOR's option, each progress payment may be submitted with waivers from the subcontractors or sub-subcontractors and suppliers for the previous period of construction covered by the previous application. The final payment application must be submitted together with or preceded by final or complete waivers from every entity involved with performance of the work covered by the payment request.

3. Waiver Forms: Submit waivers on forms, and executed in a manner, acceptable to OWNER.

4. Sworn Statements: Each progress payment must be submitted with a sworn statement showing subcontractors and material suppliers and the payment status of each. Form or the sworn statement shall be subjected to approval of owner.

B. Payment Application Times: The "date" for each progress "payment" is as indicated in OWNER-CONTRACTOR Agreement or, if none is indicated therein, it is the 15th day of each month. The period of construction work covered by each payment request is period indicated in OWNER-CONTRACTOR Agreement or, if none is indicated therein, it is period ending 15 days prior to date for each progress payment, and starting day following end of preceding period.

C. Application Preparation: Except as otherwise indicated, complete every entry provided for on the form, including notarization and execution by authorized persons. Incomplete applications will be returned by OWNER without action. Listing must include amounts of change orders issued prior to last day of the "period of construction" covered by application.

D. Initial Payment Application: The principal administrative actions and submittals which must precede or coincide with submittal of contractor's first payment application can be summarized as follows, but not necessarily by way of limitation:

1. Listing of subcontractors and principal suppliers and fabricators.

2. Progress schedule (preliminary if not final).

3. Schedule of principal products.

4. Schedule of submittals (preliminary if not final).

5. Listing of CONTRACTOR's staff assignments and principal consultants.

6. Copies of acquired permits and similar authorizations and licenses from governing authorities for current performance of the work.

7. Data needed to acquire OWNER's insurance coverages.

8. Initial progress report, including report of pre-construction meeting.

9. Same forms for Waver of Lean and Sworn Statement.

E. Application at Time of Final Completion: Following issuance of ENGINEER's final "certificate of substantial completion", and also in part as applicable to prior certificates on portions of completed work as designated, a "special" payment application may be prepared and submitted by CONTRACTOR. The principal administrative actions and submittals which must proceed or coincide with such special applications can be summarized as follows, but not necessarily by way of limitation:

1. Warranties (guarantees), maintenance agreements and similar provisions of contract documents.

2. Cost inventory of all purchased items.

3. Test records, maintenance instructions, start-up performance reports, and similar change-over information germane to OWNER's occupancy, use, operation and maintenance of completed work.

4. Final cleaning of the work.

5. Application for reduction (if any) of retainage, and consent of surety.

6. Advice to OWNER on coordination of shifting insurance coverages, including proof of extended coverages as required.

7. Final progress photographs, where required.

8. Listing of CONTRACTOR's incomplete work, recognized as exceptions to ENGINEER's certificate of substantial completion.

F. Final Payment Application: The administrative actions and submittals which must precede or coincide with submittal of contractor's final payment application can be summarized as follows, but not necessarily by way of limitation:

1. Completion of project closeout requirements.

2. Completion of items specified for completion beyond time of substantial completion (regardless of whether special payment application was previously made).

9. Assurance, satisfactory to OWNER, that unsettled claims will be settled and that work not actually completed and accepted will be completed without undue delay.

4. Transmittal of required project construction records to OWNER.

5. Proof, satisfactory to OWNER, that taxes, fees and similar obligations of CONTRACTOR have been paid.

6. Removal of temporary facilities, services, surplus materials, rubbish and similar elements.

7. Consent of surety for final payment.

G. Application Transmittal: Submit 3 executed copies of each payment application, one copy of which is completed with waivers of lien and similar attachments. Transmit each copy with a transmittal form listing those attachments, and recording appropriate information related to application in a manner acceptable to OWNER. Transmit to OWNER by means ensuring receipt within 24 hours.

END OF SECTION

SECTION 01335

PRE-CONDITION SURVEY

PART 1 – GENERAL

1.1. SCOPE OF WORK

A. The CONTRACTOR shall conduct a thorough pre-construction site condition survey of the entire job. Site Condition Survey shall consist of photographs, digital video recordings, and a survey log and report, describing and thoroughly documenting the survey with location maps and detailed comments as needed. Sufficient photographs supplemented by digital video shall be provided by the CONTRACTOR and submitted to the ENGINEER to resolve any damage claims from third party, which may arise due to the construction of this project.

B. Digital video and photograph survey shall be completed of existing facilities that may be impacted by the Work, and shall include, but not be limited to, residential buildings, commercial properties, government buildings, streets, curbs, catch basins, sidewalks, driveways, bridges, railroad tracks, ditches, culverts, trees, landscaping, headwalls, retaining walls, fences, visible utilities, and access roads used to transport material or equipment to and from the project site.

1.2. RELATED WORK

A. Section 01505 – Mobilization and Demobilization

B. Section 02100 – Site Preparation

1.3. QUALITY ASSURANCE AND CONTROL

A. The CONTRACTOR shall retain the services of an independent third-party professional or company who will conduct detailed pre-construction survey documenting the condition of all private, commercial and public property that may be impacted by the Work. The third party professional or company shall have performed similar pre-construction survey services on at least three projects of similar scope and complexity.

1.4. SUBMITTALS

A. Submit to the ENGINEER the following a minimum of eight weeks before the scheduled start of the applicable activity:

1. Name and qualifications of a person responsible for pre-construction site condition survey in accordance with Paragraph 1.3 herein.

2. Schedule delineating all tasks to be performed including but not limited to:
    a. Preparing submittals
    b. Notifications to the ENGINEER
    c. Conducting pre-condition survey
    d. Preparation of Reports

B. Photographs shall be placed in plastic photo-sheets and bound along with the related survey log and reports. Digital video shall be placed on a DVD and be formatted correctly to view on a DVD player. The data obtained from the survey shall be delivered to the ENGINEER within 7 days of the date of survey. Two copies of the DVD, photographs and report shall be provided.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

- END OF SECTION -

SECTION 01370

SCHEDULE OF VALUES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Providing a draft complete Schedule of Values (SOV) for review by the ENGINEER.

B. Providing a final complete SOV after receipt of comments from the ENGINEER regarding the draft complete SOV.

1.2 SUBMITTAL

A. The CONTRACTOR shall submit a draft complete Schedule of Values, as specified herein, to the ENGINEER within seven (7) days after Contract Award.

B. The CONTRACTOR shall submit a final Complete Schedule of Values, as specified herein, to the ENGINEER at least ten (10) days prior to submitting the first payment estimate. **Failure by the CONTRACTOR to submit a final complete Schedule of Values within the allotted time may delay approval and payment of the initial payment request.**

C. Provide information as requested by the ENGINEER to substantiate price included in the Schedule of Values.

D. The BID-3 forms submitted with the CONTRACTOR's Bid shall be considered to meet the requirements of General Conditions 2.7.3 for providing a preliminary SOV.

1.3 SCHEDULE OF VALUES

A. The complete Schedule of Values shall follow the general outline yet significantly expand on the work items listed on the BID-3 forms submitted with the CONTRACTOR's Bid.

B. The total of all items in the Schedule of Values shall equal the Bid Price.

C. The Schedule of Values shall be provided both digitally and by hard-copy in a format approved by the ENGINEER.

D. The Schedule of Values shall be used to determine the value of work completed for payment purposes.

E. For each item which has an installed value of over $50,000 break down cost to list major products or operations under each item. Round off figures to the nearest hundred (100) dollars. The sum total of all items in the Schedule shall equal to Total Contract Price.

F. Mobilization and Demobilization shall include acquiring bonds and insurance, completing pre-condition survey, establishing temporary facilities, acquiring permits, providing and installing erosion control and project signs, and any other tasks required to initiate the Work, move on to the work sites, and leave the work sites at the end of the Work. Mobilization shall be limited to 75% of the total for Mobilization and Demobilization. The total for Mobilization and Demobilization items SHALL NOT EXCEED 3% OF THE TOTAL LUMP SUM VALUE.

G. Construction Engineering shall include providing temporary traffic control when required, maintaining erosion control and construction survey points, scheduling, compiling and submitting shop drawings, maintaining and providing record drawings, compiling and submitting O&M data, managing the project, and any other tasks required to insure compliance with the Contract Documents. The total for Construction Engineering items SHALL NOT EXCEED 3% OF THE TOTAL LUMP SUM VALUE.

H. The CONTRACTOR shall be paid as provided for in the General Conditions, Article 13.

- END OF SECTION -

SECTION 01500

TEMPORARY CONSTRUCTION FACILITIES

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Temporary utilities and services.

B. Construction aids.

C. Security.

D. Access roads and parking areas.

E. Temporary controls.

F. Field offices and storage sheds.

1.2 RESPONSIBILITY

A. All construction facilities and temporary controls remain the property of the CONTRACTOR establishing them and shall be maintained in a safe and useful condition until removed from the construction site.

B. Access to dumpsters by OWNER personnel and refuse haulers must be maintained throughout construction.

1.3 TEMPORARY UTILITIES AND SERVICES

A. Applicable Utilities

1. The CONTRACTOR is to provide and pay for the following temporary utility services as required and as needed for the Work. No OWNER facilities are to be utilized by the CONTRACTOR.

B. Temporary Electric Service

1. CONTRACTOR shall furnish and maintain a complete temporary lighting and power system of the phase and voltage required. Extend to the point of usage for the work of all trades and pay for all power used. The CONTRACTOR shall make modifications to CONTRACTOR's equipment if needed to accept available power.

2. Include in the Bid all costs for providing temporary electrical service to the site including but not limited to the following:

   a) Utility company charges for extending temporary service to the site.

   b) Utility company charges for installing and removing primary switches and fuses, lightning arrestors, transformers, metering and meter rental, poles, lines, etc.

3. Temporary service shall include protective enclosures, branch wiring, outlets, lamps, and grounding as required by NEC and Local Electrical Codes.

4. If temporary wiring interferes with construction, it shall be relocated. Maintain service during all work hours and one-half hour before and after working hours.

5. When temporary service is no longer needed, remove all temporary electrical facilities from the site.

C. Temporary Heating

1. If required for the Work, the CONTRACTOR shall furnish fuel or power and provide and operate all temporary heating units. Heat shall be provided as necessary to thaw or heat materials, to control humidity, to protect all water-bearing materials against injury by frost or freezing, and to provide heat required for operations. Temporary heating units shall be adequately vented and approved devices which will not damage finished areas. The CONTRACTOR shall also furnish all tarpaulins and temporary enclosures necessary to provide this protection.

2. The CONTRACTOR shall provide heat to a minimum of 55 degrees F. in enclosed and existing buildings or as required or recommended for the normal operation of the existing facilities or construction operations.

D. Temporary Ventilation

1. If required for the Work, the CONTRACTOR shall provide, operate, and furnish power for temporary ventilation required for the proper installation and curing of materials and safety of workmen.

E. Temporary Telephone

1. The CONTRACTOR shall provide and maintain a modern wireless telephone for the ENGINEER in the temporary field office. The CONTRACTOR shall pay for all local calls; toll calls shall be paid for by persons making such calls.

F. Temporary Water

1. The CONTRACTOR shall furnish potable drinking water in suitable dispensers and with cups for use of all employees at the job.

2. If required for the Work, the CONTRACTOR shall coordinate with the local water utility for water supply for construction purposes. The CONTRACTOR shall pay the local water utility directly for all water usage.

3. The CONTRACTOR shall provide all temporary piping, hoses, etc., required to transport water to the point of usage.

4. Large quantities of water for testing pipelines and tanks shall be drawn only at night or as directed by the OWNER.

G. Temporary Sanitary Facilities

1. Provide temporary toilet facilities and maintain these during the entire period of construction under this Contract for the use of all construction personnel and the OWNER's representative on the job. Enough chemical toilets shall be provided to conveniently serve the needs of all personnel and OWNER's representative.

2. Chemical toilets and their maintenance shall meet the requirements of State and local health regulations and ordinances. Any facilities or maintenance methods failing to meet these requirements shall be corrected immediately.

3. Local commercial or any other OWNER toilet facilities shall not be used by construction personnel.

H. Temporary Pumping and Site Drainage

1. The CONTRACTOR shall keep the site free from water at all times to permit continuous access and to prevent damage to the work.

1.4 CONSTRUCTION AIDS

A. Material Hoists and Cranes

1. Provide material hoists required for normal use by all trades and employ skilled hoist operators. Provide all necessary guards, signals, safety devices, etc., required for safe hoist operation. The construction and operation of material hoists shall be in accordance with the applicable ANSI Standards, the "Manual Code of Accident Prevention in Construction" of the Associated General Contractors of America, OSHA, and of other Federal, State, and

municipal codes or ordinances. The CONTRACTOR shall prohibit the use of hoists for transporting personnel. Hoists shall be located to avoid risk of damage to completed work.

B. Special rigging and hoisting facilities shall be provided by each trade requiring their use.

1.5 SECURITY

A. Full time watchmen will NOT be specifically required as a part of the Contract, but the CONTRACTOR shall provide inspection of work area daily and shall take whatever measures necessary to protect the safety of the public, workmen, and materials, and provide for the security of the site, both day and night. CONTRACTOR shall install temporary barriers as needed around all open excavations as a minimum safety measure.

1.6 ACCESS ROADS AND PARKING AREAS

A. Construct temporary roadways and parking areas within the site as required to provide proper access to site for delivery of material and equipment of all trades. Roadways and parking areas shall be constructed and maintained to keep the surface free from mud and standing water and to keep mud from being picked up and deposited on adjacent streets and roadways. Location of the temporary roads and parking areas shall be approved by the ENGINEER.

B. At completion of the work or when directed by the ENGINEER, material used for temporary road and parking areas shall be removed, unless otherwise approved by the ENGINEER.

1.7 TEMPORARY CONTROLS

A. Dust and Mud Control

1. Take all necessary precautions, to the maximum extent reasonable, to control dust and mud associated with the work of this Contract, subject to the approval of the ENGINEER. In dry weather, spray dusty areas daily with water or weekly with oil in order to control dust. Take necessary steps to prevent the tracking of mud onto adjacent streets and highways.

2. Provide street cleaning as needed at the direction of the ENGINEER.

1.8 TEMPORARY FIELD OFFICES AND STORAGE SHEDS

A. Temporary Field Office

1. Local permanent facilities MAY be used for field offices or for storage, at the CONTRACTOR's discretion and with the OWNER's approval.

2. Temporary Field Office shall be a minimum of 550 square feet and shall meet the requirements of INDOT Office Type B with modifications as noted in these Contract Documents.

3. OWNER's/ENGINEER's Office:
   a. Separate space for sole use of OWNER and ENGINEER, with separate entrance door with new lock and two keys.
   b. Area: Minimum 250 sq ft, minimum dimension 8 ft.
   c. Sanitary Facilities: To be provided as an exterior chemical toilet; no plumbing for an interior toilet will be required for temporary offices. If local permanent facilities are used for the office then a plumbed interior toilet with sink and running potable water shall be provided.
   d. Drinking Water: Potable chilled drinking water with convenient access by workers; no plumbing for interior water will be required for temporary offices. If local permanent facilities are used for the office then a sink with running potable water shall be provided in addition to separate chilled potable drinking water.
   e. Minimum Computer Requirements:
      i. One computer, copier, printer, scanner, and fax with multiple paper feeder.
      ii. The computer hardware is to be Microsoft Vista compatible, and shall contain a DVD read-write drive.
      iii. The computer's operating system is to be Microsoft Windows XP Professional, with all current updates.
      iv. A separate phone line or cable is to be provided for internet access by the ENGINEER. Minimum service speed shall be DSL.
      v. Microsoft Office 2003 Professional is to be installed on the computer.
      vi. McAfee Anti-Virus and Anti-Spyware protection or other suitable program acceptable to the ENGINEER is to be installed and maintained on the computer for the duration of the project.

4. Storage Areas And Sheds: Size to storage requirements for products of individual Sections, allowing for access and orderly provision for maintenance and for inspection of products.

5. Preparation: Fill and grade sites for temporary structures sloped for drainage away from buildings.

6. Installation:
   a. Install office spaces ready for occupancy within 15 days after date fixed in Notice to Proceed.
   b. Parking: Two hard surfaced parking spaces for use by OWNER and ENGINEER, connected to office by hard surfaced walk.
   c. Employee Residential Occupancy: Not allowed on OWNER's property.

7. Maintenance And Cleaning:
   a. Weekly janitorial services for offices; periodic cleaning and maintenance for office and storage areas.
   b. Maintain approach walks free of mud, water, and snow.

8. Removal: At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

B. Storage Sheds

1. The CONTRACTOR shall provide storage sheds as required for the performance of the Work and protection of materials and equipment. Locate storage areas with approval of the ENGINEER.

1.9 REMOVAL OF TEMPORARY CONSTRUCTION

A. Remove the various temporary facilities, services, and controls and legally dispose of them as soon as the ENGINEER deems permissible. Sites used for temporary facilities shall be properly reconditioned and restored to a condition acceptable to the ENGINEER.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

- END OF SECTION -

SECTION 01505

MOBILIZATION AND DEMOBILIZATION

PART 1 -- GENERAL

1.1 GENERAL

A. Mobilization and Demobilization shall include the obtaining of all permits; moving onto the site of all equipment; furnishing and erecting construction facilities; implementing security requirements; and removal of same from the site; all as required for the proper performance and completion of the WORK. Mobilization and Demobilization shall include the following principal items:

1. Moving on to the site of all CONTRACTOR's equipment required for first month operations.

2. Installing temporary construction utilities, including power, wiring, and lighting facilities.

3. Establishing fire protection system.

4. Developing construction water supply.

5. Providing and siting field office trailer(s) and/or securing local office and storage space for the CONTRACTOR and the ENGINEER, complete with all furnishings and utility services including telephones, telephone appurtenances, and copying machine.

6. Providing all on-site communication facilities, including telephones, and radio pagers.

7. Providing on-site sanitary facilities and potable water facilities.

8. Arranging for and erection of CONTRACTOR's work and storage yard.

9. Constructing and implementing security features and requirements.

10. Obtaining all required permits.

11. Having all OSHA required notices and establishment of safety programs.

12. Submitting initial submittals.

13. Removing all temporary utilities, field office trailer(s) and furnishings away from project site at project completion as directed by ENGINEER.

14. Restoration of surfaces damaged as a result of construction activities, including mobilization and demobilization, that are not included under other Items and as directed by ENGINEER.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 01520

SECURITY

PART 1 -- GENERAL

1.1 SECURITY PROGRAM

A. The CONTRACTOR shall:

1. Protect WORK from theft, vandalism, and unauthorized entry.

2. Initiate program at mobilization.

3. Maintain program throughout construction period until Substantial Completion.

1.2 ENTRY CONTROL

A. The CONTRACTOR shall:

1. Restrict entry of persons and vehicles into Site.

2. Allow entry only to authorized persons with proper identification.

3. Maintain log of workmen and visitors and make log available to OWNER on request.

4. Coordinate access of OWNER'S personnel to Site.

1.3 RESTRICTIONS

A. The CONTRACTOR shall not allow cameras on site or photographs taken except by written approval of OWNER.

PART 2 -- PRODUCTS

2.1 SECURITY FENCE

A. CONTRACTOR shall provide a temporary 72-inch high, steel galvanized chain link type security fence with lockable gates. The purpose of the fencing shall be to control access to the site. All fencing and gates shall be approved by the ENGINEER prior to installation. The temporary fence materials shall be in accordance with applicable portions of Section 603, 910.13 and 910.18 of the Standard Specifications as a minimum. Gates on the temporary fencing shall be sized as needed for access during construction. Fencing may be moved to

coincide with the progression of construction with the approval of the ENGINEER.

B. This requirement for security fencing shall not lessen the CONTRACTOR's responsibility and obligations under Paragraph 6.20 of the Standard General Conditions.

PART 3 -- EXECUTION

3.1 SECURITY FENCE INSTALLATION AND MAINTENANCE

A. CONTRACTOR shall install and maintain temporary security fence and privacy screening in accordance with the manufacturer's requirements and the applicable portions of Section 603 of the Standard Specifications as a minimum. Installation and maintenance will be completed in such a way as to insure the intended functionality and aesthetics of the security fence throughout the entire Project and as directed by the ENGINEER.

- END OF SECTION -

SECTION 01620

PRODUCT DELIVERY, STORAGE AND PROTECTION

PART 1 - GENERAL

1.1 APPLICABILITY

A. This section applies to all products furnished under this Contract. Shipments of equipment or materials to be used by the CONTRACTOR or its subcontractors shall be delivered to the site only during regular working hours. All shipping papers and shipments shall be addressed and consigned to the CONTRACTOR. Under no circumstances will the OWNER accept shipments directed to it or the ENGINEER unless otherwise specified.

1.2 DELIVERY

A. Products shall not be delivered to the project site until related shop drawings have been reviewed and approved by the Design Engineer and until appropriate storage facilities are in place and approved by the ENGINEER.

B. Products shall be delivered to the site in manufacturer's original, unopened, labeled containers.

C. The CONTRACTOR shall not drop, roll or skid products off delivery vehicles. Hand carry or use suitable materials handling equipment.

1.3 STORAGE AND PROTECTION

A. GENERAL

1. The CONTRACTOR shall store and protect products in accordance with the manufacturer's recommendations and the requirements specified herein. No on-site existing storage facilities are available for use by the CONTRACTOR. All on-site facilities for storage shall be furnished by the CONTRACTOR. The designated Staging Areas as shown on the Drawings may be utilized by the CONTRACTOR for storage.

2. The CONTRACTOR shall not block or restrict the use of Public Right of Way, access roads or private property with stored materials, except where indicated on the Contract Documents.

3. The CONTRACTOR shall not store products where they will interfere with operations of the OWNER or other contractors.

4. The CONTRACTOR shall protect all products from damage or deterioration by weather.

5. The CONTRACTOR shall not store any products directly on the ground.

B. UNCOVERED STORAGE

1. Materials not subject to deterioration or contamination by weather may be stored uncovered at the project site. Such materials may include concrete masonry units, reinforcing steel, piping, precast concrete, and castings. All such material shall be stored on wood blocking where practical. Aggregates and sand may be stored uncovered provided that they are protected by contamination by other materials.

C. COVERED STORAGE

1. The following types of material may be stored out-of-doors if covered with material impervious to water:

   a. Rough Lumber

   b. Equipment as specifically allowed by the ENGINEER

2. The CONTRACTOR shall tie down covers with rope and slope to prevent accumulation of water on covers. All materials shall be stored on wood blocking or pallets.

D. FULLY PROTECTED STORAGE

1. The CONTRACTOR shall store all products not named above in buildings or trailers which have a concrete or wooden floor, a roof; and fully closed walls on all sides.

2. The CONTRACTOR shall provide heated storage space for materials which would be damaged by freezing.

3. The CONTRACTOR shall protect mechanical and electrical equipment from being contaminated by dust and dirt.

4. The CONTRACTOR shall maintain temperature and humidity at levels recommended by manufacturer(s) for electrical and electronic equipment.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 02100

SITE PREPARATION

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The WORK of this Section includes measures required during the CONTRACTOR's initial move onto the Site to protect existing fences, structures and associated improvements, streets, and utilities from damage; clearing, grubbing and stripping; and regrading of certain areas.

1.2 SITE INSPECTION

A. Prior to moving onto the Site, the CONTRACTOR shall inspect the Site conditions and review the existing site and utility routes and facilities delineating the OWNER's property and right-of-way lines.

PART 2 -- PRODUCTS - NOT USED

PART 3 -- EXECUTION

3.1 PRIMARY SITE ACCESS

A. The CONTRACTOR shall develop any necessary access to the Site, including access barriers to prohibit entry of unauthorized persons.

B. Utility Interference: Where existing utilities interfere with the WORK, the CONTRACTOR shall notify the OWNER and the ENGINEER before proceeding in accordance with the General Conditions.

3.2 CLEARING, GRUBBING, AND STRIPPING

A. Construction areas shall be cleared of grass and weeds to at least a depth of 6-inches and cleared of structures, pavement, sidewalks, concrete or masonry debris, trees, logs, upturned stumps, loose boulders, and any other objectionable material of any kind which would interfere with the performance or completion of the WORK, create a hazard to safety, or impair the subsequent usefulness of the WORK, or obstruct its operation. Loose boulders within 10-feet of the top of cut lines shall be incorporated in landscaping or removed from the Site. Trees and other natural vegetation outside the actual lines of construction shall be protected from damage during construction, as directed by the ENGINEER, unless otherwise specified.

B. Within the limits of clearing, the areas below the natural ground surface shall be grubbed to a depth necessary to remove all stumps, roots, buried logs, and all other objectionable material. Septic tanks, drain fields, and connection lines and any other underground structures, debris or waste shall be removed if found on the Site. All objectionable material from the clearing and grubbing process shall be removed from the Site and disposal at approved safe locations.

C. Unless otherwise indicated, native trees larger than 3-inches in diameter at the base shall not be removed without the ENGINEER's approval. The removal of any trees, shrubs, fences, or other improvements outside of rights-of-way, if necessary for the CONTRACTOR's choice of means and methods, shall be arranged with the owner of the property, and shall be removed and replaced, at no additional cost to the OWNER.

D. Clearing Right of Way shall be in accordance with the requirements of Section 201 of the INDOT Standard Specifications except as follows: If it becomes necessary to remove encumbrances or materials that are not indicated in the Contract Documents to be removed, then such removal and disposal of these encumbrances or materials shall be considered as a part of clearing right of way.

E. Unless otherwise provided, any existing structure or parts thereof, fence, building, or other encumbrance or obstruction upon or within the limits of the right of way which interferes in any way with the new construction shall be removed with no additional payment. Materials belonging to owners of abutting property shall be stockpiled neatly and in an acceptable manner upon their property or otherwise disposed of as required.

F. Materials not specifically reserved for use by the OWNER shall become the property of the CONTRACTOR, except as set out in the General Conditions Section 4.8. Such materials shall be removed or disposed of as specified or directed. Materials reserved for use by the OWNER shall be removed without damage in sections which can be readily transported. Such materials shall be stockpiled neatly at accessible points. No material shall be disposed of except as provided herein.

3.3 OVEREXCAVATION, REGRADING, AND BACKFILL UNDER FILL AREAS

A. After the fill areas have been cleared, grubbed, and excavated, the areas to receive fill will require overexcavation, regrading, and backfill, consisting of the removal and/or stockpiling of undesirable soils. The ground surface shall be recontoured for keying the fill and removing severe or abrupt changes in the topography of the Site. The overexcavated volumes to a level 2.5 feet below the existing ground contours shall be backfilled.

- END OF SECTION -

SECTION 02140

DEWATERING

PART 1 – GENERAL

1.1 SCOPE

A. Work described in this Section includes furnishing all labor, equipment, tools and incidentals required for all dewatering. This work includes the installation, operation, and removal of all facilities required to maintain open excavations and trenches in a dewatered condition to permit unrestricted construction operations.

B. Construct all permanent work in areas free from water. Design, construct and maintain all pumping systems, dikes, levees, cofferdams, diversion and drainage channels as necessary to maintain the areas free from water and to protect the areas to be occupied by permanent work from water damage. Remove temporary works after they have served their purpose.

C. The CONTRACTOR shall be responsible for the stability of all temporary and permanent slopes, trenches, grades, foundations, materials and structures during the course of the Contract. Repair and replace all slopes, grades, foundations, materials and structures damaged by water, both surface and sub-surface, to the lines, grades and conditions existing prior to the damage at no additional cost to the OWNER.

D. Dewatering wells installed by the CONTRACTOR shall be located within the right-of-way, the OWNER's easements, or areas with specific rights-of-entry granted for this Project.

E. Water from dewatering activities shall be pumped by the CONTRACTOR to the ICS treatment facility Spring Receiving Sump. In this manner all water from dewatering activities will be treated prior to surface water discharge. Dewatering activities shall not occur during or immediately after significant rain events. The OWNER has the right to request that dewatering activities be stopped if such a rain event has occurred that maximizes the treatment capacity at the ICS facility. Rainfall events of this magnitude are expected several times each year. Weather related work delays caused by the temporary inability to dewater, whether or not requested by the OWNER, will not result in any increase of the Contract Price.

F. All dewatering activity shall remain in compliance with Rule 5 Stormwater requirements throughout construction.

1.2 QUALITY CONTROL

A. The CONTRACTOR or subcontractor designing and installing any dewatering

system shall have a minimum of three years of experience in dewatering excavations in similar ground and depths.

1.3 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Conditions of the Contract Documents and as specified hereinafter.

B. Working Drawings

1. Submit complete working drawings and supporting documents showing the type of water control system proposed for each site where required. Obtain ENGINEER's approval prior to installation of the system.

2. Working drawings and supporting documents will show:
   a. Arrangement and location of the system.
   b. Complete description of equipment and materials to be used.
   c. Installation and operation and maintenance procedures.
   d. Drawdown curves for the range of pumping rates anticipated and estimate of anticipated dewatering system discharge rate in gallons per minute.
   e. Standby equipment and power supply.
   f. Location and size of berms, dikes, settling basins, sumps, and discharge items.
   g. Discharge location.

3. Working drawings and supporting documents will be revised and resubmitted if the system is modified during installation or during operation.

C. Copies of all permits required to perform dewatering as specified below.

D. Submit to the ENGINEER during construction within the specified time:

1. Discharge Rates: Measured discharge rates for each discharge point. Submit for each point when discharge is initiated, at changes in discharge rate greater than 50 percent, and at a frequency of weekly. Submittals shall be made within two working days of such initiation, change, and taking of each reading.

E. Qualifications of persons or subcontractor responsible for the dewatering operation.

1.4 JOB CONDITIONS

A. Responsibilities

1. Select and install a system to control water as herein specified, and to comply with the requirements of the jurisdictional agencies.

2. Take measures to prevent damage to properties, buildings or structures, sewers and other utility installations, pavements, sidewalks, improvements and work.

3. Do not overload or obstruct existing facilities.

4. Modify the system at no additional cost to the OWNER if after installation and while in operation it causes or threatens to cause damage to existing buildings, structures, utilities, facilities, or other adjoining property.

5. Measure and evaluate if movements are being caused to adjacent buildings, structures, utilities, facilities or other adjoining properties by dewatering operations.

6 Repair damage, disruption, or interference resulting directly or indirectly from dewatering operations at no additional cost to the OWNER and to the ENGINEER's approval.

PART 2 – PRODUCTS - NOT USED

PART 3 – EXECUTION

3.1 CARE OF WATER

A. Except where the excavated materials are designated as materials for permanent work, material from required excavation may be used for dikes, levees, cofferdams and other temporary backfill.

B. Furnish, install, maintain and operate necessary pumping and other equipment for dewatering the various parts of the work and for maintaining the foundation and other parts free from water as required for constructing each part of the work.

C. Install all drainage ditches, sumps and pumps to control excessive seepage on excavated slopes, to drain isolated zones with perched water tables, and to drain impervious surfaces at final excavation elevation.

D. After they have served their purpose, remove all temporary protective work at a satisfactory time and in a satisfactory manner. All diversion channels and other temporary excavations shall be cleaned out, backfilled and processed under the same Specifications as those governing the compacted fill.

E. Temporary works and all debris shall be completely removed and the site restored to its original condition after the work is completed.

F. Intercept and divert surface drainage away from the excavation, by the use of dikes, curb walls, ditches, pipes, sumps, or other means.

G. Design surface drainage systems so that they do not cause erosion on or off the site or cause unwanted flow of water.

3.2 DEWATERING

A. By the use of pumps or other approved methods, the CONTRACTOR shall prevent the accumulation of water in excavated areas. Should water accumulate, it shall be promptly removed.

B. All water that is removed by dewatering shall be pumped to the ISC treatment facility Spring Receiving Sump for treatment prior to surface water discharge.

C. Excavations shall be continuously dewatered, unless required otherwise by the OWNER, to maintain a ground water level no higher than two feet below the lowest point in the excavation unless otherwise specified. Dewatering shall be accomplished well enough in advance of excavation to ensure that groundwater is already lowered prior to completing the final excavation to finish subgrade.

D. Dewater by means which will insure dry excavations, preserve final lines and grades, and not disturb or displace adjacent soil.

E. Provide and maintain ditches of adequate size to collect surface water and seepage which may enter the excavations and divert the water into a sump so that it can be drained or pumped into drainage channels and settling basins prior to discharge to storm sewers if approved by the ENGINEER and the jurisdictional agency concerned.

F. All destabilized subgrade conditions caused by inadequate or untimely dewatering operations shall be undercut and backfilled with suitable backfill material at no additional cost to the OWNER.

- END OF SECTION -

SECTION 02150

SHORING AND BRACING

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Shoring and bracing.

1.2 DESIGN AND SUPERVISION

A. All shoring and bracing used for the Work shall be designed and certified by a Professional Engineer licensed in the State of Indiana. The certified design shall be submitted as one or more shop drawings to the ENGINEER prior to installation of any shoring or bracing. This is for information only. THE ENGINEER WILL NOT REVIEW OR APPROVE this shop drawing as this is the responsibility of the certifying engineer.

B. Shoring and bracing shall be designed and installed in such a way as to allow full access and the safe use of the ICS treatment facilities as required elsewhere in these Contract Documents.

C. Acquiring shoring and/or bracing materials prior to acceptance of the certified shoring and bracing submittal by the ENGINEER shall be at the CONTRACTOR's risk.

D. The CONTRACTOR shall engage and assign supervision of shoring and bracing installation to a qualified foundation Consultant.

1.3 REGULATIONS

A. Comply with local codes and ordinances of governing authorities having jurisdiction.

1.4 JOB CONDITIONS

A. Before starting work, check and verify governing dimensions and elevations. Survey condition of adjoining properties, take photographs, recording existing settlement or cracking of structures, pavements, and other improvements. Prepare list of such damages, verified by dated photographs, and signed by CONTRACTOR and others conducting investigation.

B. CONTRACTOR shall, at a minimum, comply with the requirements of the General Conditions, Paragraph 6.20, for all excavations.

1.5 EXISTING UTILITIES

A. Protect existing active utility services and structures from damage during shoring and bracing work. Repair or replace damages to satisfaction of utility owner.

1.6 MATERIALS

A. Provide suitable shoring and bracing materials which will support loads imposed. Materials and construction shall be as provided in the certified shoring and bracing submittal.

1.7 SHORING

A. Protect site from caving and unacceptable soil movement. Where shoring is required, locate system to clear permanent construction and to permit forming and finishing of concrete surfaces. Provide shoring system adequately anchored and braced to resist earth and hydrostatic pressures.

B. Shoring systems retaining earth on which support or stability of existing structures is dependent must be left in place at completion of work. If wood is part of shoring system near existing structures, use pressure preservative treated materials or remove before placement of backfill.

C. Shoring may be used as falsework for forming reinforced concrete.

1.8 BRACING

A. Locate bracing to clear permanent work. If necessary to move a brace, install new bracing prior to removal of original brace.

B. Install internal bracing, if required, to prevent spreading or distortion to braced frames.

C. Maintain bracing until structural elements are re-braced by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

1.9 REMOVAL

A. Shoring and/or bracing may be completely or partially removed, at the CONTRACTOR's option. All shoring and/or bracing shall be removed to an elevation at least eight (8) feet below the proposed finish grade above the section of shoring or bracing.

B. Regardless of whether shoring and/or bracing is fully or partially removed, it shall be removed by the CONTRACTOR in stages to avoid disturbance to underlying soils and damage to structures, pavements, facilities, and utilities.

C. CONTRACTOR shall repair or replace adjacent work damaged or displaced through installation or removal of shoring and bracing work.

- END OF SECTION -

SECTION 02210

SITE ROUGH GRADING

PART 1 – GENERAL

1.1 SECTION INCLUDES

Rough grading for site drainage and the site.

PART 2 – PRODUCTS

2.1 GENERAL

Unless otherwise indicated, material for fills shall be surplus excavated soil and borrow material meeting the appropriate requirements for backfill as specified in other sections and shall be subject to approval by the ENGINEER.

PART 3 – EXECUTION

3.1 GENERAL

Provide all rough grading and filling to achieve the lines and grades indicated on the Drawings, with an allowance for the thickness of surfacing or top soil. Material not suitable for the required fills shall be spread uniformly in designated spoil areas and compacted as specified in Section 02250 to achieve a smooth and firm surface. All earthwork shall be done in a manner that provides drainage and prevents surface drainage from entering excavations.

3.2 PREPARATION FOR FILLS

A. Upon completion of site preparation work, remove any additional organic material or debris where fill is to be placed. Ground surfaces sloped steeper than 1 vertical to 4 horizontal shall be plowed, stepped or benched, or broken up as directed by the OWNER so the fill material will bond with the existing surface. Level surfaces shall be disked, wetted or dried as required, and recompacted. Backfill all holes made by demolition, clearing, grubbing, and other site preparation work.

B. Lift thicknesses and compaction requirements are specified in Section 02250.

C. Fill material and the surface to be filled shall be free of any frozen material. If, in the opinion of the ENGINEER, fill already placed has loosened as a result of frost action, the fill shall be recompacted prior to placing additional lifts. Compacted material that has been flooded and no longer meets the density specified shall be removed and replaced.

- END OF SECTION -

SECTION 02221

UTILITY TRENCHING AND BACKFILLING

PART 1 – GENERAL

1.1 DESCRIPTION

A. The work of this section includes, but is not necessarily limited to excavation and backfilling for all potable water mains, raw water mains, gravity and storm sewer lines, force mains, power and instrumentation cables and other utilities as shown on the Contract Documents and specified herein.

1.2 QUALITY ASSURANCE

A. Testing and inspection services as required by this section shall be provided by the CONTRACTOR as part of the project cost. Testing shall be performed by a qualified commercial testing laboratory as chosen by the CONTRACTOR and approved by the ENGINEER. Tests can include hand auger probing, field density tests for verifying the degree of compaction and excavation inspections to determine the limits of unsuitable material to be removed. Certified copies of all test reports shall be submitted to the ENGINEER.

B. Before commencement of any on-site activity, the CONTRACTOR shall verify that a copy of the Sate Construction Permit is on file in the Office of the City of Bloomington Utilities Engineer.

C. CONTRACTOR shall indication to the City of Bloomington Utilities Inspector, during his initial visit to the site, the nature and storage place of any and all hazardous substances. This shall be updated as necessary.

1.3 REFERENCES

A. Indiana Department of Transportation (INDOT) Publication: Latest edition of Standard Specifications.

B. Occupational Safety and Health Administration (OSHA) Standards 29 CFR Part 1926 including Subparts A,B,C,D and P.

C. City of Bloomington Utilities: Latest edition of Construction Specifications for Wastewater, Water, and Storm Projects.

1.4 CARE OF EXISTING STRUCTURES AND PROPERTY

A. All poles, fences, sewer, gas, water, drainage or other pipes, wires, conduits, manholes, buildings, structures and property in the proximity of any excavation shall

be supported and protected from damage by the CONTRACTOR during construction.

B. Wherever sewer, gas, water, drainage or other pipes or conduits cross the excavation, the CONTRACTOR shall support said pipes and conduits without damage to them and without interrupting their use during the progress of the work. The manner of supporting such pipes, etc., shall be subject to review by the ENGINEER.

C. Any damage to poles, fences, sewer, gas, water, drainage or other pipes, wires, conduits, manholes, buildings, structures and property resulting from the CONTRACTOR's work shall be promptly repaired by the CONTRACTOR. The quality of all such repair work shall be to the satisfaction of the ENGINEER.

1.5 EXISTING UNDERGROUND STRUCTURES AND UTILITIES

A. The Contract Documents show the location of utilities based upon the best available information, however, the ENGINEER does not accept any responsibility for the accuracy of this information nor does he guarantee that all utilities within the work area are shown.

B. The CONTRACTOR, prior to the start of construction, shall verify the location of any existing underground utilities and structures within the site limits. It shall be the CONTRACTOR's responsibility to make any and all exploratory investigation which may be necessary to verify or locate the utility pipes, wires, structures and appurtenances of others. The CONTRACTOR shall notify the ENGINEER of any conflicts between the location called for in the information furnished and the actual location of any existing underground utilities or structures. Any conflicts found shall be recorded as directed by the ENGINEER.

PART 2 – PRODUCTS

2.1 BEDDING

A. The CONTRACTOR shall provide bedding material as noted below and indicated on the plans. Per the requirements of the City of Bloomington, bedding shall conform to ASTM D 2321 and be either No. 11 or No. 12 crushed stone.

B. All pipe shall be bedded on four inches (4") of either #11 or #12 crushed stone when in soil and on six inches (6") when the pipe is laid in rock or 1/6 pipe O.D. up to eight inches (8") maximum thickness, whichever is thicker. The stone shall be spread and the surface graded to provide a uniform and continuous support beneath the pipe at all points between pipe joints. Bedding material shall be removed for bells so the entire length of pipe rests evenly on the bedding. It will be permissible to slightly disturb the finished bedding surface by withdrawal of pipe slings or other lifting tackle. After each pipe has been placed, sufficient pipe embedment material shall be deposited and shovel-sliced beneath the haunches of

the pipe up to the spring line to hold the pipe in proper position during subsequent operations. This shall be done uniformly and simultaneously on each side of the pipe to prevent lateral displacement of the pipe before primary backfill.

C. Bedding beneath structures shall be a minimum of 4" of either #11 or #12 crushed stone in soil and 6" in rock. All over-excavation shall be filled with either #11 or #12 crushed stone or Class D Concrete, as required by the ENGINEER, to achieve elevations indicated on the plans.

2.2 BACKFILL

A. Backfill materials shall be placed and compacted in uniform lifts and shall have a moisture content to assure that maximum density will be obtained with compaction.

B. Primary backfill shall be #11 or #12 crushed stone to a point 12 inches above top of pipe. The stone shall be shovel-sliced beneath the haunches of the pipe.

C. Secondary backfill above pipe embedment shall conform to the following requirements:

1. Beneath pavements, surfacing, and driveways backfill shall be in accordance with the agency issuing the permit. If no permit is required full-depth #53 stone compacted in six-inch (6") lifts must be used.

2. Under highway shoulders, fills, or embankments backfill shall be in accordance with the agency issuing the permit. If no permit is required full-depth #53 stone backfill is required compacted in six-inch (6") lifts if nearest trench edge is within five feet of pavement.

3. In unimproved areas backfill may be the same materials as excavated, if it is good native material, but may contain no stone larger than six inches (6") in its greatest dimension.

4. Around structures backfill shall be placed and compacted in uniform lifts not to exceed twelve inches (12") in depth.

D. Backfill around flexible pipe shall be performed in accordance with material and installation the requirements of the pipe manufacturer.

1. Materials should be installed and compacted in 6-inch lifts.

2. Proper haunching provides a major portion of the pipe's strength and stability. CONTRACTOR shall use care in workmanship to avoid excessive pipe deflection and grade alignment problems.

C. The bell holes shall be excavated for bell and spigot pipe so the entire pipe barrel rests on the bedding. The bedding shall be such that after the pipe has been placed to line and grade, there remains a four (4) inch minimum depth of material below the

pipe barrel and a minimum of three (3) inches below the bell.

D. For all installations, the haunching material shall be shovel sliced or otherwise carefully placed and "walked" or hand tamped to the springline (1/2 the outside diameter) to ensure compaction of the haunch area and complete filling of all voids. The initial backfill shall be added in six (6) inch lifts "walked" in for compaction.

E. Final backfill requirements are determined by the location of the excavation.

1. For all other installations within five (5) feet of the edge of pavement, curbs, gutters, or similar structures:
   a. Trenches shall be backfilled with structural "B-Borrow" for structural installations per INDOT Standard Specifications - Section 211.
   b. Backfill shall be compacted to achieve not less than 95% Standard Proctor Dry Density per INDOT Standard Specifications Section 203.23. The CONTRACTOR shall use in-house or independent testing to verify proper compaction. The OWNER may require independent testing to verify CONTRACTOR results at any time during the duration of the project.

2. Outside five (5) feet of the edge of pavement, curbs, gutters, or similar structures trench shall be backfilled with clean fill material free of rocks larger than three (3) inches in diameter, frozen lumps of soil, wood, or other extraneous material.

F. Backfill shall be added and compacted in twelve (12) inch balanced lifts by means of mechanical tampers.

G. Flowable fill may be used as a substitute for structural "B-Borrow."

H. Jetting or flooding of the backfill shall not be used to meet the compaction requirements for utility trenching and backfilling.

PART 3 – EXECUTION

3.1 TRENCH INSTALLATION

A. The minimum width of the trench at and below the top of the gravity sewer, lateral, or force main shall be only as wide as necessary for proper installation and backfilling.

B. The minimum trench width for gravity sewers, laterals, and force mains shall not be less than the greater of the following:

Minimum Width = Pipe O.D. + 16 inches

or

Minimum Width = (Pipe O.D. x 1.25) + 12 inches

C. Under no circumstances shall the distance from the trench wall to the outside edge of the pipe be less than six (6) inches for pipes six (6) inches and less, and eight (8) inches for pipes eight (8) inches and larger.

D. For flexible conduits, the lateral resistance of in-situ soils shall be of sufficient stiffness to provide the required pipe support. Where unstable trench sidewall conditions exist, or where trench depth dictates the use of a moveable trench box, the ENGINEER shall determine the width of compacted bedding and backfill material necessary to provide adequate pipe side support.

E. The minimum and maximum trench widths above the top of the gravity sewer, lateral, and force main shall be determined by the CONTRACTOR and shall be in conformance with all applicable safety regulations including, but not limited to, those promulgated by OSHA.

3.2 GENERAL TRENCHING REQUIREMENTS

A. Whenever pipe trenches are inadvertently excavated below the designed bedding bottom, the CONTRACTOR shall fill the over-excavated area with compacted No. 8 crushed stone or No. 8 fractured face aggregate and shaped to form a firm, uniform trench base.

B. In cases where a firm foundation is not encountered at the required grade, the CONTRACTOR shall remove the unstable material to a sufficient depth not less than six (6) inches and replaced with either No. 2 crushed stone, No. 8 crushed stone, or No. 8 fractured faced aggregate. When compacted and properly shaped, the fill material shall produce a uniform and stable foundation along the entire length of the pipe. If more than one (1) foot of unstable material is encountered, the CONTRACTOR shall take additional measures to ensure that additional stabilization is provided, such as geotextile fabric wrapping of the trench section or as approved by the OWNER. The cost for such stabilization shall be paid for under the applicable provisions of the General Conditions.

C. All rocks, boulders and stones six (6) inches in diameter and larger shall be removed. Boulders or rocks are not to be used for any portion of the trench backfill.

D. The pipe trench shall not be excavated more than one hundred (100) feet in advance of pipe laying unless approved by the ENGINEER or OWNER.

D. In cases where material is deposited along open trenches, the material shall be placed and protected so that no damage will result to the work or adjacent property as a result of rain or surface wash.

3.3 LAYING THE PIPE

A. Anchors shall be required for stabilization of any pipe having a slope of 20% or greater.

B. Every precaution shall be taken to prevent foreign material from entering the pipe during installation. If this proves ineffective, the Engineer may require that, before lowering the pipe into the trench, a heavy, tightly-woven canvas bag of suitable size be placed over each pipe end and left there until connection is to be made to the adjacent pipe.

C. Each length of pipe shall be inspected while suspended above the trench immediately before installation, with special attention being given to pipe ends and gaskets. Defective pipe or fittings shall be laid aside for inspection by the Engineer, who will prescribe corrective repairs or rejection.

- END OF SECTION -

SECTION 02223

STRUCTURAL EXCAVATION AND BACKFILL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavation and backfill for structures.

B. Structural backfill.

C. Granular bedding and backfill under concrete slabs.

D. Disposal of excess excavated material.

1.2 CLASSIFICATION

A. Excavation will be unclassified regardless of the nature of the materials encountered.

1.3 REFERENCES

A. City of Bloomington Utilities: Latest edition of Construction Specifications for Wastewater, Water, and Storm Projects.

PART 2 PRODUCTS

2.1 STRUCTURAL BACKFILL

A. Structural Backfill as indicated on the Contract Documents shall be No. 53 crushed limestone complying with the Indiana Department of Transportation Standard Specification (Section 904.056).

B. The particle size shall be less than 2" and contain no more than 8% by weight passing a #200 sieve.

C. The uniformity coefficient shall be greater than 4.

D. The liquid limit shall not be greater than 25 and the plasticity index not more than 6.

E. Structural Backfill shall be compacted in accordance with Section 02250.

2.2 GRANULAR BACKFILL

A. Granular Backfill as indicated on the Contract Documents shall be natural sand or a mixture of sand with gravel, crushed gravel or crushed stone complying with the Indiana Department of Transportation Standard Specifications. Borrow as defined by the Indiana Department of Transportation Standard Specifications may be substituted for Granular Backfill when placed adjacent to buried structures.

B. Granular Backfill and B Borrow shall be compacted in accordance with Section 02250.

2.3 BACKFILL

A. Unless approved by the Engineer previously excavated materials shall not be used as backfill.

2.4 GRANULAR BEDDING COURSE

A. Granular Bedding Course as indicated on the Contract Documents shall be No. 12, washed complying with the Indiana Department of Transportation Standard Specification (Section 904.02).

2.5 DRAINAGE FILL

A. Drainage Fill as indicated on the Contract Documents shall be No, 8, washed complying with the Indiana Department of Transportation Standard Specification (Section 904.02).

2.6 COARSE DRAINAGE FILL

A. Coarse Drainage Fill as indicated on the Contract Documents shall be No. 2, washed complying with the Indiana Department of Transportation Standard Specification (Section 904.02).

2.5 CHIP AND DUST COURSE

A. Chip and Dust Course as indicated on the Contract Documents shall be No. 12 complying with the Indiana Department of Transportation Standard Specification (Section 904.02).

PART 3 EXECUTION

3.1 STRUCTURAL EXCAVATION

A. Excavate to the depth and dimensions necessary for the construction; maintain excavations in good order; and provide barricades and warning lights as required. If underground utilities and/or structures not shown on the Contract Documents are encountered, notify the ENGINEER and do not proceed until instructions are obtained. Notify the ENGINEER if springs or running water are encountered.

B. The bottom of all excavations shall be undisturbed earth unless otherwise noted, and shall be approved before subsequent work is started. Subgrade shall be proof-rolled with a loaded

tandem axle dump truck or similar rubber tired vehicle, weighing at least 20 tons. Proof-rolling, as indicated, will be required only on roadways. Structure subgrades will be evaluated by the ENGINEER as deemed necessary. Soils which are observed to rut or deflect excessively under the moving load shall either be scarified and recompacted or undercut and replaced with properly compacted fill.

C. Where excavation and backfill below the Limits of Excavation defined on the Contract Documents is ordered in writing by the ENGINEER, such additional excavation and structural backfill will be paid for as extra work. Where the Limit of Excavation is not defined, the limit shall be taken as the base of the footing or mud slab where applicable.

D. Dewatering and drainage is specified in Section 02140.

E. Do not excavate for any structure until that structure is scheduled for construction. If the bearing capacity of the foundation soils is reduced because the excavation is allowed to remain open prior to commencing work or dewatering is inadequate, the weathered or unsuitable soil shall be removed and replaced with lean (2000 psi) concrete or compacted structural backfill at the expense of the CONTRACTOR.

F. Excavations carried below depths indicated on the Contract Documents without the previous approval of the ENGINEER shall be filled with lean (2000 psi) concrete or compacted structural backfill to the correct elevation at the expense of the CONTRACTOR.

F. Side forms on footings will not be required if the soil is stable and square corners and straight sides are maintained until the concrete is placed; otherwise, excavate outside the foundation lines to allow for installation and removal of formwork and for inspection.

3.2 FILLING, BEDDING, AND BACKFILLING

A. General: Obtain the ENGINEER's approval of existing conditions before starting filling operations. Remove all vegetation, formwork, rubbish and other debris. Excavate muddy subgrade. Do not fill on frozen subgrade. The quantity of structural fill or granular fill required beneath concrete slabs and foundations is dependent on the limits of excavation required to install the footings and foundation walls as well as on the extent of any unstable soil requiring removal. Fill limits shall be from undisturbed soil to the necessary lines and grades under all concrete slabs and foundations of buildings, tanks, and miscellaneous structures.

B. Structural backfill and granular backfill shall be added and compacted in twelve (12) inch balanced lifts. Degree of compaction and methods shall be in accordance with Section 02250.

C. Structural Backfill: Provide structural backfill to achieve necessary lines and grades under all structures.

D. Granular Backfill: Provide granular backfill indicated on the Contract Documents to achieve

necessary grades under concrete slabs and elsewhere as indicated.

E. Provide 8-12 oz per square yard of non-woven geotextile filter fabric.

F. Backfilling: Do not backfill until new concrete has properly cured and wall coatings have been approved. Leakage tests shall be completed before backfilling.

G. Exercise care during backfilling operations to avoid any puncture, break, or other damage to waterproofing systems. Backfill adjacent to waterproofing in the presence of the ENGINEER.

H. Where backfilling is required on both sides of structures, backfill and compact simultaneously on opposite sides in even layers. Other backfilling sequences shall be as specifically indicated.

I. Flowable fill shall be used for backfill where compaction requirements can not be met due to restricted areas.

3.3 DISPOSAL OF EXCAVATED MATERIAL

A. Stockpiled excavated material shall be contained within construction work limits. Spoil piles for moving material into dump trucks shall be graded to drain in a controlled manner in compliance with all Rule 5 requirements.

B. All excess material shall be disposed on off-site at the Contractor's expense. Disposal of "clean" material off-site shall be the Contractor's sole responsibility including, but not limited to, hauling, location, grading, and permitting.

C. All excavated materials containing slag, cinders, foundry sand, debris and rubble shall be removed from the site and legally disposed of properly. Disposal of such materials shall be the Contractor's sole responsibility including, but not limited to, hauling, location, grading, and permitting.

- END OF SECTION -

SECTION 02224

ROCK REMOVAL

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Solid rock excavation, removal, and disposal.

1.2 DEFINITIONS

A. Rock excavation shall include ledge rock, all boulders exceeding one-half (1/2) cubic yards in volume, and concrete or masonry structures or any other material which, in the opinion of the ENGINEER, requires ripping or jack hammering for removal.

1.3 REFERENCES

A. City of Bloomington Utilities: Latest edition of Construction Specifications for Wastewater, Water, and Storm Projects.

PART 2 – EXECUTION

2.1 ROCK EXCAVATION

A. If rock is encountered in the excavation, it shall be removed by ripping or jack hammering, or as otherwise approved by the OWNER.

B. Ledge rock, boulders and large stones shall be removed to provide a clearance of at least six (6) inches below and on each side of all pipe, valves and fittings. Rock shall be excavated at least seven (7) inches from the outside of the pipe bell on each side. Before pipe bedding is started, all trench bottom irregularities shall be filled with approved granular material, well compacted into place, and the bottom of the trench brought to proper grade. Each section of pipe shall be backfilled immediately after laying. The exposed end of the last pipe shall be covered with sandbags to protect it from damage from flying debris.

C. Rock excavation for structures shall be carried to the bottom of the footing, foundation slab, or lowest point of improvements and on all sides to a width sufficient to allow proper construction procedures.

D. Excavated rock may be utilized as specified fill provided it meets requirements. All excess rock shall be removed from the site and disposed of by the CONTRACTOR at the CONTRACTOR's expense.

E. Do not excavate until notified by the ENGINEER that the elevations of the top of the rock have been taken, if required.

F. No separate payment will be made for rock excavation and disposal.

2.2 BLASTING

A. Blasting of rock, ledge rock, boulders, or large stones will not be permitted.

- END OF SECTION -

SECTION 02230

SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract Documents apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, and removing site utilities.
7. Temporary erosion- and sedimentation-control measures.

1.3 DEFINITIONS

A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, as indicated on Drawings.

E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by a circle concentric with each tree with a radius equal to the diameter of the drip line unless otherwise indicated.

F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain OWNER'S property, cleared materials shall become CONTRACTOR'S property and shall be removed from Project site.

1.5 SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

1. Use sufficiently detailed photographs or videotape.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from OWNER'S and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining OWNER'S property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by ENGINEER.

C. Salvable Improvements: Carefully remove items indicated to be salvaged and store on OWNER'S premises per OWNER'S direction.

D. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

E. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.

F. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

G. Do not direct vehicle or equipment exhaust towards protection zones.

H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

I. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 02223 Structural Excavation and Backfill.

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

B. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer complying with MPI #79, Alkyd Anticorrosive Metal Primer.

1. Use coating with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly identify trees, shrubs, and other vegetation to remain. Wrap a 1-inch blue vinyl tie tape flag around each tree trunk at 54 inches above the ground.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

A. General: Protect trees and plants remaining on-site with 4' tall orange snow fence stabilized with posts at a maximum of 10' on center. Fence shall be installed at drip edge of existing trees or as indicated on plans.

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by ENGINEER.

3.4 EXISTING UTILITIES

A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by CONTRACTOR.

1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.

1. Owner will arrange to shut off indicated utilities when requested by CONTRACTOR.

C. Locate, identify, and disconnect utilities indicated to be abandoned in place.

D. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify ENGINEER not less than seven days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without ENGINEER'S written permission.

E. Excavate for and remove underground utilities indicated to be removed.

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.
3. Use only hand methods for grubbing within protection zones.
4. Chip removed tree branches and dispose of off-site.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to depth of 6 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

1. Limit height of topsoil stockpiles to 72 inches.
2. Do not stockpile topsoil within protection zones.
3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.7 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off OWNER'S property.

B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

- END OF SECTION -

SECTION 02240

SOIL STABILIZATION

PART 1 – GENERAL

1.1 THE REQUIREMENT

A. If needed to maintain safe working conditions and protect existing facilities from damage during open-cut excavation the CONTRACTOR may stabilize the soil utilizing chemical grout and the application of air-placed concrete to the face of the excavation in conjunction with other trench support systems.

1.2 CONTRACTOR SUBMITTALS

A. Submittals shall be made in accordance with General Conditions 6.22.

B. The CONTRACTOR shall submit, for approval by the ENGINEER, detailed sketches of the intended injection techniques and patterns, including necessary data to prove that the chemicals contemplated will meet in all respects the requirements as to properties and qualities required by these Contract Documents. Any test data furnished by the CONTRACTOR substantiating the adequacy of the grout shall be from a certified testing laboratory, as directed by the ENGINEER.

1.3 QUALIFICATIONS

A. Work required under this Section shall be performed by a CONTRACTOR having at least 5 years' experience in the field of chemical grout soil stabilization and underpinning and having successfully completed at least 5 projects of a similar nature.

B. The CONTRACTOR shall submit satisfactory documentation that project personnel have the appropriate qualifications.

1.4 WORK COORDINATION

A. The CONTRACTOR shall fully coordinate the work operations of this Section with that of other trades involved and with the ENGINEER to ensure proper sequence of work, limitation, methods, and time of work so as to minimize or avoid interferences as well as performance of work by other trades.

PART 2 – PRODUCTS

2.1 MATERIALS

A. "Chemical Grout," as referred to herein, shall be a relatively nonviscous solution, not a slurry, that may be injected into a permeable soil mass, undergo chemical reactions that lead to metathetical precipitation or polymerization, and result in solidification of that injected soil by binding together the soil grains for the purpose of increasing the load bearing capacity of the soil. The solidified soil shall have an unconfined compressive strength of 50 psi at 28 days.

B. The CONTRACTOR shall be responsible for formulation of the grout. Chemicals used shall be sodium silicate based with catalyst that will provide the required chemical grout. Water used shall be compatible with the chemical system to be used.

C. Considering the chemistry of the gel and the conditions known at the site, the chemical system used shall produce a stable gel. The chemical system used shall stabilize soil to permit open-cut excavation and the application of air-placed concrete to the face of the excavation without use of any shoring, and shall have a proven record of stability.

D. The chemicals used shall be so proportioned and mixed as to produce a chemical grout that contains no solids in suspension, may be pumped without difficulty, will penetrate and fill the voids in the soil mass, and will form a gel of the required strength and stability.

E. Chemicals mixed into primary solutions before final batching may be held only in accordance with the Manufacturer's recommendations and must not be injected if limiting factors imposed by the Manufacturer are exceeded. Any solutions not to be used for injection shall be immediately disposed of to the satisfaction of the ENGINEER. The chemical system shall not be detrimental to the environment. The injected solution and its components shall be nontoxic.

2.2 SITE PREPARATION

A. The project site consists of various geotechnical characteristics as detailed in the Project Geotechnical Data Report (GDR).

B. The site clearing, grubbing, and removal shall be in accordance with Section 02100 Site Preparation. After site preparation work is complete, the CONTRACTOR may commence soil stabilization if needed.

2.3 MIXING

A. All materials shall be accurately measured by weight or volume for mixing. If a variable proportioning pump system is used, positive controls shall be incorporated to ensure accurate proportioning. Care shall be taken not to contaminate mixing vessels with reactive chemical by spillage, splash, etc.

B. A fast check reaction shall be made with each new primary chemical batch. A test sample shall be made of every injection batch. The CONTRACTOR shall keep records to establish the point of injection for each sample. These data shall be submitted to the ENGINEER on a daily basis.

C. If any sample fails to show the proper gelation, the potential area of failure shall be reinjected. The CONTRACTOR shall propose method of correction.

PART 3 – EXECUTION

3.1 APPLICATION

A. The CONTRACTOR shall determine the extent of the soil stabilization required, if any, subject to approval by the ENGINEER.

B. Care shall be taken in the placing of injection points to secure accurate injection and the proper overlapping of injection cylinders.

C. Injection rates and pressures shall be closely controlled to prevent blowout, localized "quick" conditions, and to ensure the proper filling of voids to attain the desired stabilized section.

D. Quantities of chemical grout injected at each point shall be governed by calculated volume, back pressure, or a combination of these two factors. If it appears, at any point, that a large void exists, proper steps shall be taken to ensure permeation of the desired soil section as directed by the ENGINEER.

3.2 CLEANUP

A. Upon completion of soil stabilization and work specified herein, the CONTRACTOR shall dispose of all excess materials off the jobsite and the jobsite shall be left in a clean and orderly condition ready for subsequent work operations.

- END OF SECTION -

SECTION 02250

COMPACTION CONTROL AND TESTING

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Placement, compaction control, and field density testing requirements for all earthwork, including pavement subgrade. See Section 02221 for requirements specific to Utility Trenching and Backfilling.

1.2 QUALITY ASSURANCE

A. Testing and inspection services as required by this section shall be provided by the CONTRACTOR as part of the project cost. Testing shall be performed by a qualified commercial testing laboratory as chosen by the CONTRACTOR and approved by the ENGINEER. Tests can include hand auger probing, field density tests for verifying the degree of compaction and excavation inspections to determine the limits of unsuitable material to be removed. Certified copies of all test reports shall be submitted to the ENGINEER.

PART 2 – PRODUCTS

2.1 MATERIALS

A. All materials and products are specified elsewhere in these Contract Documents.

PART 3 – EXECUTION

3.1 FILL PLACEMENT

A. If fill already placed has loosened as a result of frost action, the fill shall be recompacted prior to placing additional lifts. Compacted material that has been flooded and no longer meets the density specified shall be removed and replaced.

B. If the in-place surface has dried, sprinkle with water before placing the next lift. The surface of smooth lifts shall be scarified before the next lift is placed.

C. Where fill is required on both sides of structures, fill and compact simultaneously on opposite sides in even layers. Other filling sequences shall be as specifically indicated on the Drawings.

D. Fill shall be spread in uniform horizontal lifts. The material shall be thoroughly mixed to insure uniform moisture content slightly wetter than optimum but not greater than 5 percent above optimum water content as determined by the Standard Proctor Test, ASTM D698.

E. Where cohesive fill is used, the moisture content when compacted shall be within 3 percent of the optimum moisture content. If the fill does not have a natural water content which falls within the acceptable range, the CONTRACTOR shall mix, dry, or moisten as necessary.

F. Place and compact each lift over an entire area prior to placing successive lifts, unless otherwise approved by the ENGINEER.

G. All materials shall be placed in loose lift thicknesses indicated hereafter.

3.2 COMPACTION

A. General

1. Unless otherwise indicated, the type of equipment and number of passes required to obtain the specified degree of compaction shall be determined at the site, subject to the approval of the ENGINEER.

2. Provide mechanical compaction for cohesive material and vibratory compaction for granular materials, unless otherwise approved by the ENGINEER. Jetting, flooding, puddling, or vibroflotation methods will not be allowed.

3. Noncohesive soils shall be compacted with vibrating roller or equivalent; cohesive soils shall be compacted with sheeps-foot roller, pneumatic tamping, or approved equivalent, unless otherwise indicated.

B. Granular Backfill

1. Granular Backfill and B Borrow, as specified in Section 02223, shall have each lift thoroughly compacted and seated with the subgrade. Compaction methods and procedures shall be subject to approval of the ENGINEER.

C. Topsoil

1. Topsoil, as specified in Section 02260, shall be compacted with a "cultipacker", roller, or approved equivalent equipment weighing 100 to 160 pounds per lineal foot of roller width.

3.3 FILL LIFT THICKNESSES AND COMPACTION DENSITIES

A. Unless otherwise indicated or approved by the ENGINEER, place fills in the loose lift thicknesses indicated hereafter and compact to a dry density not less than the following percentage of maximum dry density, determined by the Standard Proctor Test, ASTM D698, unless otherwise noted.

3.4 TESTING

A. The CONTRACTOR shall provide to the ENGINEER reports of field density tests to insure required densities are being obtained:

1. One test for each 10,000 square feet or fraction thereof per lift of general backfilling.

2. Two tests for each 10,000 square feet or fraction thereof per lift of structural fill under slabs, foundations, and pavements.

3. One test per lift for each other type of fill, if so directed by the ENGINEER.

B. Tests shall be in accordance with ASTM D698 or other tests suitable for the materials being tested.

Type of Fill	Usage	Lift Thickness	Compaction %	ASTM
Structural Backfill	All locations under major structures	6"	98	D698
	All locations under minor structures (manholes, etc.)	6"	95	D698
	Under walks, concrete curbs, the concrete steps	6"	95	D698
Impermeable Fill	All locations	6"	98	D698
Granular Backfill (and B Borrow)	Below concrete slab bedding, foundations, rigid paving, and excavated areas adjacent to structures	8"	95	*D698
	All other uses	12"	95	D698
Granular Bedding Course	Beneath concrete slabs	6"	95	D698
General Site Grading	Fill in other locations not covered herein	12"	95	D698
	Topsoil placement	12"	95	D698
Drainage Fill	Building slabs, pervious pavement, porous unit paving, softile, rain gardens, and retaining walls	6"	98	D698
Coarse Drainage Fill	Decorative porous unit pavers	8"	98	D698
Chip and Dust Course	Playground tile	6"	95	D698

"Influence area" shall be considered the area within lines sloped downward at 45 degrees from the outer edges of paving, foundations, and utility lines.

* See drawings for additional compaction requirements.

- END OF SECTION -

SECTION 02260

FINISH GRADING

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Topsoil placement.

B. Final grading of the site.

PART 2 – PRODUCTS

2.1 TOPSOIL

A. Topsoil shall be fertile, friable, loose and easily pulverized natural topsoil typical of the area, free from subsoil, stones over 1-inch in diameter, plants, roots or other extraneous material which would be detrimental to the proper development of vegetative growth, and shall not be used while muddy or frozen.

B. Topsoil shall have a pH value of 6.2 to 7.4 and contain not less than 8% organic matter (AASHTO T194). The topsoil shall consist of either natural topsoils typical of the locality and free from coarse stone aggregate or surface soils stripped from the site and enriched with humus at a rate of 8% by volume. The soil mixture prepared by mixing surface soils and humus shall be free of oil, cinders, coarse stone, and woody root material.

C. The CONTRACTOR shall save all existing project topsoil, if possible, keeping it in a separate pile, and working into at least the top six inches of the subsoil with a power rototiller.

D. In the event that sufficient topsoil cannot be obtained from common excavation, top soil may be obtained from outside the limits of this project as directed by the ENGINEER and in accordance with Sections 621.04, 621.08 and 914.01 of the Standard Specifications, at no additional cost to the OWNER. No additional compensation shall be allowed for over hauling common excavation suitable for topsoil, stockpiling or placement of topsoil.

E. When Borrow is required, the CONTRACTOR may elect to preserve the required topsoil from common excavation or furnish borrow suitable for topsoil. No payment will be made for top soil when borrow is required.

F. Topsoil shall not be incorporated into the work until it is approved.

G. Topsoil shall be spread to a sufficient depth to produce the thickness specified, after it has been compacted lightly with an approved roller, tamping device or other approved method. The depth of topsoil shall not be greater than 8 inches.

PART 3 – EXECUTION

3.1 GENERAL

Provide all topsoil placement and finish grading and filling to achieve the lines and grades indicated on the Drawings. All earthwork shall be done in a manner that provides drainage.

3.2 TOPSOIL PLACEMENT

A. Place topsoil in all areas of new grading or where topsoil has been removed. Prior to placing material, the area to be covered shall be free of all rocks or clods over 1.5 inches in diameter, and all sticks or other foreign material, which may prevent the close contact of the topsoil to the existing soil. Areas to be covered with topsoil shall be tilled or disked to a depth of at least three (3) inches before the material is placed. If as a result of a rain, the recently placed special topsoil becomes eroded, or if eroded places, ruts or depressions exist, the soil shall be reworked until it is smooth. Topsoil shall be spread evenly and compacted to a thickness of not less than one (1) inch, and to the proposed elevations and grades. Grade shall be flush with walks and paving.

B. Topsoil shall be compacted in accordance with Section 02250.

3.3 FINISH GRADING

A. All areas of the project including all previously grassed areas that have been disturbed, borrow sites, excavated and filled sections and adjacent transition areas shall be uniformly smooth-graded. Depressions from settlement shall be filled and compacted. Tops of embankments and breaks in grade shall be rounded. All surfaces shall be finished to provide adequate drainage. Finished surfaces shall be reasonably smooth, compacted, free from irregular surface changes and comparable to the smoothness obtained by blade-grader operations.

B. Slope grades to drain away from structures at a minimum of 1/4-inch per foot for ten (10) feet.

C. Finished surfaces adjacent to paved or surfaced areas and within ten (10) feet of structures shall be within one (1) inch of the proposed grade. All other areas shall be within three (3) inches of the proposed grade.

D. Newly graded areas shall be protected from traffic and erosion. All settlement or washing away that may occur from any cause prior to seeding or acceptance shall be repaired and

grades re-established to the required elevations and slopes at no additional cost to the OWNER.

E. Unless otherwise indicated, all surplus material shall be disposed of by the CONTRACTOR.

- END OF SECTION -

SECTION 02268

EROSION CONTROL BARRIER

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide erosion control barriers, complete and in place, in accordance with the Contract Documents

1.2 CONTRACTOR SUBMITTALS

A. Submittals shall be in accordance with General Conditions Section 6.22.

B. Product Data: Manufacturer's catalog sheets on geotextile fabrics.

PART 2 -- PRODUCTS

2.1 FABRIC

A. Fabric may be woven or non-woven, made from polypropylene, polyethylene, or polyamid, and shall contain sufficient UV inhibitors so that it will last for 6 months in outdoor exposure.

B. Fabric shall have the following properties:

Parameter	Standard Method	Value
Grab tensile strength	ASTM D 4632	100 lb
Burst strength	ASTM D 3786	200 psi
Apparent opening size	ASTM D 4751	Between 200 and 70 sieve size

C. Fabric Manufacturer, or equal
1. Mirafi by TenCate Geosynthetics North America

2.2 POSTS

A. Posts shall be wood, at least 2 inches by 2 inches, or steel 1 1/2-inch, T-shaped with protective coating, at least 6 feet long with protective coating.

2.3 FENCING

A. Woven wire fabric fencing shall be galvanized, mesh spacing of 6 inches, maximum 14- gauge, at least 30 inches tall.

2.4 FASTENERS

A. Fasteners to wood posts shall be steel, at least 1 1/2 inches long.

B. Fasteners to steel posts shall be galvanized clips.

PART 3 -- EXECUTION

3.1 PREPARATION

A. Provide erosion control barriers at the indicated locations and as required to prevent erosion and silt loss from the Site.

B. CONTRACTOR shall not commence clearing, grubbing, earthwork, or other activities which may cause erosion until barriers are in place.

3.2 INSTALLATION

A. Barrier systems shall be installed in such a manner that surface runoff will percolate through the system in sheet flow fashion and allow sediment to be retained and accumulated.

B. Attach the woven wire fencing to the posts that are spaced a maximum of 8 feet apart and embedded a minimum of 12 inches. Install posts at a slight angle toward the source of the anticipated runoff.

C. Trench in the toe of the filter fabric barrier with a spade or mechanical trencher so that the downward face of the trench is flat and perpendicular to the direction of flow. Lay fabric along the edges of the trench. Backfill and compact.

D. Securely fasten the fabric materials to the woven wire fencing with tie wires.

E. Reinforced fabric barrier shall have a height of 18 inches.

F. Provide the filter fabric in continuous rolls and cut to the length of the fence to minimize the use of joints. When joints are necessary, splice the fabric together only at a support post with a minimum 6-inch overlap and seal securely.

3.3 MAINTENANCE

A. Regularly inspect and repair or replace damaged components of the barrier. Unless otherwise directed, maintain the erosion control system until final acceptance; then remove erosion and sediment control systems promptly.

B. Remove sediment deposits when silt reaches a depth of 1/2 the height of the barrier or when the fabric starts to bulge, whichever is less. Dispose of sediments on the Site, if a location is indicated on the Contract Documents, or at a site arranged by the CONTRACTOR which is not in or adjacent to a stream or floodplain.

- END OF SECTION -

SECTION 02601

MANHOLES, CATCH BASINS, VAULTS AND APPURTENANCES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cutting into existing manholes.

B. New manhole and catch basin construction and appurtenances.

C. Precast concrete vaults.

1.2 SUBMITTALS

A. Submit product data of manhole steps, lids, and frames, and gaskets for approval in accordance with the General Conditions.

B. Submit product data on precast concrete vault, hatches and covers in accordance with the General Conditions. Show dimensions and wall penetrations.

1.3 REFERENCES

A. City of Bloomington Utilities: Latest edition of Construction Specifications for Wastewater, Water, and Storm Projects.

1.4 EXISTING CONDITIONS

A. Avoid damage to the existing system. Existing manholes, catch basins and sewers damaged by the CONTRACTOR shall be repaired to the satisfaction of the OWNER at no additional cost.

PART 2 PRODUCTS

2.1 GENERAL

A. Manholes for sanitary sewers and catch basins for storm sewers shall have an inside diameter as indicated in the Contract Documents and be constructed of precast reinforced concrete units in accordance with drawing details and as specified herein.

B. Top: Precast concrete, eccentric cone, or flat slab top type, as indicated. Flat tops shall be designed for H20 loading unless otherwise indicated.

C. Base: Precast concrete base riser section with integral floor, or separate base slab with riser section.

D. Manhole and Appurtenances: The following items shall apply to all manhole and structures:

1. Manholes shall be furnished with watertight, manhole frames and covers. They shall be East Jordan Iron Works, catalogue number 1020 and 1022. Catalogue numbers 1037 or 1050 or equivalent may be used with the permission of the ENGINEER. Catalogue number 1020A, heavy duty, or approved equivalent shall be used for the lids. All lids shall have the words "ICS PLANT EFFLUENT" cast in each manhole cover.

2. Both the manhole frame and cover shall have machined horizontal and vertical bearing surfaces. Inverted manhole frames are not allowed.

3. Catch basin inlet frames and grates shall be East Jordan Iron Works castings and shall be of the type shown in the Contract Documents and approved by the ENGINEER. The words: "DUMP NO WASTE – DRAINS TO RIVER" shall be imprinted on each frame.

4. Pick holes shall not create openings through the manhole cover.

5. Manhole frames and catch basin grates shall be adjusted to proper grade utilizing reinforced, precast concrete rings. Total adjustment to be 12" maximum, 2 rings maximum. Brick or concrete blocks will not be allowed.

6. All frames and adjusting rings shall be securely sealed to the cone section or top barrier section of the manhole using resilient, flexible, non-hardening, preformed, bituminous mastic material (Conseal CS-102B or equal approved by the ENGINEER). This mastic shall be applied in such a manner that no surface water or ground water inflow can enter the manhole through gaps between the top ring, between adjusting rings, or between the last adjusting ring and the manhole frame. Up to twelve inches (12") of adjusting rings may be installed on a given manhole. No more than one (1) two inch (2") adjusting ring, and no more than two (2) adjusting rings in total shall be used.

7. A continuous layer of non-hardening, preformed bituminous mastic material (Conseal CS-102B or equal as approved by the ENGINEER) shall be applied to each manhole barrel, cone and top section to provide a watertight seal.

8. A non-cracking hydraulic cement or Portland mixture shall be used on all manhole interior joints excluding the top of cone to manhole joint.

9. Rubber boots/seals must be used where pipe enters manhole, must be resilient, and must comply with ASTM C923.

10. Hydraulic cement, mortar, and concrete must be of strength and water tightness quality per ASTM standards.

11. Precast or cast-in-place benches and fillets shall be installed as shown in the Contract Documents.

12. Steps shall be in accordance with local, state and federal regulations. Steps shall be of the type required for the method of construction selected and shall be cast or mortared in place. Steps shall be 12-inches minimum width and shall be plastic coated cast iron. The minimum allowable design live load for steps shall be a single load of 300 pounds concentrated at the point which will cause maximum stress on the member. The steps shall be provided with a depth ring or plate a minimum of 3 inches from the embedded end of each leg to provide for uniform setting depth of all steps. The embedded end of each leg shall be formed in such a way to provide positive anchoring of the step. Steps shall have non-slip treads which project a minimum of 4 inches from the manhole wall. Treads shall be designed so that the foot cannot slip off the end of the step. Steps shall be provided at 16-inches on center.

13. Chimney seals shall be provided and installed on all manholes. Seals shall be manufactured by Adaptor, Inc., West Allis, WI or equal.

2.2 PRECAST CONCRETE VAULTS

A. Precast concrete vaults shall comply with ASTM C857 and C858. Minimum wall thickness shall be six inches. Provide precast concrete cover designed for 100 psf. Access hatches to be provided per Contract Documents and Section 05560. Pipe penetrations and sumps to be per the details in the Contract Documents. All penetrations, lifting lugs, joints, etc. to be sealed water tight.

PART 3 EXECUTION

3.1 CONNECTIONS TO EXISTING MANHOLES AND SEWERS

A. Connections at existing manholes shall be made in a manner to prevent damaging the structure and shall be made watertight where the connection is made, as specified under Leakproofing in this specification. Openings shall be core drilled and rubber boots shall be installed.

3.2 MANHOLES

A. Precast concrete rings and reinforced concrete pipe sections shall be laid so that the axis of the manhole is vertical. Gaskets for riser joints shall be installed in accordance with the manufacturer's recommendations.

B. Concrete masonry block may only be used for repairs or modifications of existing masonry structures or the bottom ring of new structures in existing sewer lines. Masonry shall be laid with shove joints completely filled with Type S (1800 psi) mortar in accordance with ASTM C270 and C91. Horizontal joints shall not exceed 1/2-inch and vertical joints 1/4-inch on their interior face. Lay all blocks as headers, staggering vertical joints between courses. Strike interior and exterior joints smooth with the face of the wall.

C. Unless otherwise indicated in the Contract Documents, set castings at finished grade.

3.3 LEAKPROOFING

A. Disturbed portions of existing masonry structures and new bottom ring masonry structure, if any, shall be leakproofed with a 1/2-inch thickness of cement mortar containing a waterproofing admixture conforming to FS-C-181-B. Cement mortar shall be of the same composition as mortar for masonry joints.

B. Do not backfill adjacent to structures until coating has been inspected and any defective coverage is repaired.

- END OF SECTION -

SECTION 02731

EFFLUENT DISCHARGE LINE

PART 1 – GENERAL

1.1 DESCRIPTION

A. Work under this section includes, but is not limited to the installation and testing of gravity sewer pipe, fittings, and connections for the effluent discharge line. Acceptable diameters and depths for any given pipe material and application are per the plans unless otherwise noted.

1.2 RELATED WORK:

A. Section 02221 - Utility Trenching and Backfilling

B. Section 02601 - Manholes, Catch Basins, Vaults and Appurtenances

1.3 REFERENCES

A. City of Bloomington Utilities: Latest edition of Construction Specifications for Wastewater, Water, and Storm Projects.

1.4 QUALITY ASSURANCE

A. All similar components shall be manufactured and furnished by one manufacturer unless specifically approved by the ENGINEER in writing.

B. All pipe shall be made in the U.S.A.

C. The new effluent discharge line shall pass an air pressure test and a deflection test.

1.5 SUBMITTALS

A. The CONTRACTOR shall submit shop drawings in accordance with the General Conditions for the pipe and pipe fittings furnished herein. Shop Drawing submittals shall include descriptive literature, pressure ratings, certification of all applicable ASTM standards, design calculations, and manufacturer's installation instructions.

PART 2 – PRODUCTS

2.1 Polyvinylchloride Pipe (PVC)

A. PVC sanitary sewer pipe shall be CONTECH A-2000 PVC Pipe for Sanitary Sewers or equal approved by the ENGINEER.

B. Pipe and fittings shall be smooth wall conforming to ASTM F 949. All fittings shall be heavy walled fittings.

Pipe shall have a minimum pipe stiffness of 46 psi when measured at 5% vertical ring deflection and tested in accordance with ASTM D 2412 and a minimum tensile strength of 34.50 MPa.

C. Joints and Gaskets

1. Flexible gasketed joints shall be compression type so that when assembled, the gasket inside the bell will be compressed radially on the pipe spigot to form a watertight seal.
2. Joints shall meet the requirements of ASTM D 3212.
3. The assembly of joints shall be in accordance with the pipe manufacturer's recommendations.
4. All gaskets shall meet the requirements of ASTM F 477.

E. Field Cutting of Pipe

1. All field-cutting of pipe shall be done in a neat, trim manner using a hand or power saw.

F. Rejection of Damaged Pipe

1. PVC pipe possessing the following defects may be rejected for installation: variation from straight centerline; elliptical shape; illegible markings as required; deep or excessive gouges or scratches of the pipe wall; fractures, punctures, or cracks passing through the pipe wall; and damaged ends where such damage would prevent making a satisfactory joint.

G. Pipe Markings

1. For PVC pipe, each length of pipe must be marked per ASTM and AWWA requirements and at a minimum with the following: name of manufacturer, tradename or trademark, nominal pipe size, production/extrusion code, material and cell class designation, and ASTM designation.

   In addition, the plain end of each pipe length shall have rings painted around the pipe at the proper location to allow field checking of the correct setting depth of the pipe in the bell.

H. Manufacture and Construction

1. Pipes shall be manufactured and tested in accordance with appropriate ASTM and AWWA standards to result in a solid wall pipe.

2. Tees, wyes, and other fittings shall be heavy-walled and capable of withstanding the same stresses as the pipe to which they are connected. All fittings shall be fabricated from pipe meeting the requirements of these standards.

I. Material Markings

1. Each length of pipe and each manhole or other structure shall be marked per the requirements of each respective ASTM, AWWA and/or ANSI Standard referenced within this Section.

J. Certification of Materials

1. The ENGINEER reserves the right to require material certification from the manufacturer prior to construction to ensure the material supplied conforms to the prescribed requirements.

2. Upon request, the CONTRACTOR shall furnish a certificate of conformance to the required ASTM, AWWA, and/or ANSI Standards, this Manual, and other conformance certifications in the form of affidavits of conformance, test results, and/or copies of test reports.

3. Provisions for obtaining this certification shall be the responsibility of the CONTRACTOR. The OWNER and ENGINEER do not assume the responsibility for the expense of obtaining material certification.

K. Handling, Storage, and Color

1. The manufacturer shall package the pipe in a manner designed to deliver the pipe to the project site neatly, intact, and without physical damage. The transportation carrier shall use an appropriate method to ensure the pipe is properly supported, stacked, and restrained during transport. On-site, the pipe shall be stored on clean, level ground to prevent undue scratching or gouging.

2. The interior of the pipe shall be light colored to facilitate CCTV inspection. The pipe exterior may be colored per the manufacturer's standard color scheme with the exception of blue. Blue pipe shall not be used to avoid confusion with water pipes.

PART 3 – EXECUTION

3.1 GENERAL

A. The CONTRACTOR shall furnish and set all line and grade stakes (HUB). A Professional Engineer or Land Surveyor registered in the State of Indiana will be required to set, or oversee the setting of, all bench mark stakes necessary for the installation of any facility being constructed. Bench marks shall be set in strategic locations within the project to facilitate the installation of grade stakes. Horizontal and vertical control will be required to be provided with record drawings to be submitted to the Owner upon completion of the project. The method of establishing and following line and grade in conformance with the approved Contract Documents shall be determined by the Contractor.

B. Suitable tools and equipment shall be used for the safe and convenient handling of all materials and for the installation of all facilities. All material shall be unloaded with care. Care shall be taken to prevent pipe coatings, encasements or wrappings from being damaged. Each section of pipe shall be carefully examined for cracks and other defects prior to installation. Pipe or fittings found to be cracked, broken, or otherwise defective either before, during, or after installation, shall be removed and replaced with material free from defects. All pipes, gaskets, and other fittings shall be thoroughly cleaned prior to installation and shall be kept clean during construction.

C. The point of commencement for laying pipe should be the lowest point in the proposed line. Provisions for beginning construction at other than the lowest point in the proposed line shall be approved by the ENGINEER. All bell and spigot pipe shall be laid with the bell end, or with the receiving groove end of tongue and groove pipe pointing upgrade or toward the lift station end of force mains. Each pipe shall be laid on an even firm bed throughout its length so that no uneven strain will come to any single portion of the pipe. Particular care shall be taken to prevent the total load from bearing on the pipe sockets. All bells of bell and spigot pipes shall be carefully placed into a receiving hole excavated into the pipe bedding material. All pipes shall be properly joined utilizing the manufacturer's assembly marks. Adequate pressure shall be applied to the center of each tongue and groove pipe to ensure the proper joint seal is achieved.

D. Before constructing the effluent discharge line, the CONTRACTOR shall provide a watertight bulkhead or seal, in the existing sewer immediately downstream of the point of connection or the most practical location as determined by the ENGINEER. This bulkhead shall be left in place until the new line has been cleaned of all accumulated water and debris and accepted by the OWNER. During all work stoppages in construction of the line, the open face of the last pipe laid shall be plugged with a watertight seal to prevent sand, water, earth, or other materials from entering the pipe. Whenever pipe and special castings are required to be cut, the cutting shall be done by skilled workers in such manner as

to leave a smooth end at right angles to the axis of the pipe without damage to the pipe casting or lining. CUTTING TORCHES SHALL NOT BE USED.

E. Until such time as a minimum of four (4) feet of compacted fill material has been placed over the installed effluent discharge line, the CONTRACTOR shall not use heavy equipment in such a way as to cause damage to these pipelines or structures.

F. The OWNER reserves the right to order pipe installation discontinued whenever, in their opinion, there is danger of the quality of work being impaired because of cold weather. The CONTRACTOR shall be responsible for heating the pipe and jointing material so as to prevent freezing of joints. No flexible or semi-rigid pipe shall be laid when the air temperature is less than 32° F unless proper precautions, per the manufacturer's recommendations, are taken by the CONTRACTOR and the method is approved by the ENGINEER and the OWNER. When pipes with rubber gaskets or resilient-type joints are to be laid in cold weather, sufficiently warm the gasket or joint material to facilitate making a proper joint. No portion of a facility shall be installed directly onto frozen ground or backfilled with frozen material.

3.3 Air Pressure Test

A. Per the requirements of the City of Bloomington, the effluent discharge line shall pass an air pressure test as described herein. All defects exposed by testing and inspection shall be repaired by the CONTRACTOR to the satisfaction of the ENGINEER and at no cost to the OWNER. The CONTRACTOR shall be required to provide all materials, equipment, and labor required in the performance testing. The costs of providing tests and repairs shall be included in the Contract Price.

B. New gravity sewers shall be required to pass an air pressure test. The CONTRACTOR shall submit test methods and equipment for ENGINEER's review and acceptance.

C. The test must be conducted in the presence of the ENGINEER and the test results must be reviewed and accepted by the ENGINEER prior to final acceptance.

D. The completed gravity sewer shall be inspected for damage and improper installation, tested for leakage, and repaired if necessary prior to being placed into operation. The CONTRACTOR shall retest the gravity sewer subsequent to any repairs required initial testing fails.

E. All sewer lines greater than twenty-four (24) inches shall be tested using air under low pressure in conformance to ASTM F 1417-92.

1. The section of sewer to be tested shall be isolated with pneumatic plugs that have a sealing length greater than the diameter of the pipe and are capable of resisting test pressure without external bracing or blocking.

2. The sewer shall be pressurized to 4 psi gauge greater than the average back pressure of any ground water over the pipe. This pressure shall be maintained until the temperature of the pipe and the air have equalized, but not less than two minutes.

3. After the temperature has stabilized, the air supply shall be disconnected and the pressure allowed to drop. The time in minutes required for the pressure to drop from 3.5 psi to 2.5 psi shall not be less than 28 minutes and 20 seconds for 30-inch diameter pipe. The maximum length of pipe when testing to 28 minutes and 20 seconds is 80-ft. Longer lengths may be tested for a longer duration to meet the same approvals if conforming to the City of Bloomington requirements and approved by the ENGINER.

3.4 Deflection Test

A. Per the requirements of the City of Bloomington, the CONTRACTOR shall be required to perform a deflection test of all flexible pipe after the final backfill has been in place for at least thirty (30) days. Pipe failure shall be defined as a five percent (5%) or greater deflection of the internal pipe diameter when testing with a rigid ball or mandrel of no less than 95% of the base inside diameter of the pipe being tested. The test is a go/no-go procedure in which the mandrel must be hand-pulled without any type of mechanical assistance.

B. The CONTRACTOR shall submit test methods and equipment for ENGINEER's review and acceptance.

C. The test must be conducted in the presence of the ENGINEER and the test results must be reviewed and accepted by the ENGINEER prior to final acceptance.

D. Any pipe which is found to have failed by deflection within the warranty period shall be replaced by the CONTRACTOR at no additional cost to the OWNER.

3.5 Other Testing

A. The OWNER shall reserve the right to supplement the other required tests with a pressure smoke test if considered necessary or desirable by the OWNER or ENGINEER.

B. Before final acceptance, all new gravity sewers shall be televised by the City of Bloomington Utilities Department. The CONTRACTOR shall arrange with the City for televising. The first televising run shall be conducted after all other testing and cleaning is complete. The CONTRACTOR must give at least 72 hours

prior notice (not including weekends or holidays) to the Utilities Department when scheduling televising. A second televising run will be conducted 11 months after the date of final acceptance. Both televising runs will be used to determine wye locations, defective joints, and deformed or cracked pipe or fittings. Both runs will be done by the City Utilities without charge to the Contractor. Any additional runs that are considered necessary to reinspect defective pipes or joints shall be charged to the Contractor at a rate to be determined by the City of Bloomington.

- END OF SECTION –

SECTION 02920

LAWNS AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract Documents, including the General Conditions, Special Conditions, and other incorporated standards and documents, shall apply to this Technical Specification Section.

1.2 SUMMARY

A. Section Includes:
   1. Seeding.
   2. Hydroseeding.
   3. Turf renovation.
   4. Erosion-control material(s).

B. Related Sections:
   1. Section 02230 Site Clearing for topsoil stripping and stockpiling.
   2. Section 02100 Site Preparation, Section 02210 Site Rough Grading, and Section 02250 Compaction Control and Testing for excavation, filling and backfilling, and rough grading.

1.3 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.
   1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

C. Qualification Data: For qualified landscape Installer.

D. Product Certificates: For soil amendments and fertilizers, from manufacturer.

E. Material Test Reports: For existing native surface topsoil and imported or manufactured topsoil.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf and prairie establishment.
   1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
   2. Experience: Five years' experience in turf installation.
   3. Pesticide Applicator: State licensed, commercial.

B. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.
   1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
   2. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
   3. Report suitability of tested soil for turf growth.
      a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
      b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

B. Bulk Materials:
   1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
   2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
   3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

1.7 PROJECT CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.
   1. Spring Planting: April 1 – May 31.
   2. Fall Planting: August 15 – October 15.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.8 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:
   1. Seeded Turf: 60 days from date of Substantial Completion.
      a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

B. Initial Meadow Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable meadow is established, but for not less than 60 days from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species: Seed of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

   1. Proportioned by weight as follows:
      a. 95 percent Turf Type Tall fescue blend with minimum of three top rated varieties.
      b. 5 percent Kentucky bluegrass (Poa pratensis).

2.2 INORGANIC SOIL AMENDMENTS

A. Provide soil amendments in forms and quantities recommended by qualified soils testing reports.

B. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
   1. Class: O, with a minimum of 95 percent passing through No. 8(2.36-mm) sieve and a minimum of 55 percent passing through No. 60(0.25-mm) sieve.
   2. Provide lime in form of ground dolomitic limestone.

C. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6(3.35-mm) sieve and a maximum of 10 percent passing through No. 40(0.425-mm) sieve.

D. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50(0.30-mm) sieve.

E. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

2.3 ORGANIC SOIL AMENDMENTS

A. Provide soil amendments in forms and rates recommended by qualified soils testing reports.

B. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1/2-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
   1. Organic Matter Content: 50 to 60 percent of dry weight.
   2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

C. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.

D. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

E. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.4 FERTILIZERS

A. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
   1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
   2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

C. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
   1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.5 PLANTING SOILS

A. Planting Soil: Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation process and stockpiled on-site. Verify suitability of native surface topsoil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
   1. Supplement with another specified planting soil when quantities are insufficient.
   2. Mix existing, native surface topsoil with the following soil amendments and fertilizers as required to produce planting soil:

B. Planting Soil: Imported topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.
   1. Additional Properties of Imported Topsoil or Manufactured Topsoil: Screened and free of stones 1 inch(25 mm) or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass; not infested with nematodes, grubs, other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled, pore-space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.
   2. Mix imported topsoil or manufactured topsoil with soil amendments and fertilizers as required to produce planting soil.

2.6 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

2.7 PESTICIDES

A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.8 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.

B. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd., with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.

C. Erosion-Control Mats: Cellular, non-biodegradable slope-stabilization mats designed to isolate and contain small areas of soil over steeply sloped surface, of 3-inch nominal mat thickness. Include manufacturer's recommended anchorage system for slope conditions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.
   1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
   2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
   3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by ENGINEER and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
1. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

A. Limit turf subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off OWNER'S property.
1. Apply superphosphate fertilizer directly to subgrade before loosening.
2. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
   a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
   b. Mix lime with dry soil before mixing fertilizer.
3. Spread planting soil to a depth of 6 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
   a. Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil.

C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches of soil. Till soil to a homogeneous mixture of fine texture.
   a. Apply superphosphate fertilizer directly to surface soil before loosening.

3. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
4. Legally dispose of waste material, including grass, vegetation, and turf, off OWNER'S property.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. Before planting, obtain ENGINEER'S acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

A. Prepare area as specified in "Turf Area Preparation" Article.

B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.

C. Fill cells of erosion-control mat with planting soil and compact before planting.

D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
1. Do not use wet seed or seed that is moldy or otherwise damaged.
2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a minimum total rate of 3 to 4 lb/1000 sq. ft.

C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 1:4 with erosion-control blankets and 1:6 with erosion-control fiber mesh installed and stapled according to manufacturer's written instructions.

E. Protect seeded areas with erosion-control mats where shown on Drawings; install and anchor according to manufacturer's written instructions.

F. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1 inch in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.
   1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.

G. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

H. In lieu of straw mulch, seeded areas may be hydromulched at CONTRACTOR'S discretion. Apply slurry coat of fiber much at a rate of 1000 lb/acre. Protect adjacent structures, pavements and plantings from overspray.

3.6 TURF RENOVATION

A. Renovate existing turf.

B. Renovate existing turf damaged by CONTRACTOR'S operations, such as storage of materials or equipment and movement of vehicles.
   1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
   2. Install new planting soil as required.

C. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.

D. Remove topsoil containing foreign materials such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from CONTRACTOR'S operations, and replace with new planting soil.

E. Mow, dethatch, core aerate, and rake existing turf.

F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off OWNER'S property.

H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

I. Apply soil amendments and initial fertilizers required for establishing new turf and mix thoroughly into top 4 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.

J. Apply seed and protect with straw mulch or hydromulch as required for new turf.

K. Water newly planted areas and keep moist until new turf is established.

3.7 TURF MAINTENANCE

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
   1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
   2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
   3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Provide tanker for landscape watering or install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.
   1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
   2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
   1. Mow to a height of 2 to 3 inches.

D. Turf Postfertilization: Apply fertilizer after initial mowing and when grass is dry.
   1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.8 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by ENGINEER:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.9 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with OWNER'S operations and others in proximity to the Work. Notify OWNER before each application is performed.

B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.10 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

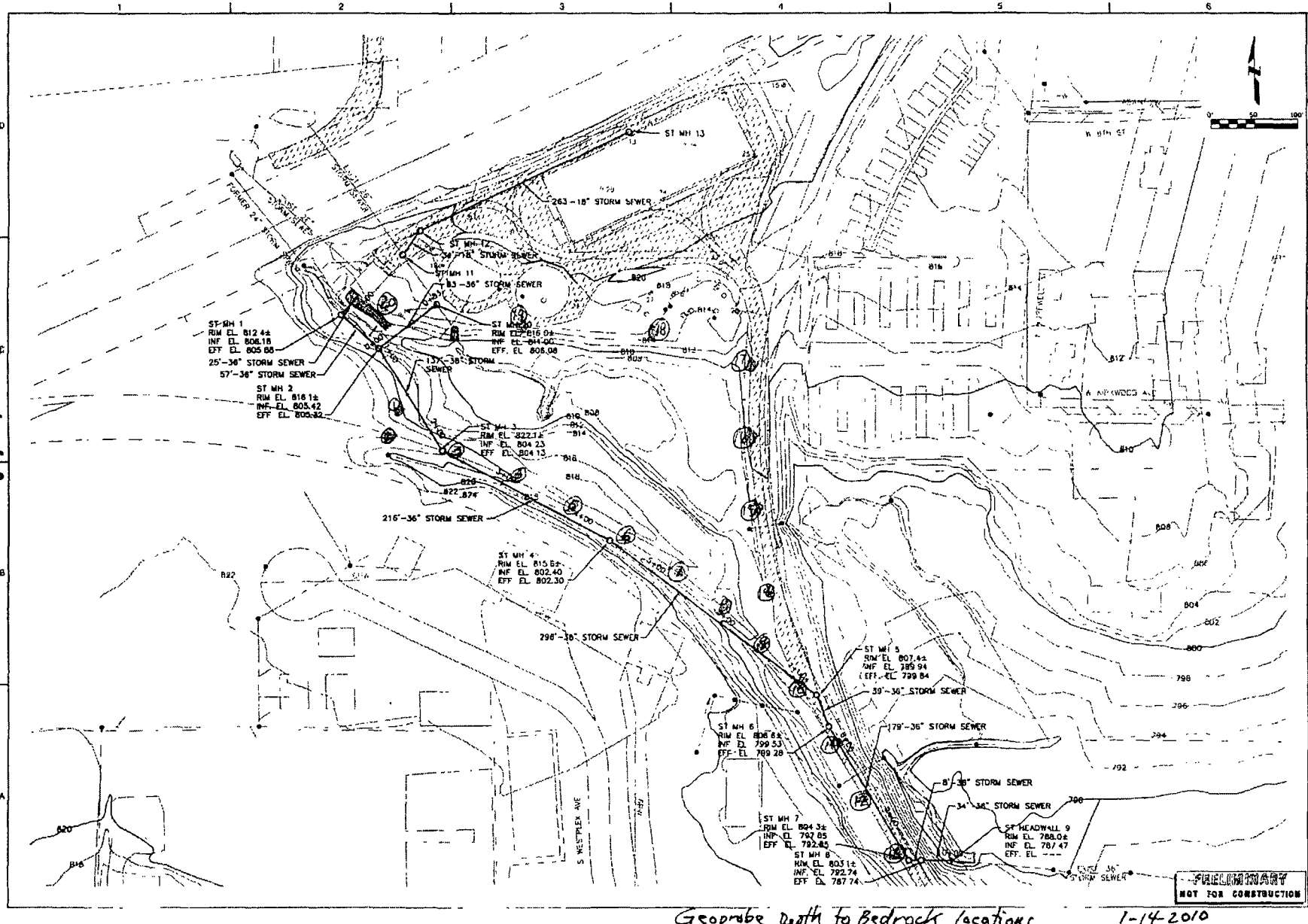
B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

C. Remove nondegradable erosion-control measures after grass establishment period.

- END OF SECTION -

Attachment 2

Bedrock Probing Along Potential Pipeline Pathways for the New Effluent Discharge Line for the Illinois Central Spring Treatment Facility, Bloomington Indiana



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ILLINOIS CENTRAL SPRING
BLOOMINGTON, IN
EFFLUENT DISCHARGE PIPE

DESIGNED BY
DRAWN BY
CHECKED BY
DATE CHECKED

NOTE: DIMENSIONAL DATA IS NOT TO BE OBTAINED BY SCALING ANY PORTION OF THIS DRAWING

DATE REVISION

OVERALL SITE PLAN -
ALTERNATE 1 ALIGNMENT

PROJECT NO.
C0850030

DRAWING NO.
FIG 1

Geoprobe Depth to Bedrock locations 1-14-2010

ICS
30500.41/DEX
January 19, 2010

Northing	Easting	Elevation	Description	
435143.59	945672.49	251.16	GP-01	Topo
435132.65	945670.89	251.23	GP-02	Topo
435124.77	945692.18	250.51	GP-03	Topo
435115.62	945713.28	249.92	GP-04	Topo
435106.01	945733.28	249.29	GP-05	Topo
435095.07	945753.23	248.61	GP-06	Topo
435083.20	945772.67	247.72	GP-07	Topo
435071.81	945792.32	247.08	GP-08	Topo
435060.21	945812.18	246.58	GP-09	Topo
435037.46	945820.35	246.16	GP-10	Topo
435017.98	945831.90	245.79	GP-11	Topo
434998.39	945843.81	245.49	GP-12	Topo
434979.29	945856.00	245.26	GP-13	Topo
435082.73	945808.36	246.81	GP-14	Topo
435102.32	945804.72	246.83	GP-15	Topo
435125.89	945802.28	247.11	GP-16	Topo
435148.89	945802.26	247.39	GP-17	Topo
435168.49	945774.59	248.48	GP-18	Topo
435167.15	945720.52	248.77	GP-19	Topo
435175.09	945674.33	248.24	GP-20	Topo
435197.62	945799.37	250.47	IC02	Control
435197.63	945799.35	250.42	IC02-C	Survey Close
435163.77	945765.04	248.66	IC04	Control
435234.53	945811.21	251.63	IC06	Control

ICSTF Discharge Extension - Depth to Bedrock from Surface
Geoprobe survey performed 1/14/2010

Station #	Depth to Refusal (ft)	Surface Elevation	Bedrock Elevation	Invert Elevation	Bedrock Removal [1]
1	10.2	824.01	813.81	805	9.81
2	12.1	824.24	812.14	804.5	
3	15.0	821.89	806.89	804.1	3.79
4	14.0	819.94	805.94	803.25	3.69
5	11.9	817.89	805.99	802.75	4.24
6	9.6	815.64	806.04	802.3	4.74
7	7.7	812.72	805.02	801.7	4.32
8	10.2	810.64	800.44	801.1	0.34
9	12.3	808.99	796.69	800.5	0
10	17.6	807.6	790	799.8	0
11	17.6	806.41	788.81	799.1	0
12	17.6	805.42	787.82	798.5	0
13	15.6	804.65	789.05	792.85	0
14	10.7	809.73	799.03	795.2	4.83
15	13.8	809.8	796	796.1	0.9
16	13.3	810.72	797.42	797.2	1.22
17	15.5	811.65	796.15	798.27	-1.12
18	8.3	815.23	806.93	799	8.93
19	10.1	816.18	806.08	800.5	6.58
20	7.4	814.43	807.03	802	6.03

[1] Includes 1 foot below estimated invert for bedding material.