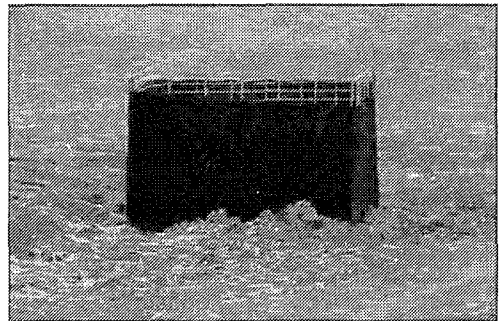


TEMPORARY DROP INLET PROTECTION

Geotextile Fabric Drop Inlet Protection



Geotextile fabric drop inlet protection is a temporary sediment control measure consisting of a temporary geotextile fabric barrier placed around a storm drain drop inlet.

Purpose

To capture sediment at the entrance to a storm drain inlet, allowing full use of the storm drain system during the construction period.

Note: This measure is not recommended for paved surfaces due to inability to entrench the fabric and lack of an anchoring system.

Specifications

Note: Alternative support systems may be substituted for hardwood posts and cross braces.

Contributing Drainage Area

One acre maximum.

Effective Life

Six months (maximum).

Capacity

Runoff from a two-year frequency, 24-hour storm event entering a storm drain without bypass flow.

Geotextile Structure

- Height – 12 to 18 inches, measured from top of storm drain inlet.
- Post spacing – 36-inch maximum spacing between posts.
- Frame support – trenching to strengthen integrity of the structure. (Structure must withstand 1 1/2-foot head of water and sediment without collapsing or undercutting.)

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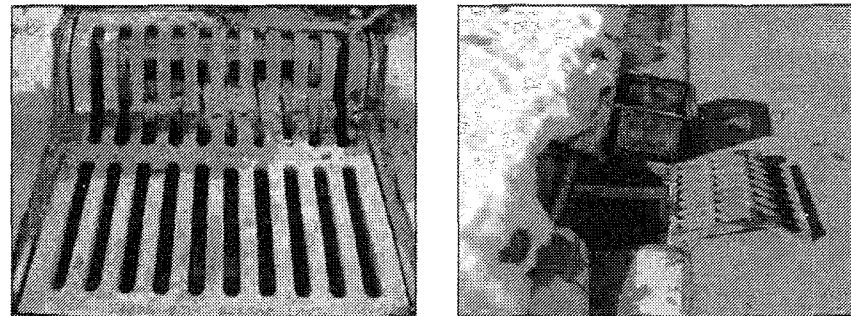
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TEMPORARY CURB & PAVED AREA INLET PROTECTION

Insert (Basket) Curb Inlet Protection

Insert (basket) curb inlet protection is a temporary sediment control measure consisting of a metal frame or basket that is used to support a geotextile fabric. The system is installed under the storm sewer grate.



Purpose

To minimize sediment from entering the storm sewer system while allowing runoff to enter the storm sewer system in the event of excessive storm events. This measure traps sediment associated with small storm events below the grade of the paved area. This measure does not place an obstruction in the street to trap sediment and is especially conducive to stages of construction when the public has access to the project site.

Note: This measure should be used in conjunction with other sediment control measures.

Specifications

Contributing Drainage Area:

One-quarter acre maximum.

Capacity

Runoff from a two-year frequency, 24-hour storm event entering a storm drain without bypass flow.

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SILT FENCE

Table 2. Geotextile Fabric Specifications for Silt Fence (minimum)

Physical Property	Woven Geotextile Fabric	Non-Woven Geotextile Fabric
Filtering efficiency	85%	85%
Tensile strength at 20% elongation	30 lbs. per linear inch	50 lbs. per linear inch
Standard strength	50 lbs. per linear inch	70 lbs. per linear inch
Extra strength	70 lbs. per linear inch	100 lbs. per linear inch
Slurry flow rate	0.3 gal./min./square foot	4.5 gal./min./square foot
Water flow rate	15 gal./min./square foot	220 gal./min./square foot
UV resistance	70%	85%
Post spacing	7 feet	5 feet

Note: Silt fences can be purchased commercially.

- Height – a minimum of 18 inches above ground level (30 inches maximum).
- Reinforcement – fabric securely fastened to posts with wood lathe.
- Support Posts
 - 2 x 2 inch hardwood posts. Steel fence posts may be substituted for hardwood posts (steel posts should have projections for fastening fabric).
 - Spacing
 - Eight feet maximum if fence is supported by wire mesh fencing.
 - Six feet maximum for extra-strength fabric without wire backing.

Installation

Prefabricated silt fence (see Exhibits 1, 2, and 3)

- Lay out the location of the fence so that it is parallel to the contour of the slope and at least 10 feet beyond the toe of the slope to provide a sediment storage area. Turn the ends of the fence up slope such that the point of contact between the ground and the bottom of the fence end terminates at a higher elevation than the top of the fence at its lowest point (see Exhibit 1).
- Excavate an eight-inch deep by four-inch wide trench along the entire length of the fence line (see Exhibit 2). Installation by plowing is also acceptable.
- Install the silt fence with the filter fabric located on the up-slope side of the excavated trench and the support posts on the down-slope side of the trench.

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GEOTEXTILE FABRIC DROP INLET PROTECTION

Materials

- Support posts
 - 2 x 2 inch or 2 x 4 inch hardwood posts.
 - Three feet length, minimum.
- 1 x 2 inch or 1 x 3 inch hardwood cross bracing lumber.
- Lathe.
- Staples or nails.
- Geotextile fabric

Table 1. Geotextile Fabric Specifications

Physical Property	Woven	Non-Woven
Filtering Efficiency	85%	85%
UV Resistance (Inhibitors and stabilizers to ensure six month minimum life at temperatures of 0° to 120° F)	70%	85%
Tensile Strength at 20% Elongation:		
Standard Strength	30 lbs./linear inch	50 lbs./linear inch
Extra Strength	50 lbs./linear inch	70 lbs./linear inch
Slurry Flow Rate	0.3 gal./min./sq. ft.	4.5 gal./min./sq. ft.
Water Flow Rate	15 gal./min./sq. ft.	220 gal./min./sq. ft.

Installation

(see Exhibits 1 and 2)

- Dig an eight-inch deep, four-inch wide trench around the perimeter of the inlet.
- If using pre-assembled geotextile fabric and posts, drive the posts into the soil, tightly stretching the geotextile fabric between posts as each is driven. (Posts must be placed on the inlet side of the anchor trench with the geotextile fabric on the side of the trench farthest from the inlet.)

Note: If assembling the geotextile fabric and posts on-site, drive the posts into the soil and then secure the geotextile fabric to the posts by placing a piece of lathe over the fabric and fastening it to the post (stretching the fabric between posts as it is fastened).

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GEOTEXTILE FABRIC DROP INLET PROTECTION

- Use the wrap join method when joining posts (see Silt Fence on page 215).
- Place the bottom 12 inches of geotextile fabric into the eight-inch deep trench, laying the remaining four inches in the bottom of the trench and extending away from the inlet.
- Backfill the trench with soil material and compact it in place.
- Brace the posts by nailing braces into each corner post or utilize rigid panels to support fabric.

Note: In situations where storm water may bypass the structure, either:

- Set the top of the geotextile fabric filter at least six inches lower than the ground elevation on the down-slope side of the storm drain inlet.
- Build a temporary dike, compacted to six inches higher than the fabric, on the down-slope side of the storm drain inlet, AND/OR
- Use in conjunction with excavated drop inlet protection (see Excavated Drop Inlet Protection on page 145).

Maintenance

- Inspect daily.
- Inspect geotextile fabric and make needed repairs immediately.
- Remove sediment from pool area to provide storage for the next storm event. Avoid damaging or undercutting fabric during sediment removal.
- When contributing drainage area has been stabilized, remove sediment, properly dispose of all construction material, grade area to the elevation of the storm drain inlet top, then stabilize immediately.

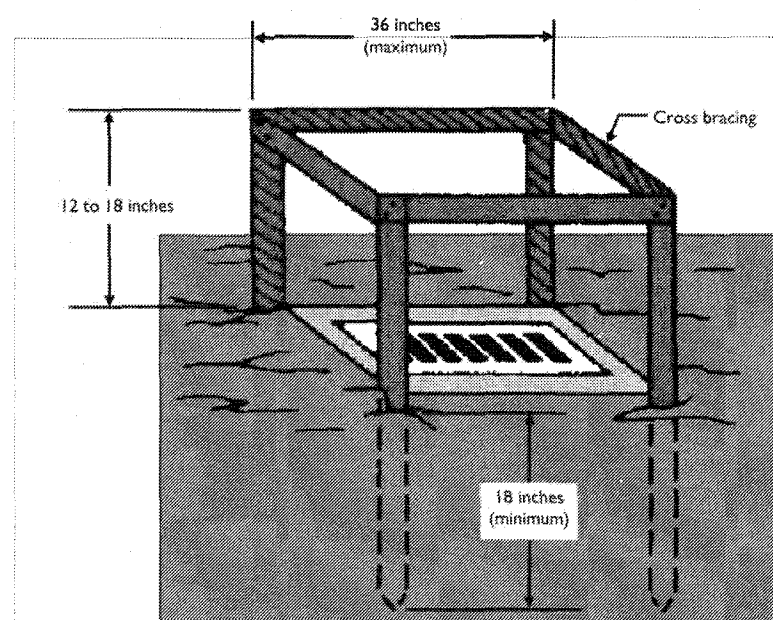
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GEOTEXTILE FABRIC DROP INLET PROTECTION

Exhibit 1



Source: Adapted from North Carolina Erosion and Sediment Control Planning and Design Manual, 1989

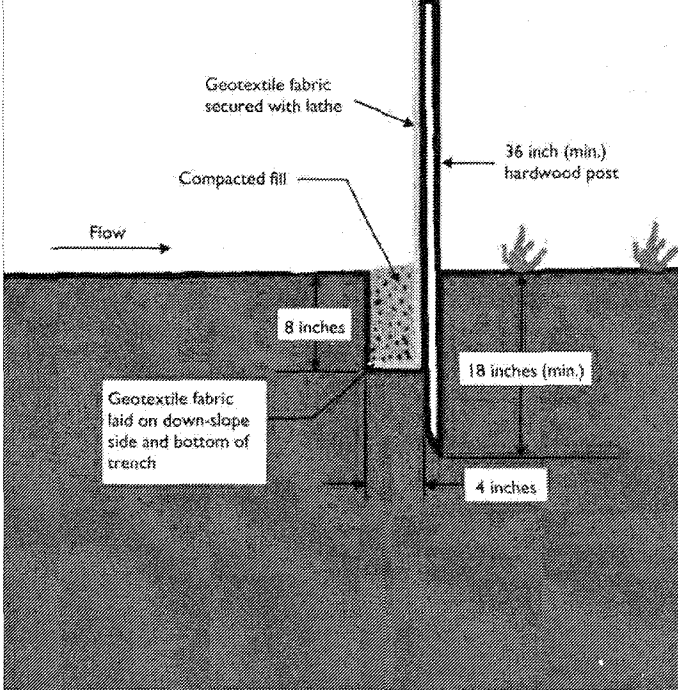
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GEOTEXTILE FABRIC DROP INLET PROTECTION

Exhibit 2



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INSERT (BASKET) CURB INLET PROTECTION

Maintenance

- Inspect daily.
- Remove accumulated sediment and debris after each storm event. Deposit sediment in an area where it will not re-enter the paved area or storm drains.
- Replace or clean geotextile fabric as needed.
- When the contributing drainage area has been stabilized, remove inlet protection.

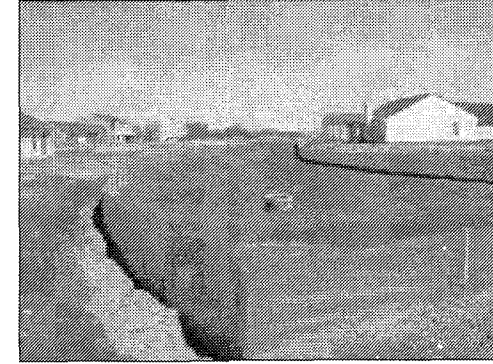
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SEDIMENT BARRIERS & FILTERS

Silt Fence



A silt fence is a temporary barrier of entrenched geotextile fabric stretched across and attached to supporting posts and installed on the contour to intercept and treat sediment-laden storm water runoff from small, unvegetated drainage areas.

Purpose

To trap sediment from small, disturbed areas by reducing the velocity of sheet flow. Silt fences capture sediment by ponding water to allow deposition, not by filtration.

Note: Silt fence is not recommended for use as a diversion and should not be used across a stream, channel, ditch, swale, or anywhere that concentrated flow is anticipated.

Specifications

Drainage Area

- Limited to one-quarter acre per 100 linear feet of fence.
- Further restricted by slope steepness (see Table 1).

Effective Life

Six months (maximum).

Location

- Installed parallel to the slope contour.
- Minimum of 10 feet beyond the toe of the slope to provide a broad, shallow sediment pool.
- Accessible for maintenance (removal of sediment and silt fence repair).

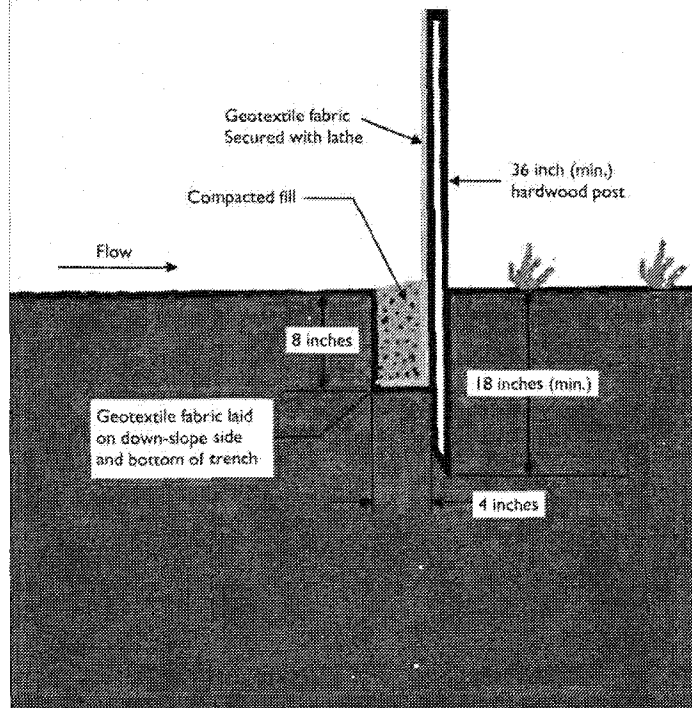
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SILT FENCE

Exhibit 2



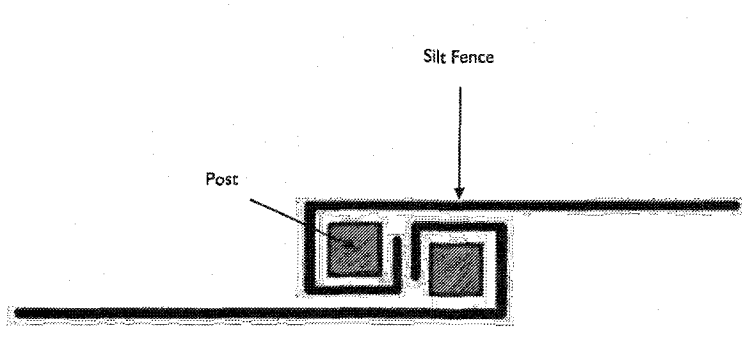
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SILT FENCE

Exhibit 3



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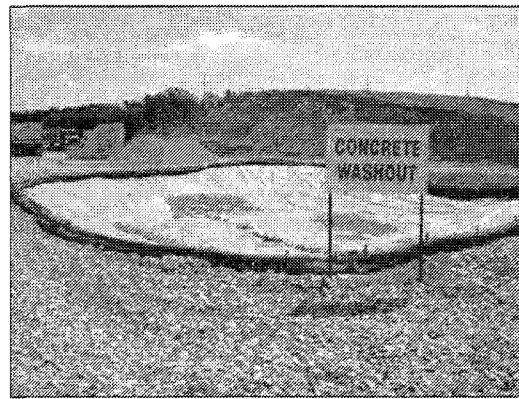
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SITE MANAGEMENT MEASURES

Concrete Washout



Concrete washout areas are designated locations within a construction site that are either a prefabricated unit or a designed measure that is constructed to contain concrete washout. Concrete washout systems are typically used to contain wash-out water when chutes and hoppers are rinsed following delivery.

Purpose

Concrete washout systems are implemented to reduce the discharge of pollutants that are associated with concrete washout waste through consolidation of solids and retention of liquids. Uncured concrete and associated liquids are highly alkaline which may leach into the soil and contaminate ground water or discharge to a waterbody or wetland which can elevate the pH and be harmful to aquatic life. Performing concrete washout in designated areas and into specifically designed systems reduces the impact concrete washout will have on the environment.

Specifications

Site Management

- Complete construction/installation of the system and leave washout locations operational prior to concrete delivery.
- Do not wash out concrete trucks or equipment into storm drains, wetlands, streams, rivers, creeks, ditches, or streets.
- Never wash out into a storm sewer drainage system. These systems are typically connected to a natural conveyance system.
- Where necessary, provide stable ingress and egress (see **Temporary Construction Ingress/Egress Pad** on page 17).
- It is recommended that washout systems be disposed of excess concrete or

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CONCRETE WASHOUT

Maintenance

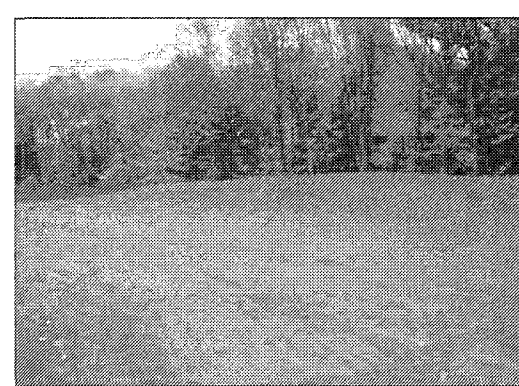
- Inspect daily and after each storm event.
- Inspect the integrity of the overall structure including, where applicable, the containment system.
- Inspect the system for leaks, spills, and tracking of soil by equipment.
- Inspect the polyethylene lining for failure, including tears and punctures.
- Once concrete wastes harden, remove and dispose of the material.
- Excess concrete should be removed when the washout system reaches 50 percent of the design capacity. Use of the system should be discontinued until appropriate measures can be initiated to clean the structure. Prefabricated systems should also utilize this criterion, unless the manufacturer has alternate specifications.
- Upon removal of the solids, inspect the structure. Repair the structure as needed or construct a new system.
- Dispose of all concrete in a legal manner. Reuse the material on site, recycle, or haul the material to an approved construction/demolition landfill site. Recycling of material is encouraged. The waste material can be used for multiple applications including but not limited to roadbeds and building. The availability for recycling should be checked locally.
- The plastic liner should be replaced after every cleaning; the removal of material will usually damage the lining.
- The concrete washout system should be repaired or enlarged as necessary to maintain capacity for concrete waste.
- Concrete washout systems are designed to promote evaporation. However, if the liquids do not evaporate and the system is near capacity it may be necessary to vacuum or remove the liquids and dispose of them in an acceptable method. Disposal may be allowed at the local sanitary sewer authority provided their National Pollutant Discharge Elimination System permits allow for acceptance of this material. Another option would be to utilize a secondary containment system or basin for further dewatering.
- Prefabricated units are often pumped and the company supplying the unit provides this service.
- Inspect construction activities on a regular basis to ensure suppliers, contractors, and others are utilizing designated washout areas. If concrete waste is being disposed of improperly, identify the violators and take appropriate action.

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SURFACE STABILIZATION

Permanent Seeding



Permanent seeding involves the establishment of a permanent vegetative cover to protect soils from erosive forces.

Purpose

- To provide permanent vegetative cover and improve visual aesthetics of a project site.
- To reduce erosion and sedimentation damage by stabilizing disturbed areas.
- To reduce problems associated with mud or dust from unvegetated soil surfaces.
- To reduce sediment-laden storm water runoff from being transported to downstream areas.

Specifications

Seedbed Preparation

Grade and apply soil amendments.

Seeding Frequency

Seed final graded areas daily while soil is still loose and moist.

Density of Vegetative Cover

Ninety percent or greater over the soil surface.

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CONCRETE WASHOUT

residual loads due to potential to exceed the design capacity of the washout system. Small amounts of excess or residual concrete (not washout water) may be disposed of in areas that will not result in flow to an area that is to be protected.

- Install systems at strategic locations that are convenient and in close proximity to work areas and in sufficient number to accommodate the demand for disposal.
- Install signage identifying the location of concrete washout systems.

Location

- Locate concrete washout systems at least 50 feet from any creeks, wetlands, ditches, karst features, or storm drains/natural conveyance systems.
- To the extent practical, locate concrete washout systems in relatively flat areas that have established vegetative cover and into specifically designed systems adjacent to land areas.
- Locate in areas that provide easy access for concrete trucks and other construction equipment.
- Locate away from other construction traffic to reduce the potential for damage to the system.

General Design Considerations

- The structure or system shall be designed to contain the anticipated washout water associated with construction activities.
- The system shall be designed, to the extent practical, to eliminate runoff from entering the washout system.
- Runoff from a rainstorm or snowmelt should not carry wastes away from the washout location.
- Washout will not impact future land uses (i.e., open spaces, landscaped areas, home sites, parks).
- Washout systems/containment measures may also be utilized on smaller individual building sites. The design and size of the system can be adjusted to accommodate the expected capacity.

Prefabricated Washout Systems/Containers

- Self-contained sturdy containment systems that are delivered to a site and located at strategic locations for concrete disposal.

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CONCRETE WASHOUT

- When concrete washout systems are no longer required, the concrete washout systems shall be closed. Dispose of all hardened concrete and other materials used to construct the system.
- Holes, depressions and other land disturbances associated with the system should be backfilled, graded, and stabilized.

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CONCRETE WASHOUT

- These systems are manufactured to resist damage from construction equipment and protect against leaks or spills.
- Manufacturer or supplier provides the containers. The project site manager maintains the system or the supplier provides complete service that includes maintenance and disposal.
- Units are often available with or without ramps. Units with ramps lend themselves to accommodate pump trucks.
- Maintain according to the manufacturer's recommendations.

Designed and Installed Units

These units are designed and installed on site. They tend to be less reliable than prefabricated systems and are often prone to failure. Concrete washout systems can be constructed above or below grade. It is not uncommon to have a system that is partly below grade with an additional containment structure above grade.

- Washout systems shall utilize a pit or bermed area designed and maintained at a capacity to contain all liquid and concrete waste generated by washout operations.
- The volume of the system must also be designed to contain runoff that drains to the system and rainfall that enters the system for a two-year frequency, 24-hour storm event.

Below Grade System

- A washout system installed below grade should be a minimum of ten feet wide by ten feet long, but sized to contain all liquid and waste that is expected to be generated between scheduled cleanout periods. The size of the pit may be limited by the size of polyethylene available. The polyethylene lining should be of adequate size to extend over the entire excavation.
- Include a minimum 12-inch freeboard to reasonably ensure that the structure will not overtop during a rain event.
- Line the pit with ten millimeter polyethylene lining to control seepage.
- The bottom of excavated pit should be above the seasonal high water table.

Above Grade System

- A system designed and built above grade should be a minimum of ten feet wide by ten feet long, but sized to contain all liquid and waste that is expected to be generated between scheduled cleanout periods. The size of the containment system may be limited by the size of

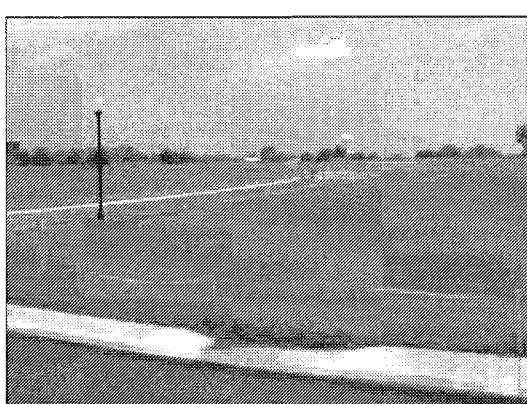
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SURFACE STABILIZATION

Temporary Seeding



Temporary seeding involves the establishment of rapid growing annual grasses or small grains to stabilize disturbed areas until such time as a permanent, nonerrosive cover can be established.

Purpose

- To provide vegetative cover where permanent seeding is not desirable or practical.
- To reduce erosion and sedimentation damage by stabilizing disturbed areas.
- To reduce problems associated with mud or dust from unvegetated soil surfaces during construction.
- To reduce sediment-laden storm water runoff from being transported to downstream areas.
- To improve visual aesthetics of construction areas.

Specifications

Seedbed Preparation

Grade and apply soil amendments.

Seeding Frequency

Seed rough graded areas daily while soil is still loose and moist.

Density of Vegetative Cover

Eighty percent or greater over the soil surface.

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CONCRETE WASHOUT

- polyethylene available. The polyethylene lining should be of adequate size to extend over the berm or containment system.
- The system design may utilize an earthen berm, straw bales, sandbags, or other acceptable barriers that will maintain its shape and integrity and support the polyethylene lining.
- Include a minimum four-inch freeboard as part of the design.

Washout Procedures

- Do not leave excess mud in the chutes or hopper after the pour. Every effort should be made to empty the chutes and hopper at the pour. The less material left in the chutes and hopper, the quicker and easier the cleanout. Small amounts of excess concrete (not washout water) may be disposed of in areas that will not result in flow to an area that is to be protected.
- At the washout location, scrape as much material from the chutes as possible before washing them. Use non-water cleaning methods to minimize the chance for waste to flow off site.
- Remove as much mud as possible when washing out.
- Stop washing out in an area if you observe water running off the designated area or if the containment system is leaking or overflowing and ineffective.
- Do not back flush equipment at the project site. Back flushing should be restricted to the plant as it generates large volumes of waste that more than likely will exceed the capacity of most washout systems. If an emergency arises, back flush should only be performed with the permission of an on-site manager for the project.
- Do not use additives with wash water. Do not use solvents or acids that may be used at the target plant.

Materials

- Minimum of ten millimeter polyethylene sheeting that is free of holes, tears, and other defects. The sheeting selected should be of an appropriate size to fit the washout system without seams or overlap of the lining (**designed and installed systems**).
- Signage.
- Orange safety fencing or equivalent.
- Straw bales, sandbags (bags should be ultraviolet-stabilized geotextile fabric), soil material, or other appropriate materials that can be used to construct a containment system (**above grade systems**).

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TEMPORARY SEEDING

Materials

- Soil Amendments – Select materials and rates as determined by a soil test (contact your county soil and water conservation district or cooperative extension office for assistance and soil information, including available soil testing services) or 400 to 600 pounds of 12-12-12 analysis fertilizer, or equivalent. Consider the use of reduced phosphorus application where soil tests indicate adequate phosphorus levels in the soil profile.
- Seed – Select appropriate plant species seed or seed mixtures on the basis of quick germination, growth, and time of year to be seeded (see Table 1).
- Mulch –
 - Straw, hay, wood fiber, etc. (to protect seedbed, retain moisture, and encourage plant growth).
 - Anchored to prevent removal by wind or water or covered with manufactured erosion control blankets.

Table 1. Temporary Seeding Specifications

Seed Species ¹	Rate per Acre	Planting Depth	Optimum Dates ²
Wheat or Rye	150 lbs.	1 to 1½ inches	Sept. 15 – Oct. 30
Spring Oats	100 lbs.	1 inch	March 1 – April 15
Annual Ryegrass	40 lbs.	½ inch	March 1 – May 1 Aug. 1 – Sept. 1
German Millet	40 lbs.	1 to 2 inches	May 1 – June 1
Sudangrass	35 lbs.	1 to 2 inches	May 1 – July 30
Buckwheat	60 lbs.	1 to 2 inches	April 15 – June 1
Corn (broadcast)	300 lbs.	1 to 2 inches	May 11 – Aug. 10
Sorghum	35 lbs.	1 to 2 inches	May 1 – July 15

¹Perennial species may be used as a temporary cover, especially if the area to be seeded will remain idle for more than one year (see **Permanent Seeding** on page 38).

²Seeding done outside the optimum seeding dates increases the chances of seeding failure. Dates may be extended or shortened based on the location of the project site within the state.

Notes:
Mulch alone is an acceptable temporary cover and may be used in lieu of temporary seeding, provided that it is appropriately anchored.

A high potential for fertilizer, seed, and mulch to wash exists on steep banks, cuts, and in channels and areas of concentrated flow.

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PERMANENT SEEDING

Table 1. Permanent Seeding Recommendations

This table provides several seed mixture options. Additional seed mixtures are available commercially. When selecting a mixture, consider intended land use and site conditions, including soil properties (e.g., soil pH and drainage), slope aspect, and the tolerance of each species to shade and drought.

Open Low-Maintenance Areas (remaining idle more than six months)

Seed Mixtures	Rate per Acre Pure Live Seed	Optimum Soil pH
1. Perennial ryegrass - white clover ¹	70 lbs. 2 lbs.	5.6 to 7.0
2. Perennial ryegrass - tall fescue ²	70 lbs. 50 lbs.	5.6 to 7.0
3. Tall fescue ² - white clover ¹	70 lbs. 2 lbs.	5.5 to 7.5

Steep Banks and Cuts, Low-Maintenance Areas (not mowed)

Seed Mixtures	Rate per Acre Pure Live Seed	Optimum Soil pH
1. Smooth brome grass - red clover ¹	35 lbs. 20 lbs.	5.5 to 7.0
2. Tall fescue ² - white clover ¹	50 lbs. 2 lbs.	5.5 to 7.5
3. Tall fescue ² - red clover ¹	50 lbs. 20 lbs.	5.5 to 7.5
4. Orchard grass - red clover ¹ - white clover ¹	30 lbs. 20 lbs. 2 lbs.	5.6 to 7.0
5. Crownvetch ³ - tall fescue ²	12 lbs. 30 lbs.	5.6 to 7.0

Lawns and High-Maintenance Areas

Seed Mixtures	Rate per Acre Pure Live Seed	Optimum Soil pH
1. Bluegrass	140 lbs.	5.5 to 7.0
2. Perennial ryegrass (turf type)	60 lbs. 90 lbs.	5.6 to 7.0
3. Tall fescue (turf type) ¹ - bluegrass	170 lbs. 30 lbs.	5.6 to 7.5

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CONCRETE WASHOUT

- Metal pins or staples at a minimum of six inches in length, sandbags, or alternative fastener to secure polyethylene lining to the containment system.
- Non-collapsing and non-water holding cover for use during rain events (optional).

Installation

Prefabricated Washout Systems/Containers

- Install and locate according to the manufacturer's recommendations.

Designed and Installed Systems

- Utilize and follow the design in the storm water pollution prevention plan to install the system.
- Dependent upon the type of system, either excavate the pit or install the containment system.
- A base shall be constructed and prepared that is free of rocks and other debris that may cause tears or punctures in the polyethylene lining.
- Install the polyethylene lining. For excavated systems, the lining should extend over the entire excavation. The lining for bermed systems should be installed over the pooling area with enough material to extend the lining over the berm or containment system. The lining should be secured with pins, staples, or other fasteners.
- Place flags, safety fencing, or equivalent to provide a barrier to construction equipment and other traffic.
- Place a non-collapsing, non-water holding cover over the washout facility prior to a predicted rainfall event to prevent accumulation of water and possible overflow of the system (optional).
- Install signage that identifies concrete washout areas.
- Post signs directing contractors and suppliers to designated locations.
- Where necessary, provide stable ingress and egress (see **Temporary Construction Ingress/Egress Pad** on page 17) or alternative approach pad for concrete washout systems.

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TEMPORARY SEEDING

Application

Seedbed Preparation

- Test soil to determine pH and nutrient levels.
- Apply soil amendments as recommended by the soil test. If testing is not done, apply 400 to 600 pounds per acre of 12-12-12 analysis fertilizer, or equivalent.
- Work the soil amendments into the upper two to four inches of the soil with a disk or rake operated across the slope.

Seeding

- Select a seed species or an appropriate seed mixture and application rate from Table 1.
- Apply seed uniformly with a drill or cultipacker seeder or by broadcasting. Plant or cover seed to the depth above in Table 1.

Notes:

- If drilling or broadcasting the seed, ensure good seed-to-soil contact by firming the seedbed with a roller or cultipacker after completing seeding operations.
- Daily seeding when the soil is moist is usually most effective.
- If seeding is done with a hydroseeder, fertilizer and mulch can be applied with the seed in a slurry mixture.

- Apply mulch (see **Mulching** on page 55 or **Compost Mulching** on page 59) and anchor it in place.

Maintenance

- Inspect within 24 hours of each rain event and at least once every seven calendar days.
- Check for erosion or movement of mulch and repair immediately.
- Monitor for erosion damage and adequate cover (80 percent density); reseed, fertilize, and apply mulch where necessary.
- If nitrogen deficiency is apparent, top-dress fall seeded wheat or ryegrass with 50 pounds per acre of nitrogen in February or March.

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PERMANENT SEEDING

Channels and Areas of Concentrated Flow

Seed Mixtures	Rate per Acre Pure Live Seed	Optimum Soil pH
1. Perennial ryegrass - white ¹	150 lbs. 2 lbs.	5.6 to 7.0
2. Kentucky bluegrass - smooth bromegrass - orchardgrass - timothy - perennial ryegrass - white clover ²	20 lbs. 10 lbs. 3 lbs. 4 lbs. 10 lbs. 2 lbs.	5.5 to 7.5
3. Tall fescue ² - white clover ¹	150 lbs. 2 lbs.	5.5 to 7.5
4. Tall fescue ² - perennial ryegrass - Kentucky bluegrass	150 lbs. 20 lbs. 20 lbs.	5.5 to 7.5

¹ For best results: (a) legume seed should be inoculated; (b) seeding mixtures containing legumes should preferably be spring-seeded, although the grass may be fall-seeded and the legume frost-seeded (see **Dormant Seeding and Frost Seeding** on page 41); and (c) if legumes are fall-seeded, do so in early fall.

² Tall fescue provides little cover for, and may be toxic to some species of wildlife. The Indiana Department of Natural Resources recognizes the need for additional research on alternatives such as buffalograss, orchardgrass, smooth bromegrass, and switchgrass. This research, in conjunction with demonstration areas, should focus on erosion control characteristics, wildlife toxicity, turf durability, and drought resistance.

Notes:

- An oat or wheat companion or nurse crop may be used with any of the above permanent seeding mixtures, at the following rates:
 - (a) spring oats – one-fourth to three-fourths bushel per acre
 - (b) wheat – no more than one-half bushel per acre
- A high potential for fertilizer, seed, and mulch to wash exists on steep banks, cuts, and in channels and areas of concentrated flow.

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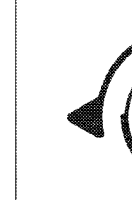
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THIS DRAWING IS NOT INTENDED TO BE REPRESENTED AS A RETRACTION OR CORRECTION OF A PREVIOUS SURVEY OR A SURVEY OR LOCATION REPORT.

CERTIFIED: 05/09/19

David J. Stoepelwirth

STOEPPELWIRTH



STORM WATER POLLUTION PREV. PLAN SPECS.
THE BLUFFS AT YOUNGS CREEK
SECTION 1

DRAWN BY: PDR

CHECKED BY: BKR

SHEET NO.

C310

S&A 3100 NO.

83540MMA-S1

BY

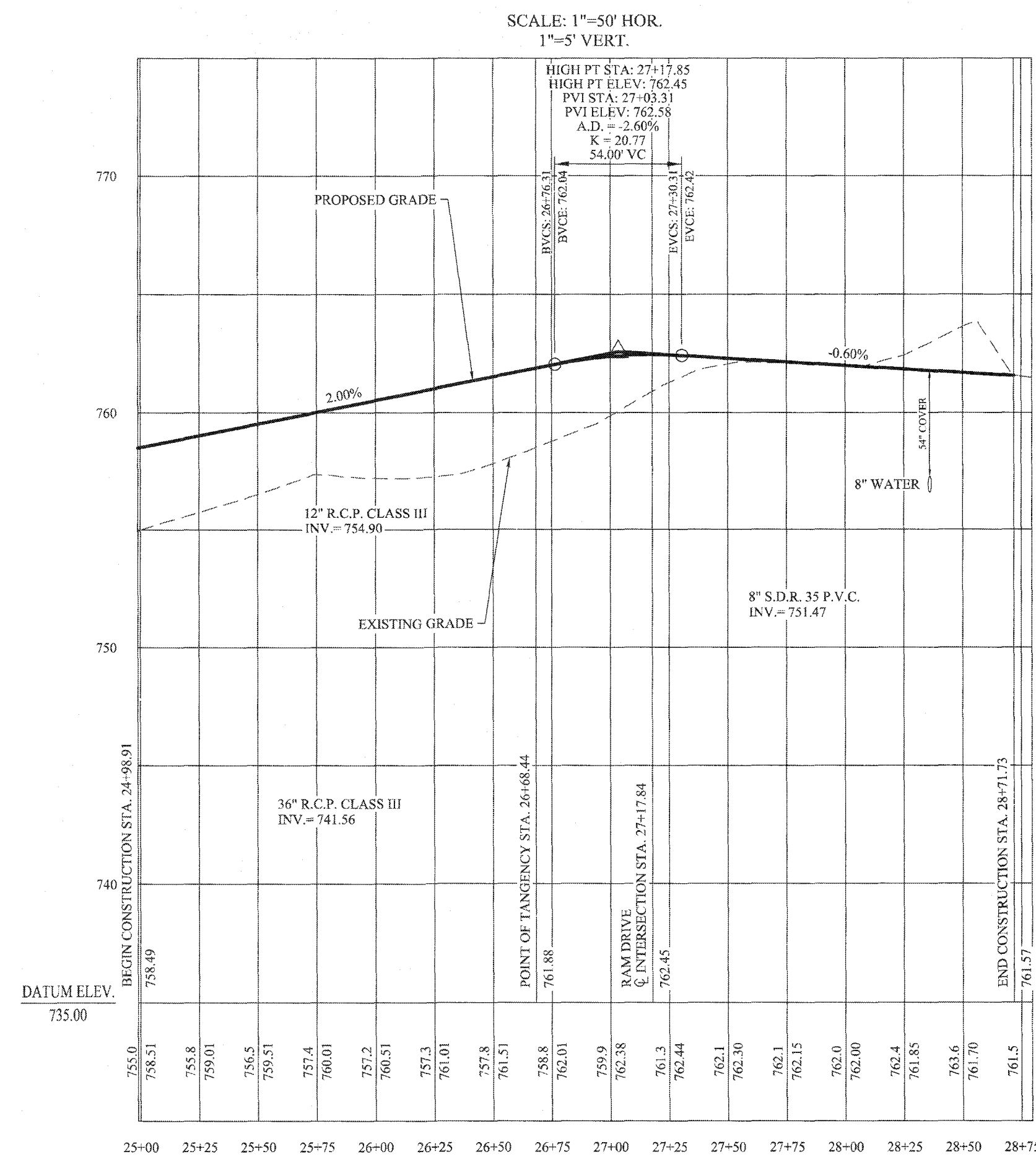
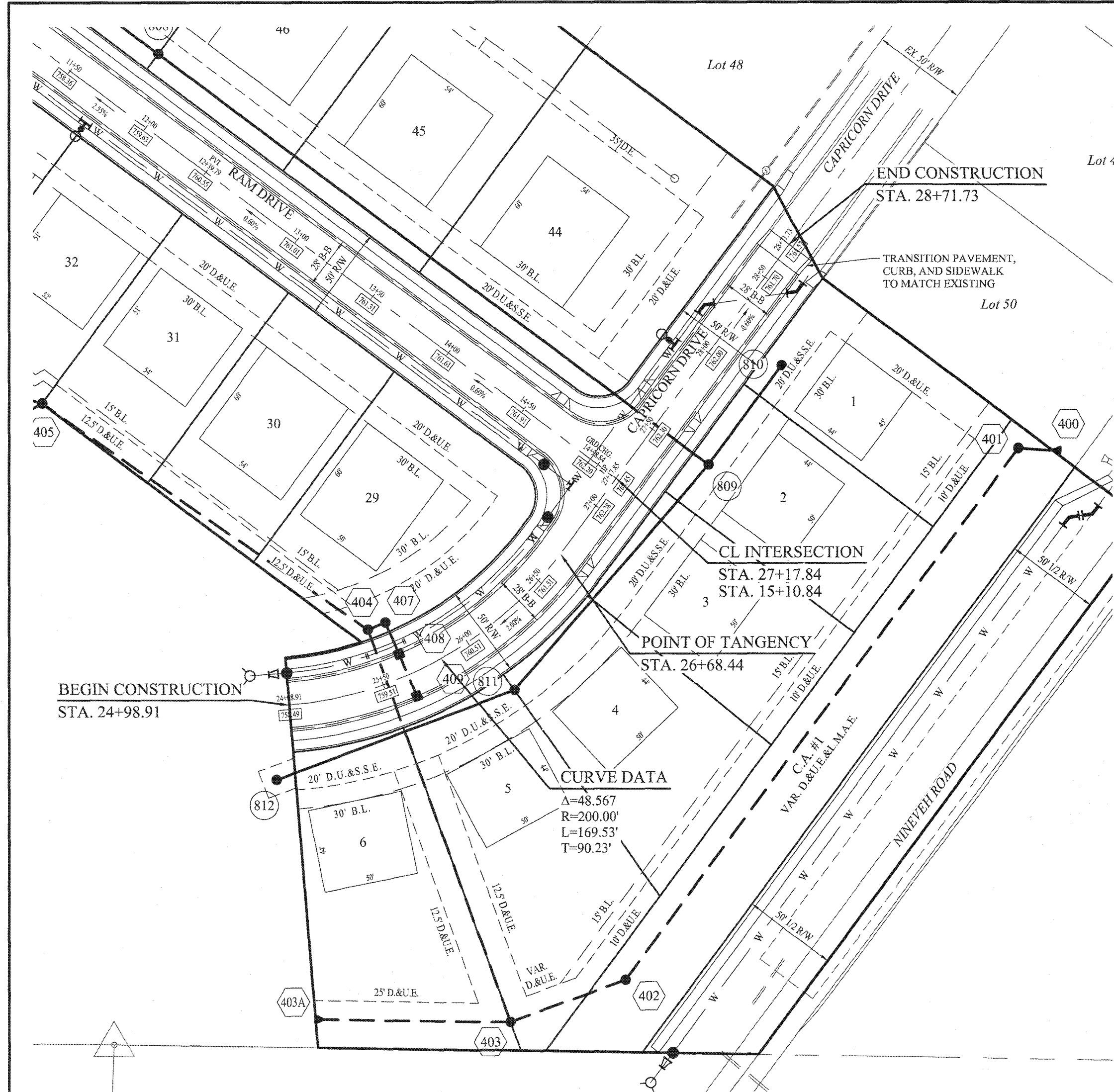
REVISIONS

DATE

MARK

BY

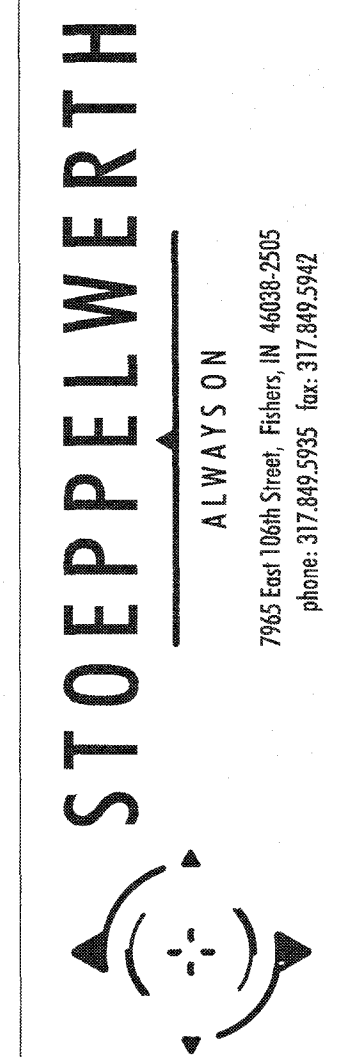
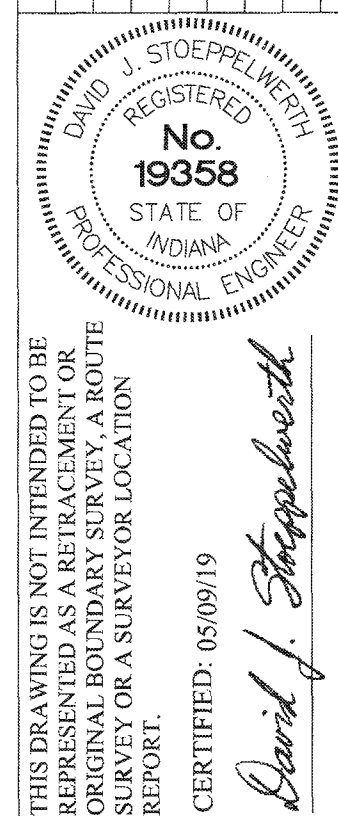
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May 8, 2019 10:34 AM
May 8, 2019 11:28:02 AM / Paul Richards
Plotted By:



CAPRICORN DRIVE



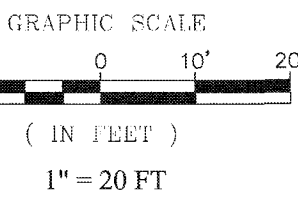
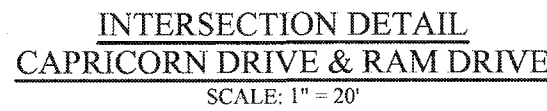
LEGEND	
BVCS	BEGIN VERTICAL CURVE STATION
BVCE	BEGIN VERTICAL CURVE ELEVATION
EVCS	END VERTICAL CURVE STATION
EVCE	END VERTICAL CURVE ELEVATION
AD	GRADE CHANGE
PVI	POINT OF VERTICAL INTERSECTION
VC	VERTICAL CURVE
UTILITY CROSSINGS	
CONTRACTOR SHALL VERIFY DEPTHS OF ALL EXISTING ONSITE UTILITIES PRIOR TO CONSTRUCTION TO CONFIRM THERE IS NOT ANY CONFLICTS WITH OTHER UTILITIES, STORM SEWERS OR STREETS. CONFLICTS AFTER CONSTRUCTION BEGINS ARE SOLELY THE CONTRACTOR'S RESPONSIBILITY.	




STREET PLAN & PROFILES	
THE BLUFFS AT YOUNGS CREEK SECTION 1	
FRANKLIN, FRANKLIN TOWNSHIP JOHNSON COUNTY, INDIANA	
DRAWN BY: PDR	CHECKED BY: BKR
SHEET NO. C400	
S & A JOB NO. 83540MMA-S1	

DATE	MARK	REVISIONS	BY
------	------	-----------	----

File Name:
Modified / By:
Plotted / By:



LEGEND	
	ADA RAMP TO BE INSTALLED (SEE DETAILS ON SHEET C802A)

INTERSECTION DETAIL

THE BLUFFS AT YOUNGS CREEK
SECTION 1

FRANKLIN, FRANKLIN TOWNSHIP
JOHNSON COUNTY, INDIANA



STOEPPELWERTH

ALWAYS ON

7965 East 106th Street, Fishers, IN 46038-2505
phone: 317.849.5935 fax: 317.849.5942

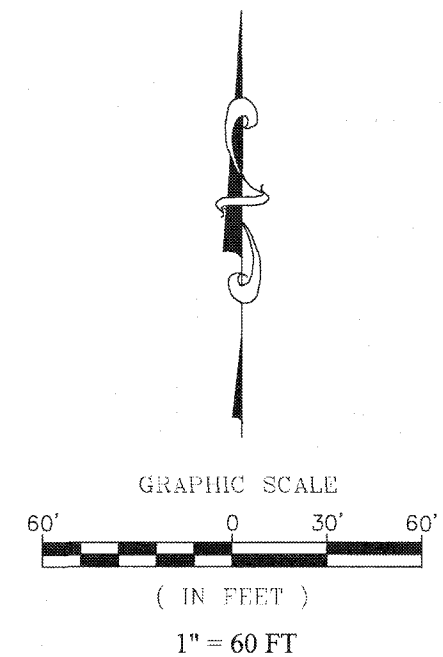
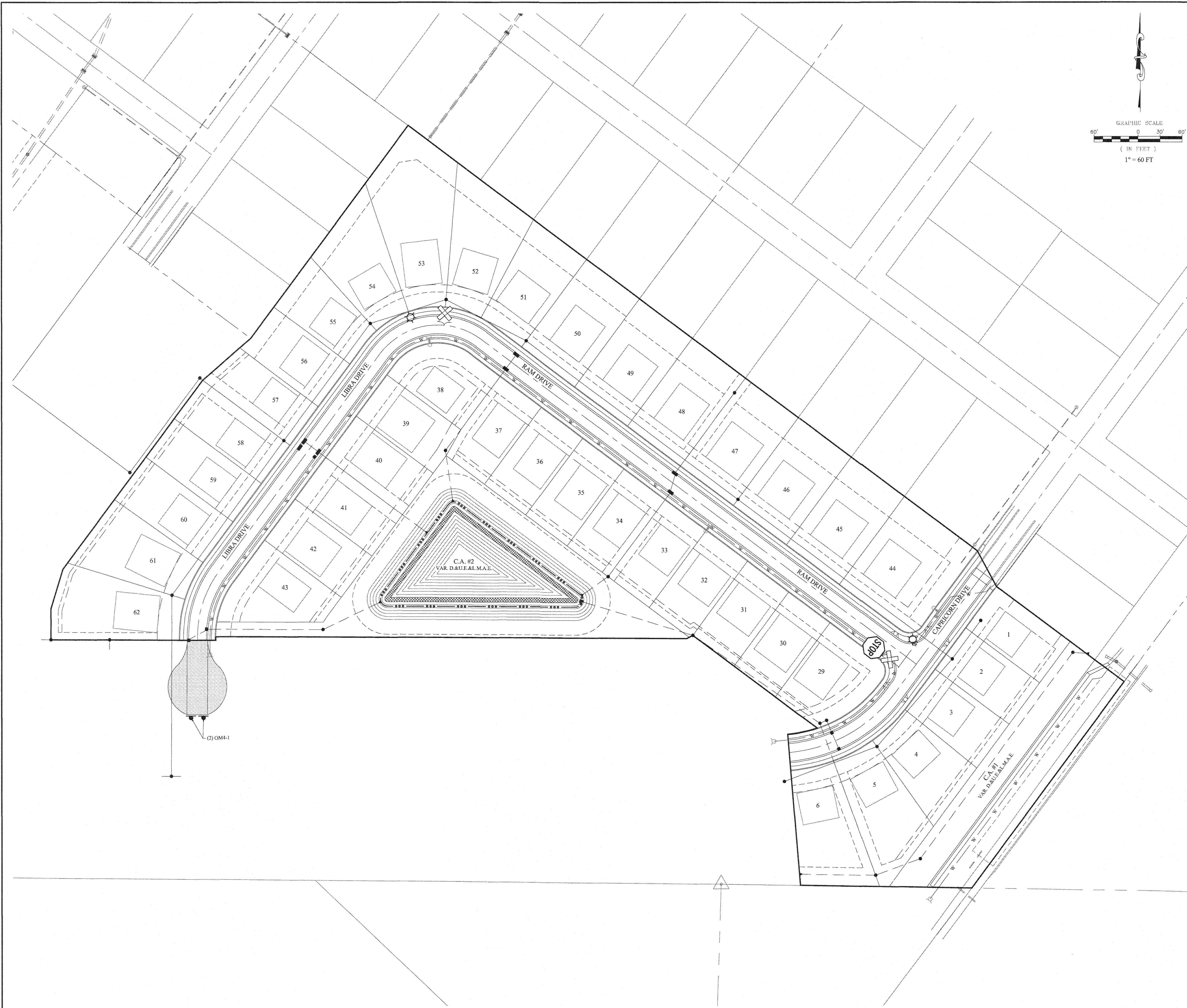
THIS DRAWING IS NOT INTENDED TO BE REPRESENTED AS A RETACEMENT OR ORIGINAL BOUNDARY SURVEY, A ROUTE SURVEY OR A SURVEYOR LOCATION REPORT.

CERTIFIED: 05/09/19

David J. Stoppelwerth

[illegible]

File Name: S:\83540MMA-S01\DWG\C403 - Street Sign Plan.dwg - C403
Plotted By: PDR
Plotted Date: May 8, 2013 1:06:25 PM / Paul Richards



LEGEND		
	STREET NAME SIGN	- 2 D3-1
	STOP SIGN	- 1 R1-1
	STREET LIGHT	- 2
	END OF ROAD MARKER	- 2 OM4-1
ALL TRAFFIC CONTROL SIGNS SHALL CONFORM TO CHAPTER 2 OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), CURRENT REVISION.		

6.13 Street Sign Standards

- A. General Street Sign Requirements: Street signs, including street name signs, stop signs, "no-parking" signs, and all other appropriate regulatory signs, shall be installed by the subdivider at all locations specified on the approved Construction Plans and otherwise as required by the City Engineer.
- B. Street Sign Installation: All street signs shall be installed prior to the acceptance of the subdivision's streets by the Board of Public Works & Safety.
1. Temporary Signs: The subdivider shall be responsible for the installation and maintenance of temporary street and traffic control signs until the permanent signs are installed and accepted by the Board of Public Works and Safety.
2. Permits: At his/her discretion, the Planning Director may withhold the issuance of improvement location permits, including those for model homes and speculative structures, until appropriate permanent or temporary street signs have been installed.
- C. Street Sign Standards: All street sign and post types and locations shall conform to the Uniform Manual of Traffic Control Devices, applicable INDOT standards and specifications, the requirements of the City Engineer, the specifications of the Board of Public Works and Safety, and the following:
1. Signposts: Each signpost shall consist of a 2 inch galvanized Type A post, 12 feet long with a minimum of 3 feet below grade.
- a. Street Name Signpost Locations: Street name sign posts shall be located within the street right-of-way, no closer than 4 feet from the edge of the traveled portion of the street.
- b. Stop Sign Signpost Locations: Stop sign signposts shall be located so that the edge of the sign is a minimum of 2 feet from the edge of the traveled portion of the street.
- c. Speed Limit and Informational Signpost Locations: Speed limit and information sign signposts shall be located so that the edge of the sign is a minimum of 2 feet from the back edge of the curb (or shoulder if no curb is present).
- d. Sidewalk Obstruction Prohibited: In no instance shall any signpost be located in or obstructing a sidewalk.
2. Street Name Signs: Each street name sign shall be made of blue reflectorized, double-blade metal with 6 inch or large white letters mounted at the top of the post with the street name labeled on both sides.
3. Stop Signs: Each stop sign shall be a minimum of 30 inches in width and have a high-intensity finish. There shall be a minimum of 7 feet from the top of the adjacent curb to the bottom of the sign.
4. Speed Limit and Information Signs: Speed limit and other information signs shall be a 24 inch by 30 inch vertical rectangle with a high-intensity finish.

Know what's below.
Call before you dig.

STREET SIGN PLAN

THE BLUFFS AT YOUNGS CREEK
SECTION 1

FRANKLIN, FRANKLIN TOWNSHIP

STOEPPELWERTH
ALWAYSON

7965 East 116th Street, Fishers, IN 46038-2505
phone: 317.849.2505 fax: 317.849.2542

DRAWN BY: PDR
CHECKED BY: BKR

SHEET NO. C403

S.A. & J.B. NO. 83540MMA-S1

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CERTIFIED: 05/09/19

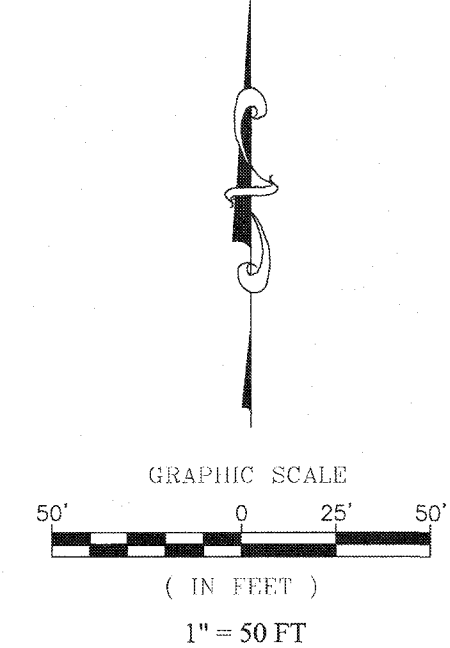
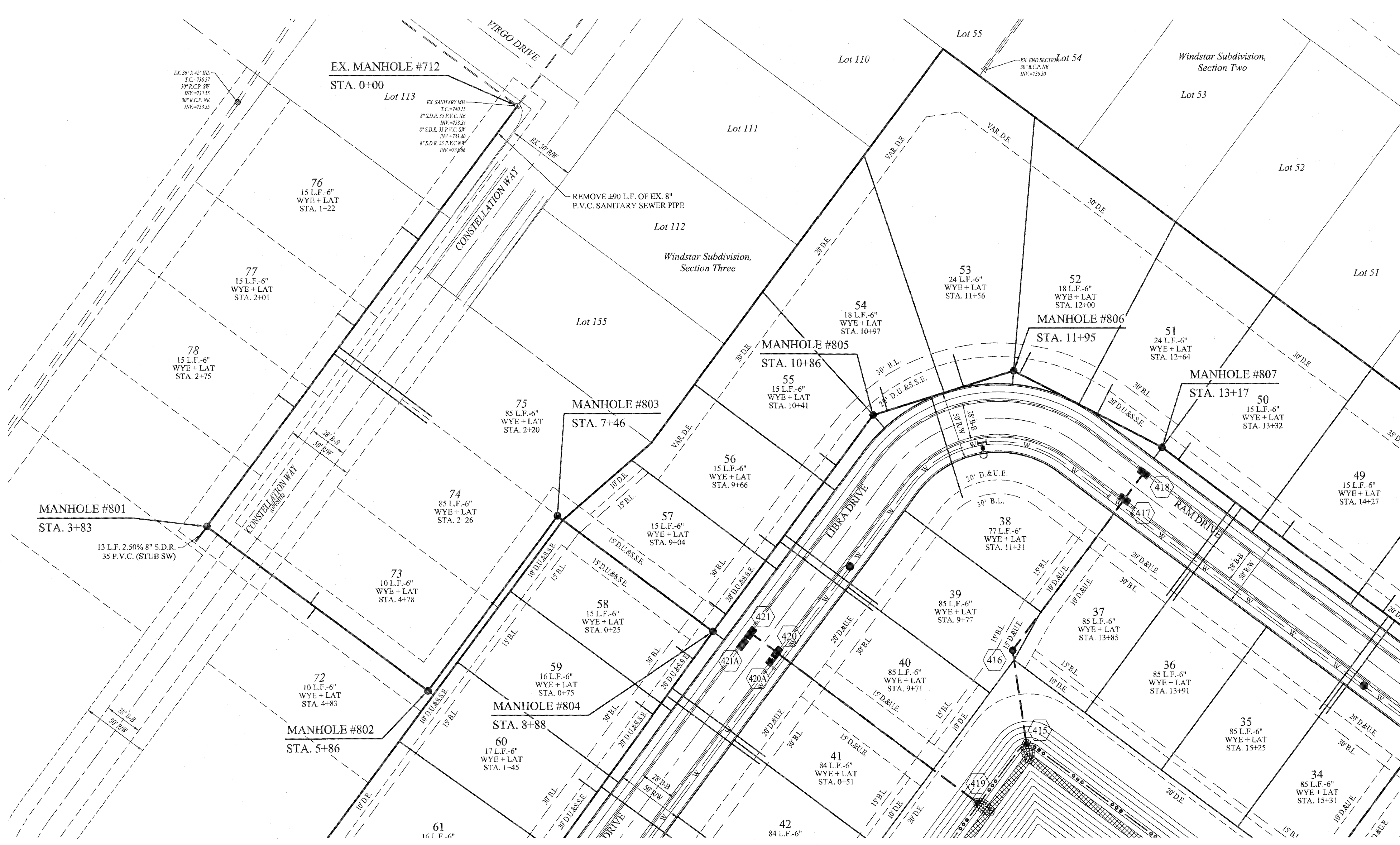
David J. Stoepfelwirth
REGISTERED PROFESSIONAL ENGINEER
No. 19358
STATE OF INDIANA

REVISIONS

DATE

MARK

BY



LEGEND

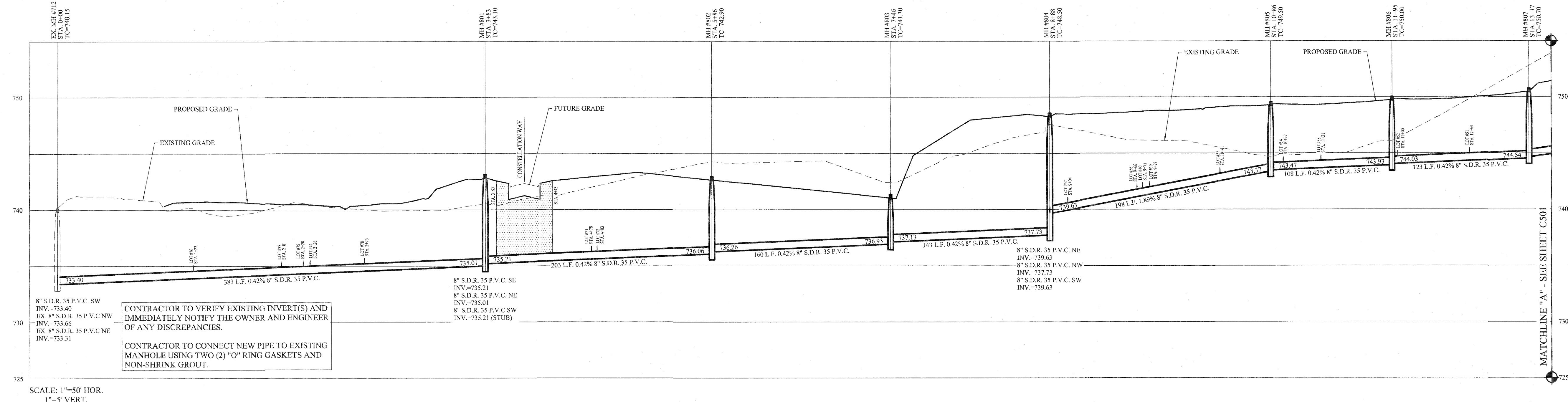
- EXISTING SANITARY SEWER (w/ LATERALS)
- EXISTING STORM SEWER
- EXISTING WATER LINE
- PROPOSED SANITARY SEWER (w/ LATERALS)
- PROPOSED STORM SEWER
- PROPOSED WATER LINE
- DENOTES FULL DEPTH GRANULAR BACKFILL

NOTES

- MIN. SLOPES PER THE TEN STATE STANDARDS SHALL PREVAIL IN ALL CASES.
- ALL WATER MAINS SHALL MAINTAIN 18 INCHES VERTICAL CLEARANCE AND 10 FEET HORIZONTAL CLEARANCE.

UTILITY CROSSINGS

CONTRACTOR SHALL VERIFY DEPTHS OF ALL EXISTING ON-SITE UTILITIES PRIOR TO CONSTRUCTION TO CONFIRM THERE IS NOT ANY CONFLICTS WITH OTHER UTILITIES, STORM SEWERS OR STREETS. CONFLICTS AFTER CONSTRUCTION BEGINS ARE SOLELY THE CONTRACTOR'S RESPONSIBILITY.



CONTRACTOR TO VERIFY EXISTING INVERT(S) AND IMMEDIATELY NOTIFY THE OWNER AND ENGINEER OF ANY DISCREPANCIES.

CONTRACTOR TO CONNECT NEW PIPE TO EXISTING MANHOLE USING TWO (2) "O" RING GASKETS AND NON-SHRINK GROUT.

Indiana 811

Know what's below.
Call before you dig.

STOEPPELWERTH

REGISTERED PROFESSIONAL ENGINEER
No. 19358
STATE OF INDIANA

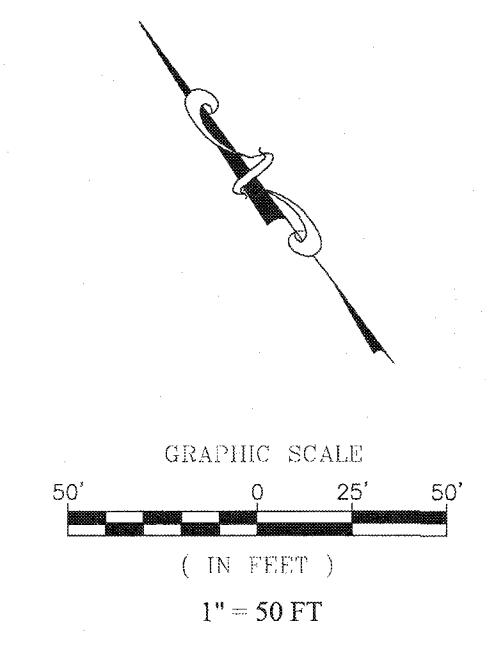
THIS DRAWING IS NOT INTENDED TO BE REPRESENTED AS A RETACEMENT OR ORIGINAL BOUNDARY SURVEY. A ROUTE REPORT OR A SURVEY LOCATION REPORT.

CERTIFIED: 05/09/19
David J. Stoepelwerth

SANITARY SEWER PLAN & PROFILE
THE BLUFFS AT YOUNGS CREEK
SECTION 1

JOHNSON COUNTY, INDIANA
FRANKLIN, FRANKLIN TOWNSHIP

DRAWN BY: PDR
CHECKED BY: BKR
SUBMIT NO.: C500
S.B. & J.O.R.N.O.: 83540MMA-S1




LEGEND	
	EXISTING SANITARY SEWER (w/ LATERAL S)
	EXISTING STORM SEWER
	EXISTING WATER LINE
	PROPOSED SANITARY SEWER (w/ LATERALS)
	PROPOSED STORM SEWER
	PROPOSED WATER LINE
	DENOTES FULL DEPTH GRANULAR BACKFILL
NOTES	
<ol style="list-style-type: none"> 1. MIN. SLOPES PER THE TEN STATE STANDARDS SHALL PREVAIL IN ALL CASES. 2. ALL WATER MAINS SHALL MAINTAIN 18 INCHES VERTICAL CLEARANCE AND 16 FEET HORIZONTAL CLEARANCE. 	
UTILITY CROSSINGS	
<p>CONTRACTOR SHALL VERIFY DEPTHS OF ALL EXISTING ONSITE UTILITIES PRIOR TO CONSTRUCTION TO CONFIRM THERE IS NOT ANY CONFLICTS WITH OTHER UTILITIES, STORM SEWERS OR STREETS. CONFLICTS AFTER CONSTRUCTION BEGINS ARE SOLELY THE CONTRACTOR'S RESPONSIBILITY.</p>	

[illegible]

THIS DRAWING IS NOT INTENDED TO BE
REPRESENTED AS A RE-TRACEMENT OR
ORIGINAL BOUNDARY SURVEY. A ROUTE
SURVEY OR A SURVEYOR LOCATION
REPORT.

CERTIFIED: 05/09/19

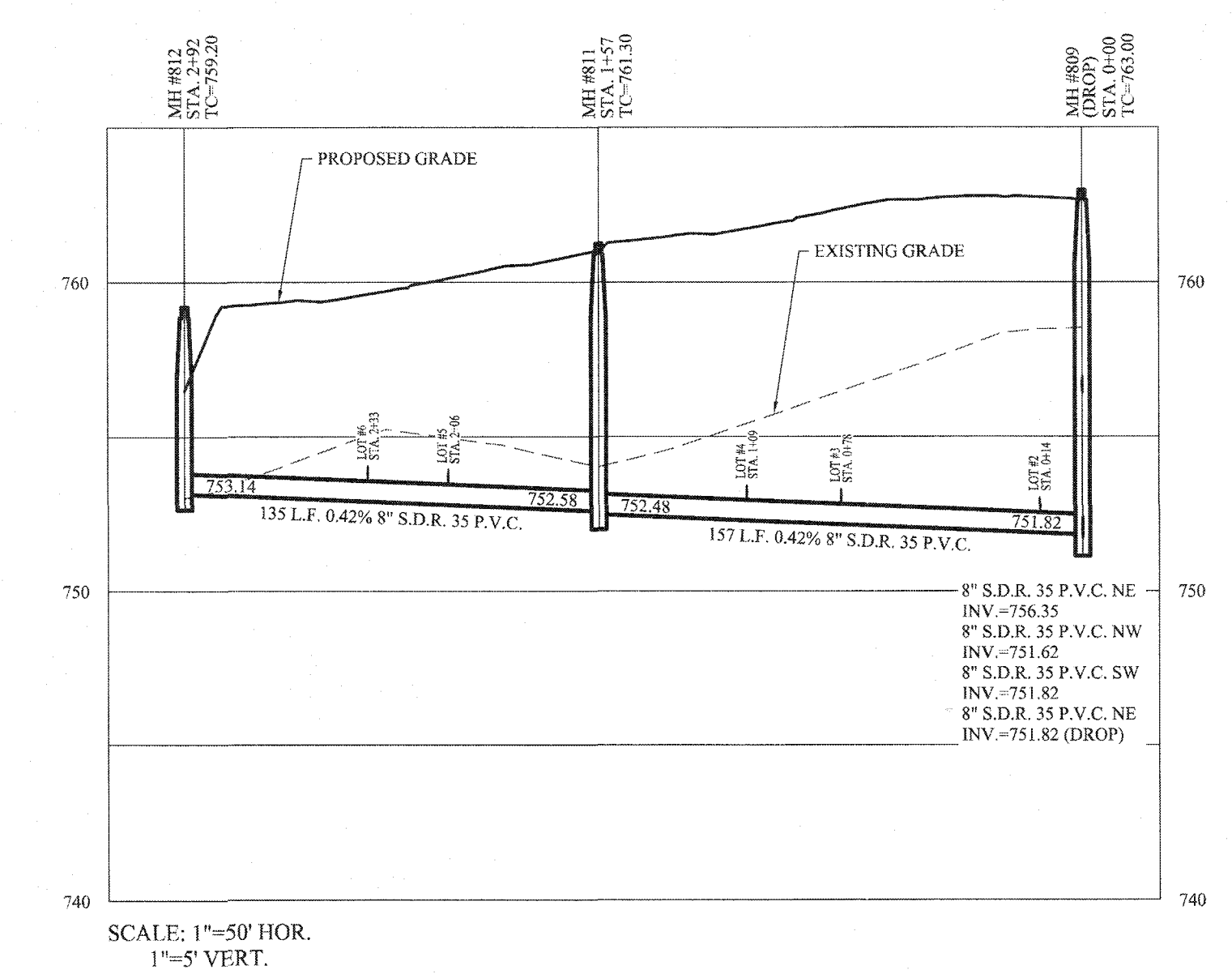
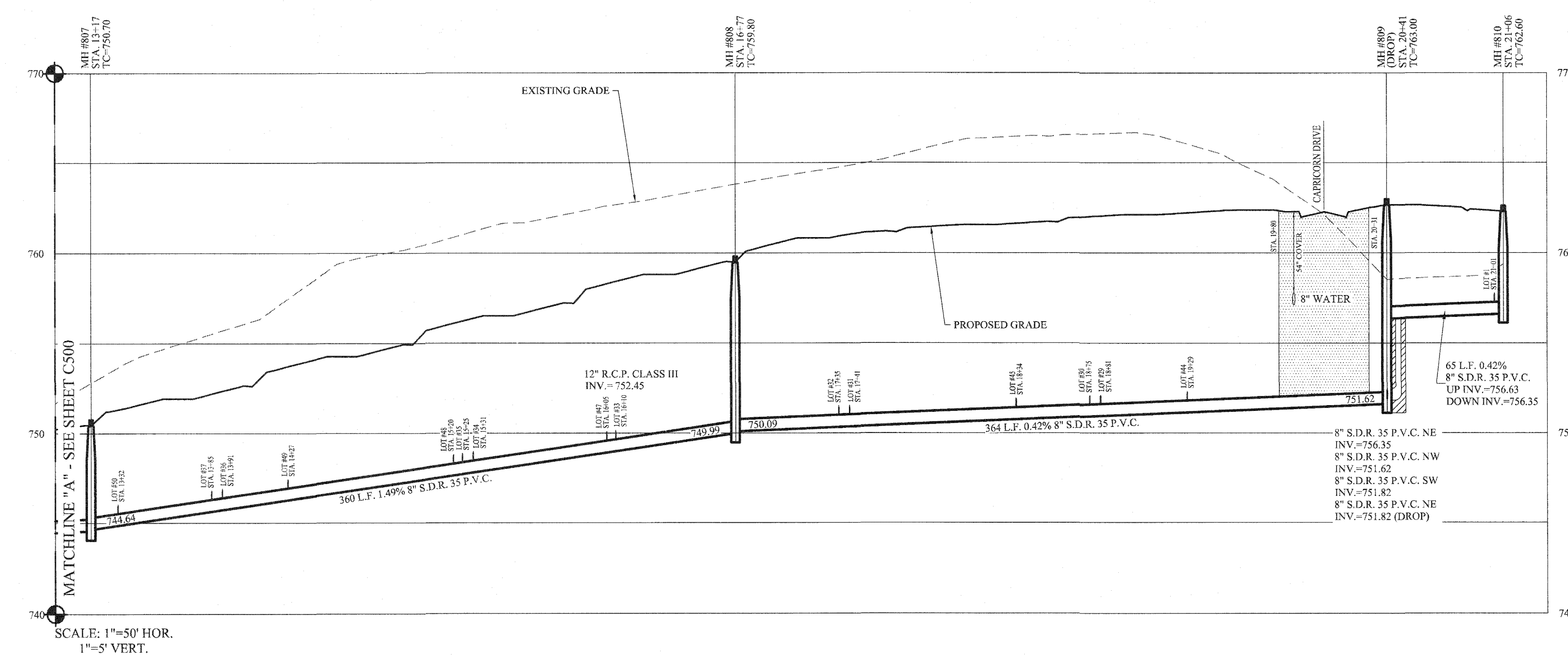
David J. Stoepfelmeyer



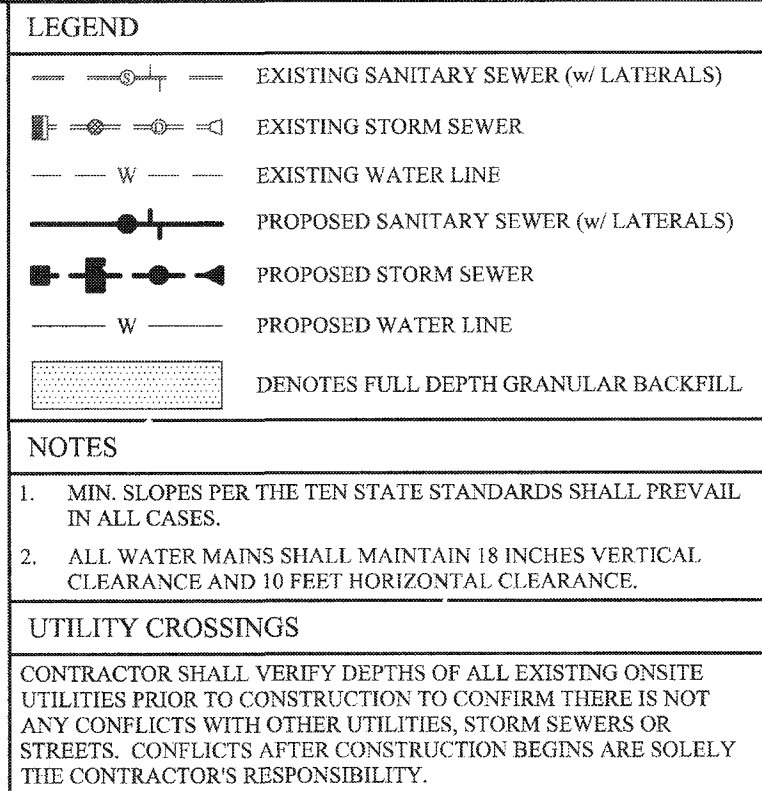
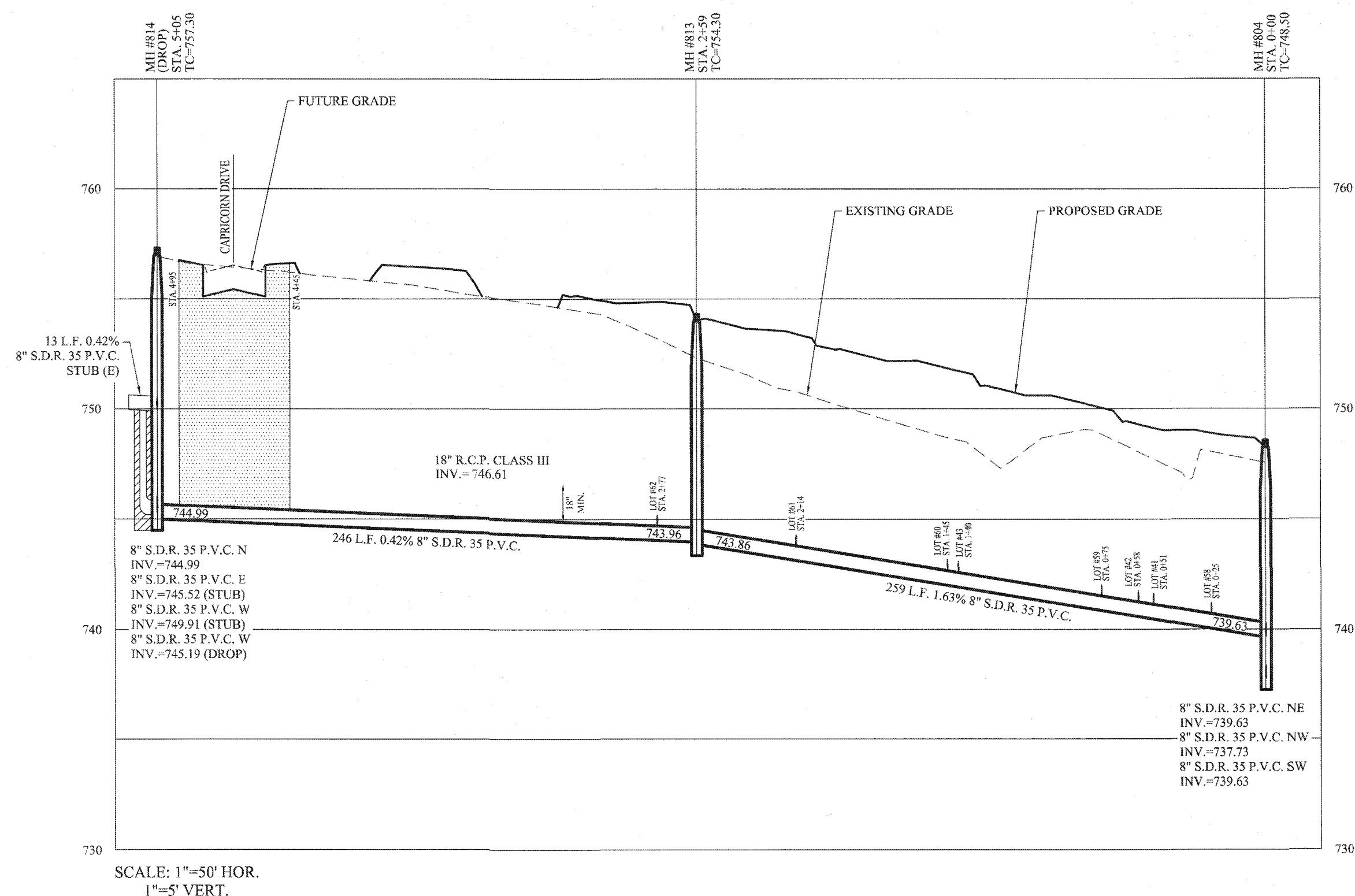
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STOEPPELWERTH
ALWAYS ON
7965 East 106th Street, Fishers, IN 46038-2505
phone: 317.849.2505 fax: 317.849.2542

SANITARY SEWER PLAN & PROFILE THE BLUFFS AT YOUNGS CREEK SECTION 1		JOHNSON COUNTY, INDIANA
DRAWN BY: PDR	CHECKED BY: BKR	
SHEET NO.		
<div>C501</div> <div>S & A JOHNSON</div> <div>83540MMA-S1</div>		



File Name: S:\3540MMA-S01D\WGIC500 - Sanitary Plan & Profile.dwg - C501
Modified / By: May 9, 2019 9:59:43 AM / pchards
Plotted / By: May 9, 2019 11:32:01 AM / Paul Richards



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David J. Stoepelweert

REPORT: 05/09/19

DAVID J. STOEPPELWEERT
REGISTERED
No.
19358
STATE OF
INDIANA
PROFESSIONAL ENGINEER

THIS DRAWING IS NOT INTENDED TO BE REPRESENTED AS A RETRACEMENT OR ORIGINAL BOUNDARY SURVEY, A ROUTE SURVEY OR A SURVEYOR LOCATION

CERTIFIED: 05/09/19
David J. Stoppelwerth

STOEPPELWERTH



SANITARY SEWER PLAN & PROFILE

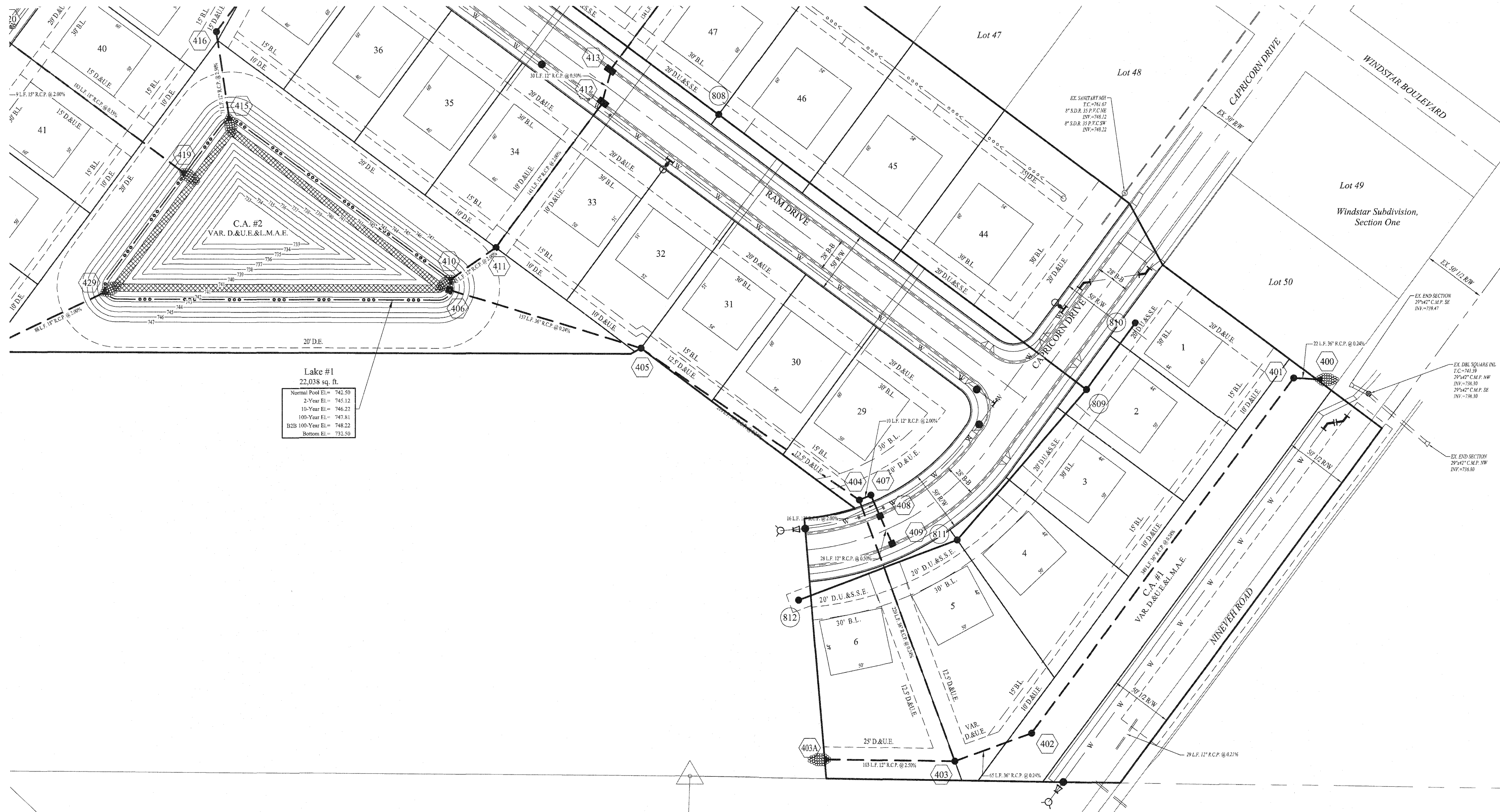
THE BLUFFS AT YOUNGS CREEK
SECTION 1

JOHNSON COUNTY, IN
IN FRANKLIN TOWNSHIP

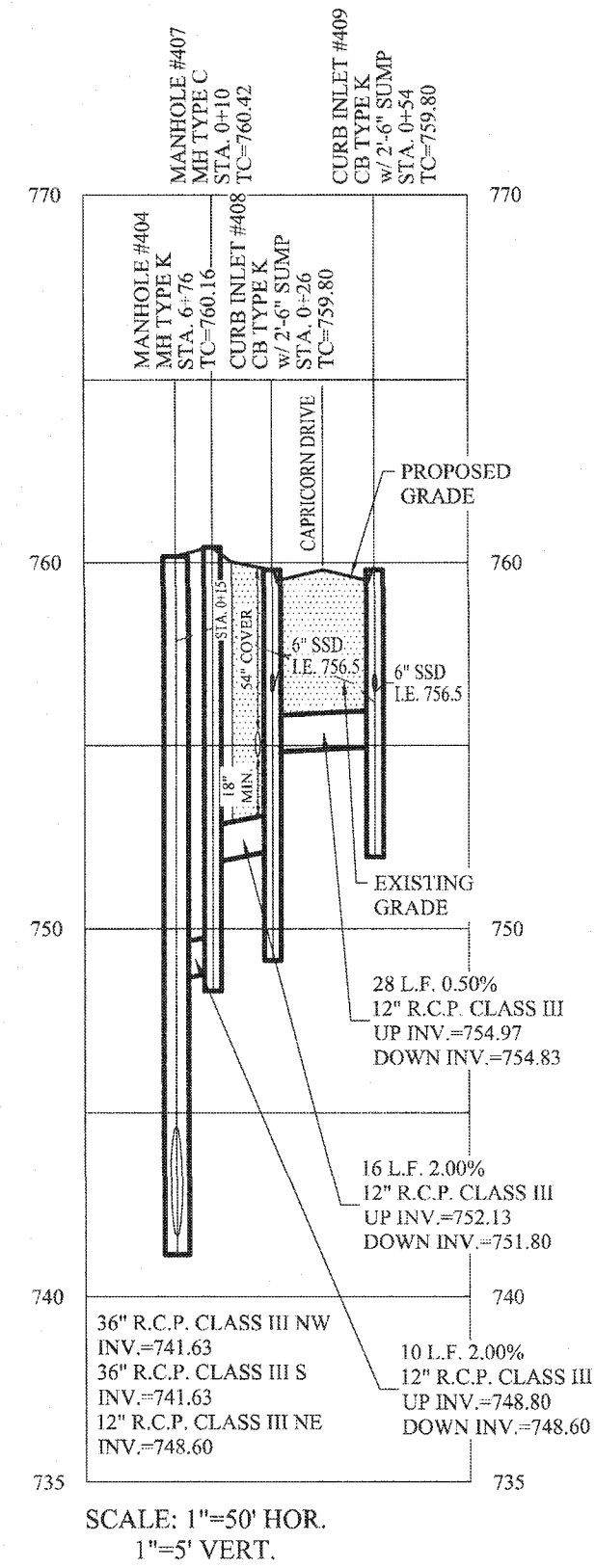
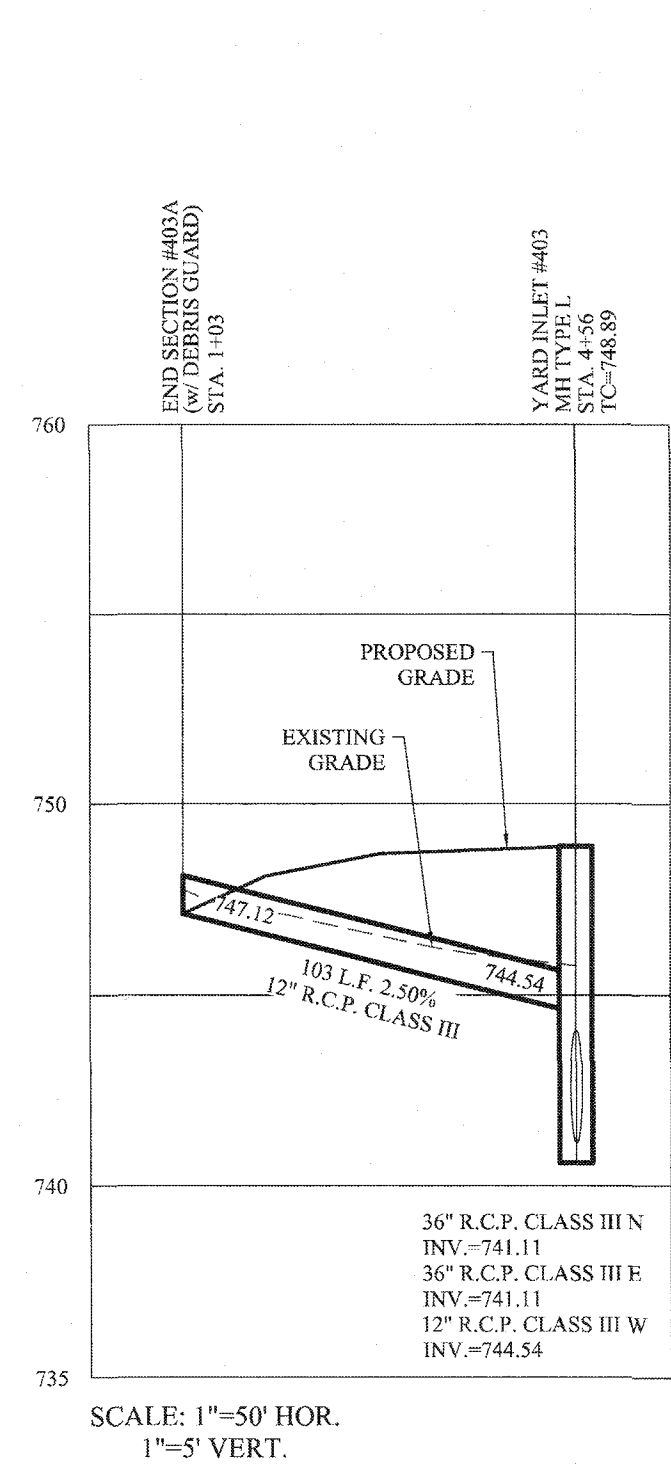
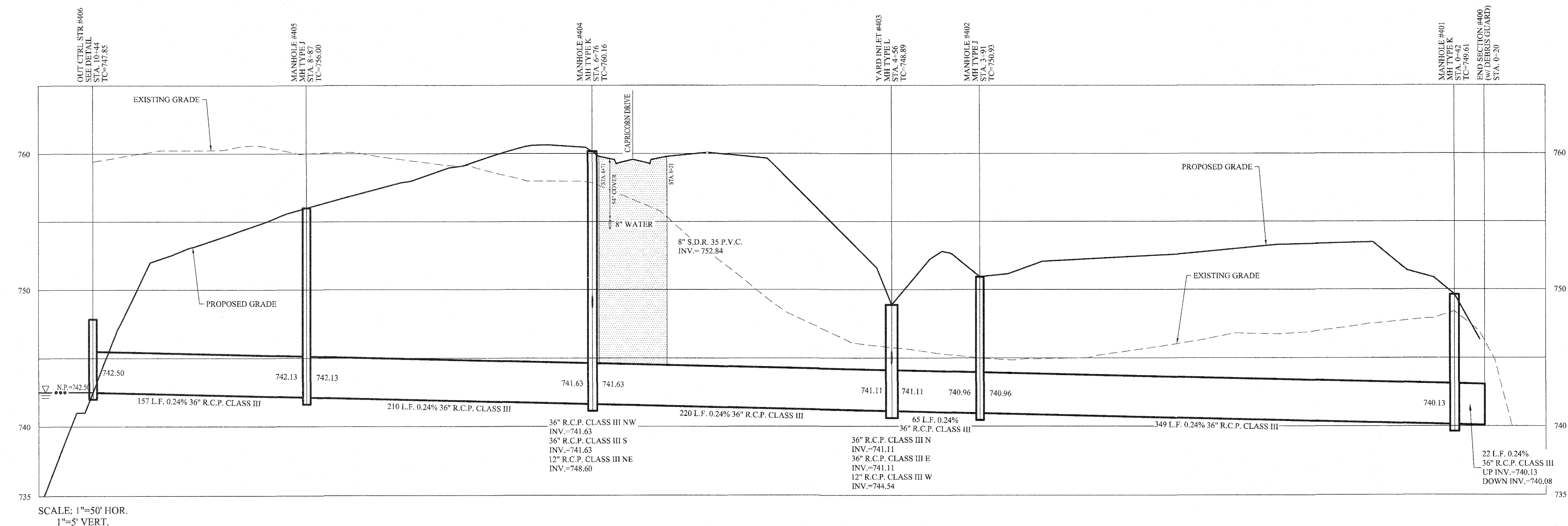
DRAWN BY: PDR	CHECKED BY: BKR
SHEET NO. C502	
S & A JOB NO. 83540MMA-S1	



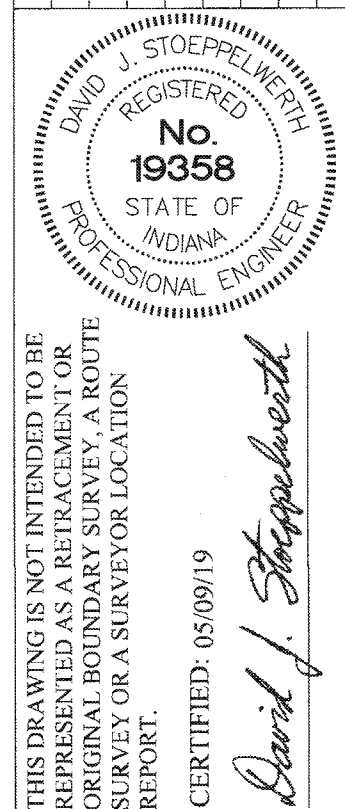
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May 9, 2019 10:16:31 AM / pchards
Modified / By: Paul Richards
Plotted / By:



Lake #1
22,038 sq. ft.
Normal Pool E1 = 742.39
2-Year E1 = 745.12
10-Year E1 = 746.22
100-Year E1 = 747.81
8225 100-Year E1 = 748.22
Bottom E1 = 735.10



- LEGEND
- EXISTING SANITARY SEWER (w/ LATERALS)
 - EXISTING STORM SEWER
 - EXISTING WATER LINE
 - PROPOSED SANITARY SEWER (w/ LATERALS)
 - PROPOSED STORM SEWER
 - PROPOSED WATER LINE
 - DENOTES FULL DEPTH GRANULAR BACKFILL
- NOTES
- ALL WATER MAINS SHALL MAINTAIN 18 INCHES VERTICAL CLEARANCE AND 10 FEET HORIZONTAL CLEARANCE.
 - SEE SHEETS C801A - C801B FOR STRUCTURE DETAILS.



THIS DRAWING IS NOT INTENDED TO BE
REPRESENTED AS A RETACEMENT OR
ORIGINAL BOUNDARY SURVEY A ROUTE
SURVEY OR A SURVEYOR LOCATION
REPORT.

CERTIFIED: 05/09/19
David J. Stoepelwerth

STOEPPELWERTH

ALWAYS ON
7905 East 10th Street, Fishers, IN 46038-2905
phone: 317.849.5935 fax: 317.849.5942

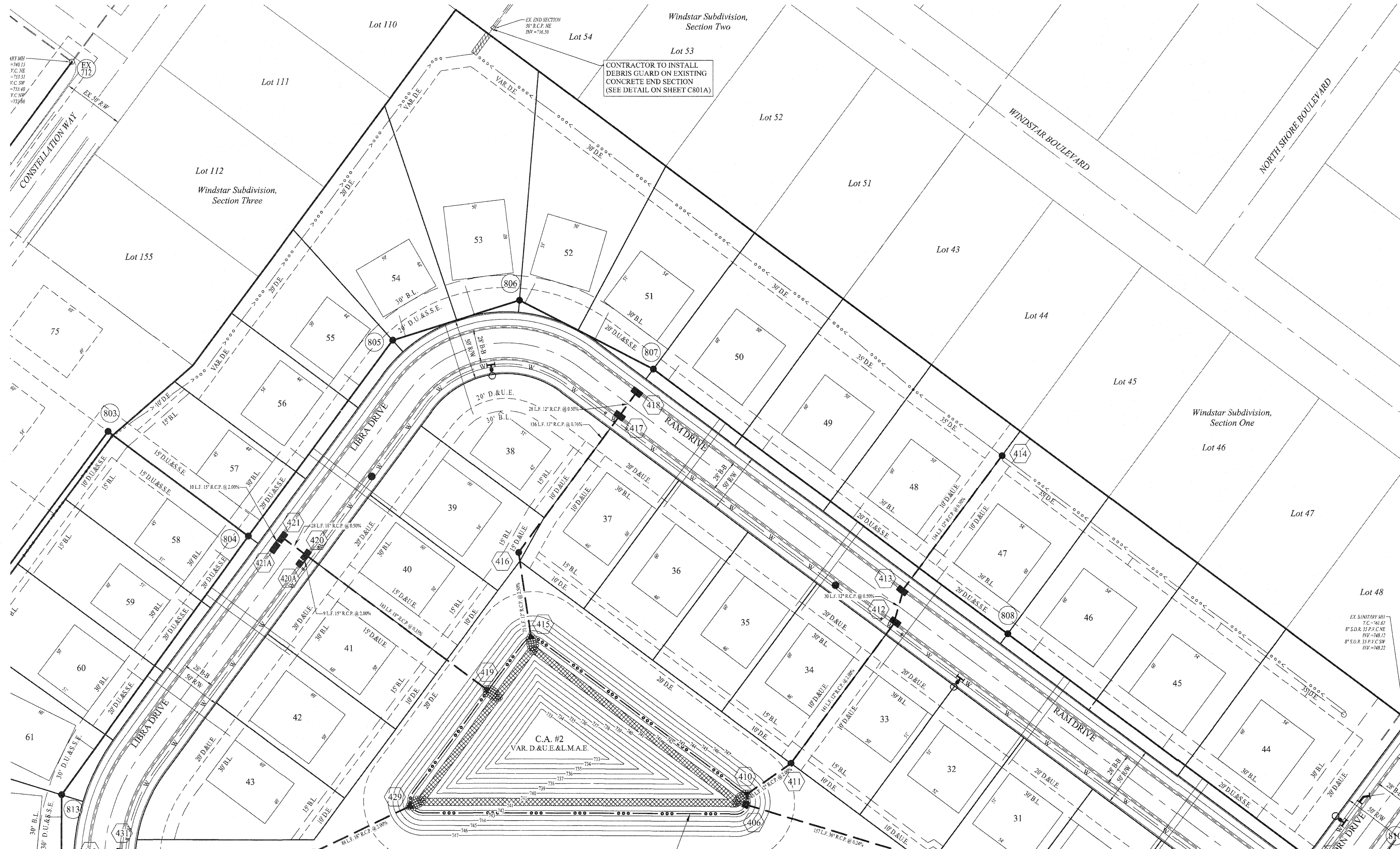
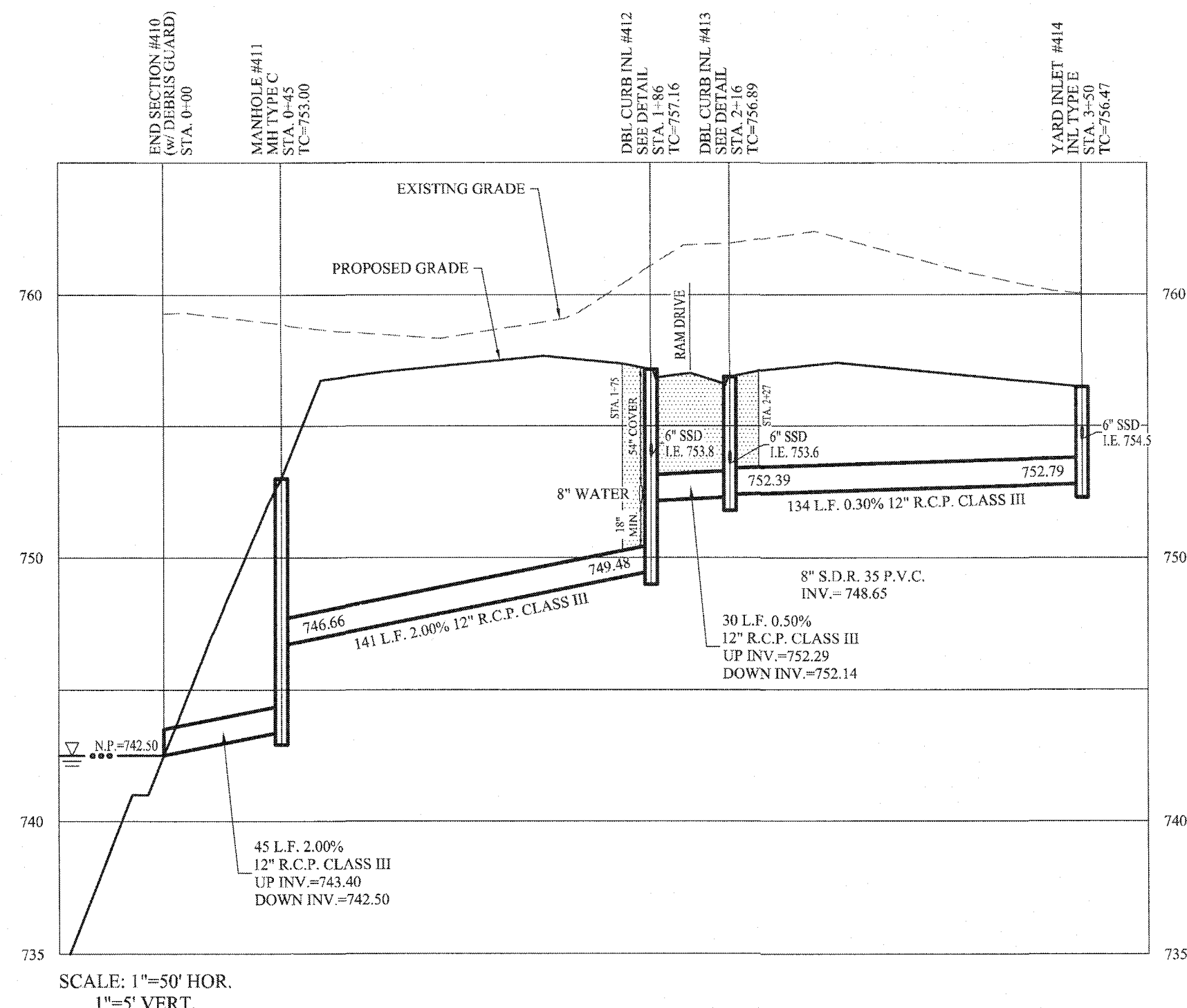
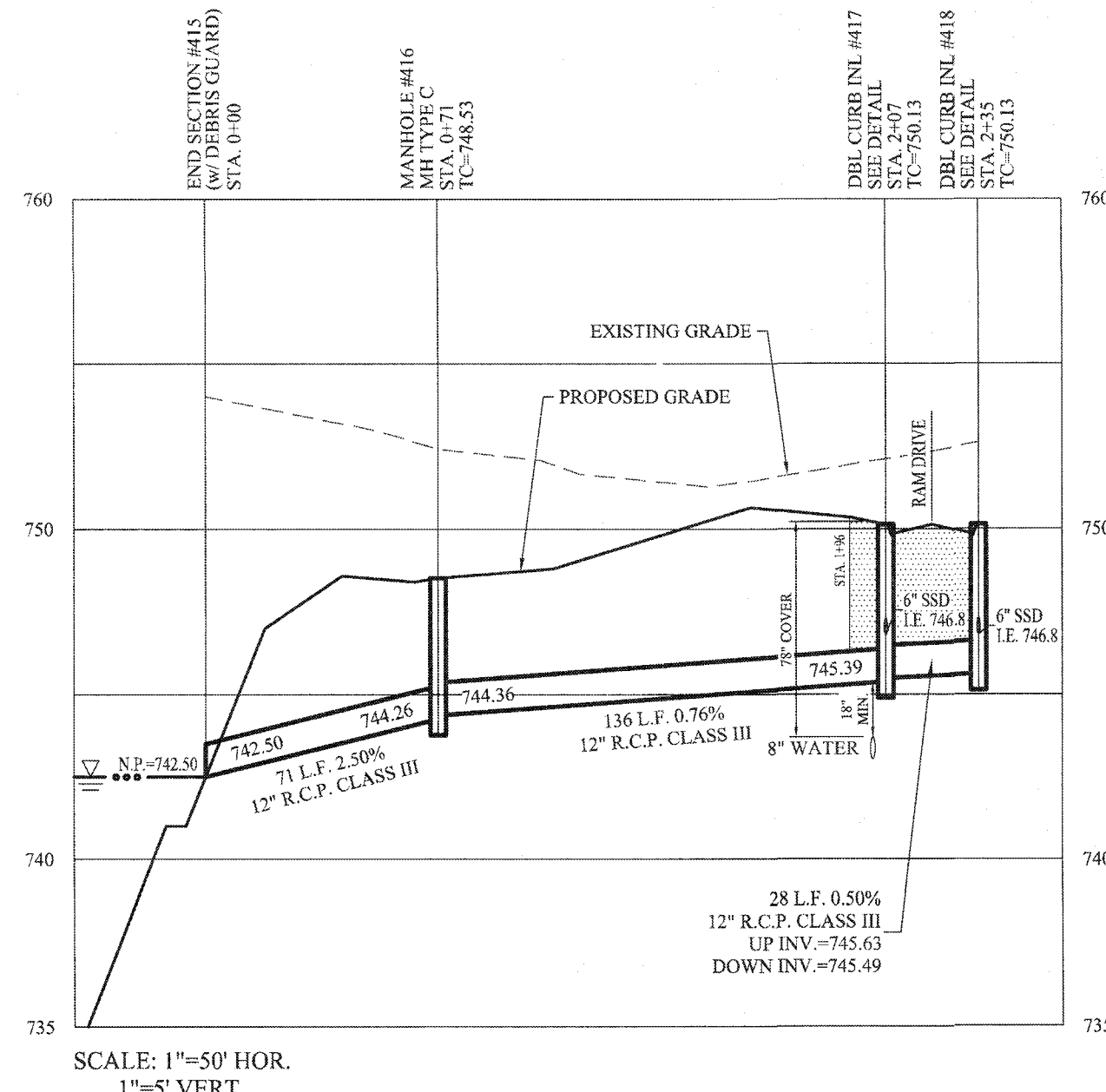
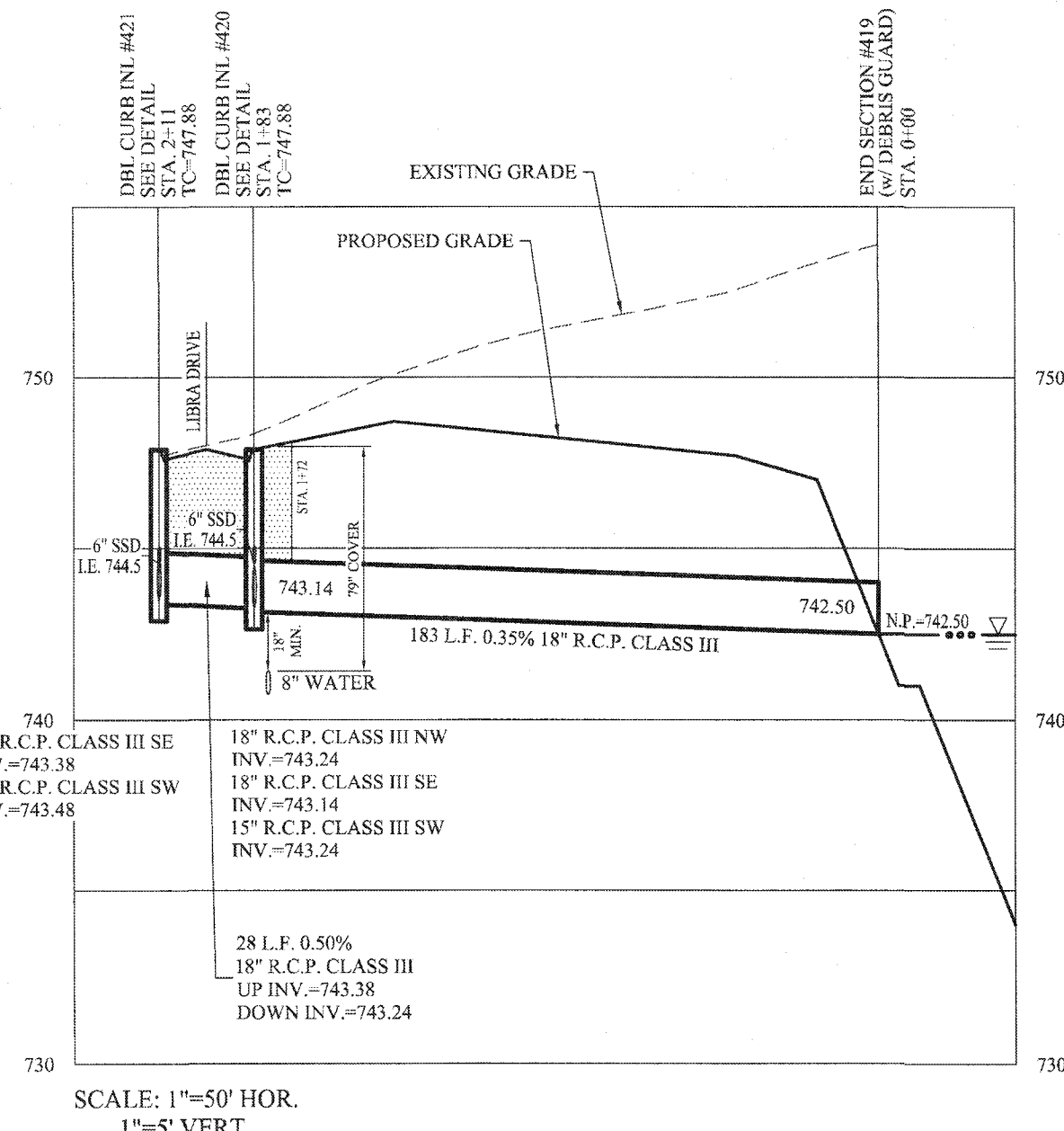
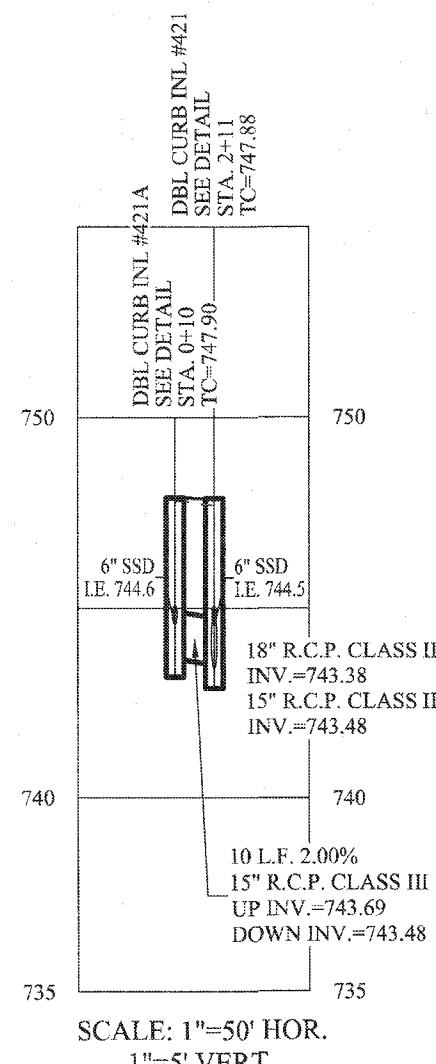
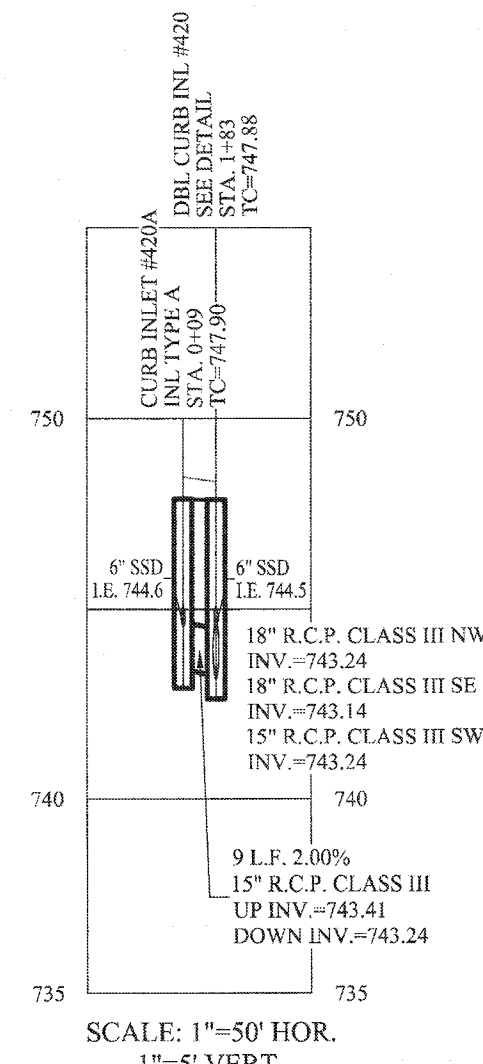
STORM SEWER PLAN & PROFILE

THE BLUFFS AT YOUNGS CREEK
SECTION 1

JOHNSON COUNTY, INDIANA
FRANKLIN, FRANKLIN TOWNSHIP

DRAWN BY: PDR
CHECKED BY: BKR
SHEET NO.
C600
S & A 83540
83540MMA-S1

File Name: S:\93540MMA-SU\DWG\C600 - Storm Plan & Profile.dwg - C601
Plotted By: Paul Richards
May 8, 2018 11:34:40 AM



LEGEND

- EXISTING SANITARY SEWER (w/ LATERALS)
- EXISTING STORM SEWER
- EXISTING WATER LINE
- PROPOSED SANITARY SEWER (w/ LATERALS)
- PROPOSED STORM SEWER
- PROPOSED WATER LINE
- DENOTES FULL DEPTH GRANULAR BACKFILL

NOTES

- ALL WATER MAINS SHALL MAINTAIN 18 INCHES VERTICAL CLEARANCE AND 10 FEET HORIZONTAL CLEARANCE.
- SEE SHEETS C801A - C801B FOR STRUCTURE DETAILS.

UTILITY CROSSINGS

CONTRACTOR SHALL VERIFY DEPTHS OF ALL EXISTING ON-SITE UTILITIES PRIOR TO CONSTRUCTION TO CONFIRM THERE IS NOT ANY CONFLICTS WITH OTHER UTILITIES, STORM SEWERS OR STREETS. CONFLICTS AFTER CONSTRUCTION BEGINS ARE SOLELY THE CONTRACTOR'S RESPONSIBILITY.

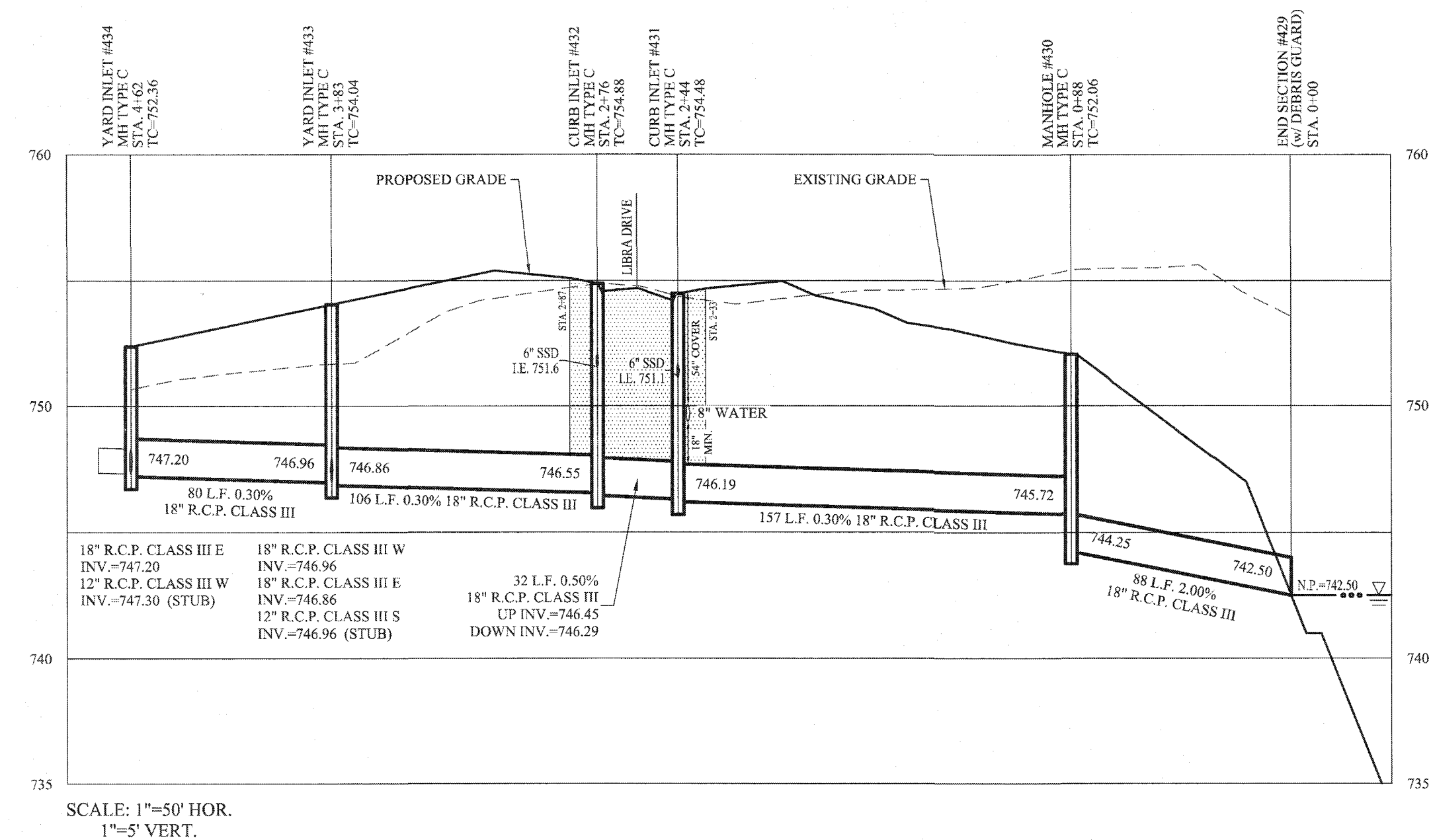
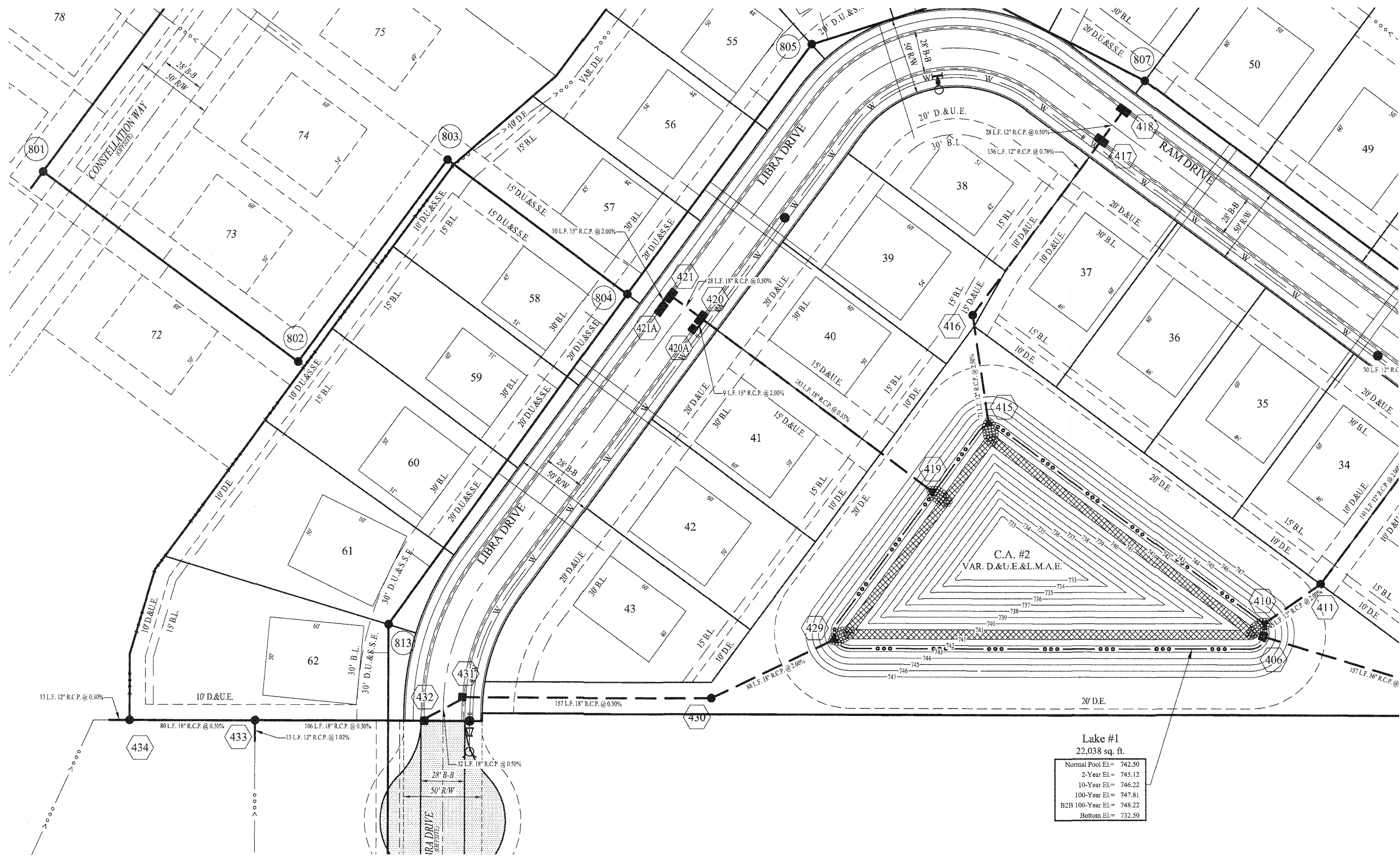
STOEPPELWERTH
ALWAYS ON
7905 East 10th Street, Fishers, IN 46038-2905
phone: 317.449.5955 fax: 317.449.5942

STORM SEWER PLAN & PROFILE
THE BLUFFS AT YOUNGS CREEK
SECTION 1

DRAWN BY: PDR
CHECKED BY: BKR
SHEET NO. C601
S & A JOB NO. 83540MMA-S1

JOHNSON COUNTY, INDIANA
FRANKLIN, FRANKLIN TOWNSHIP

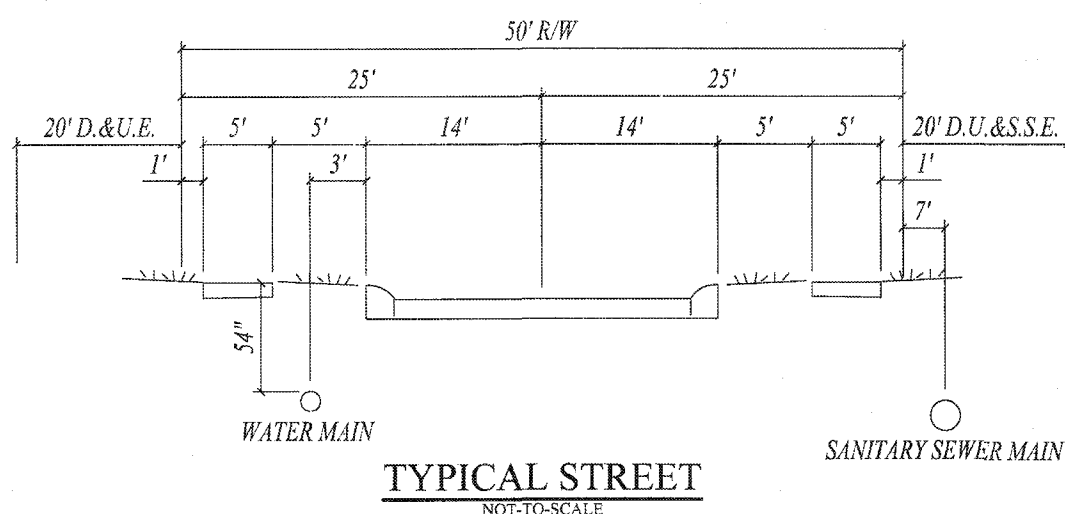
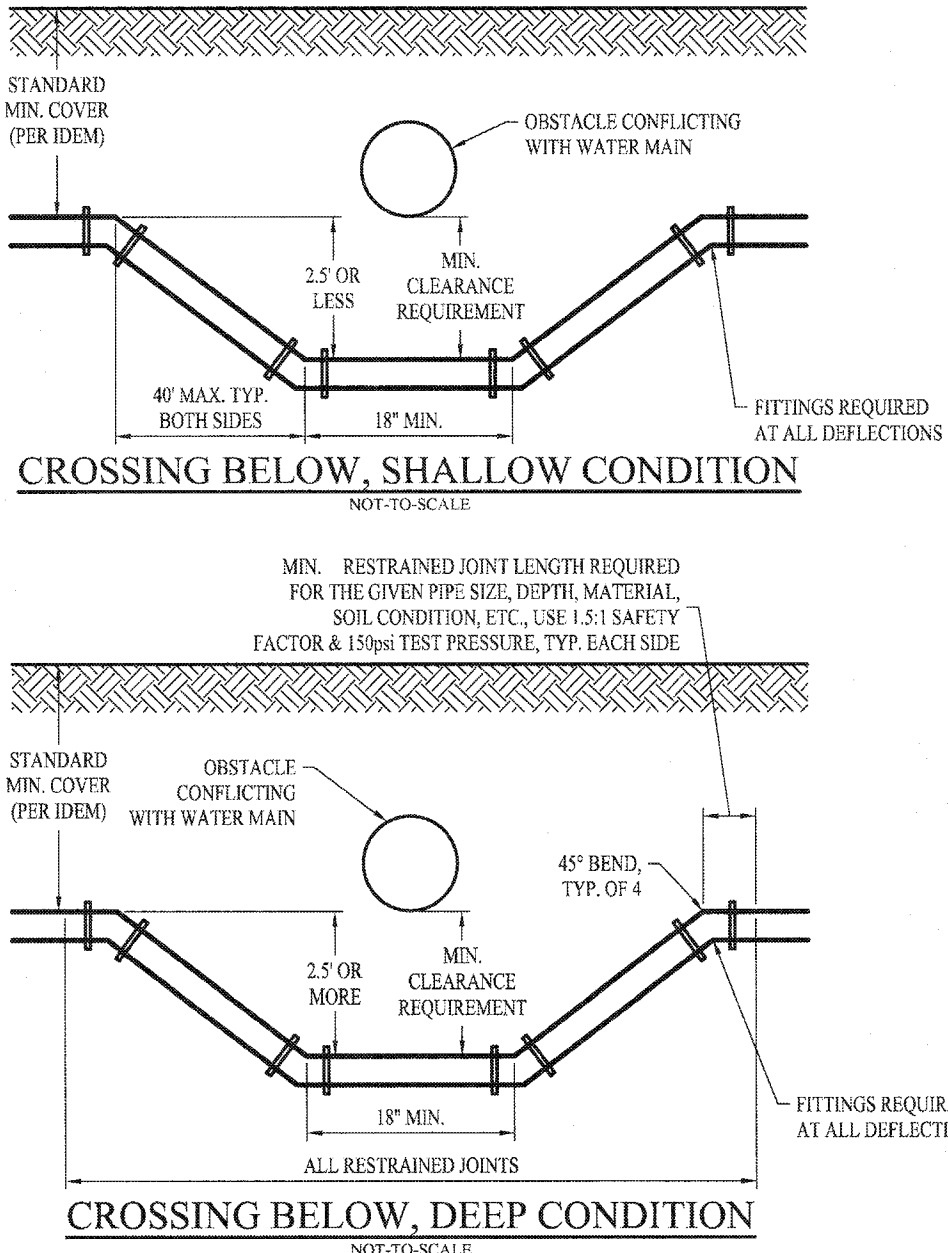
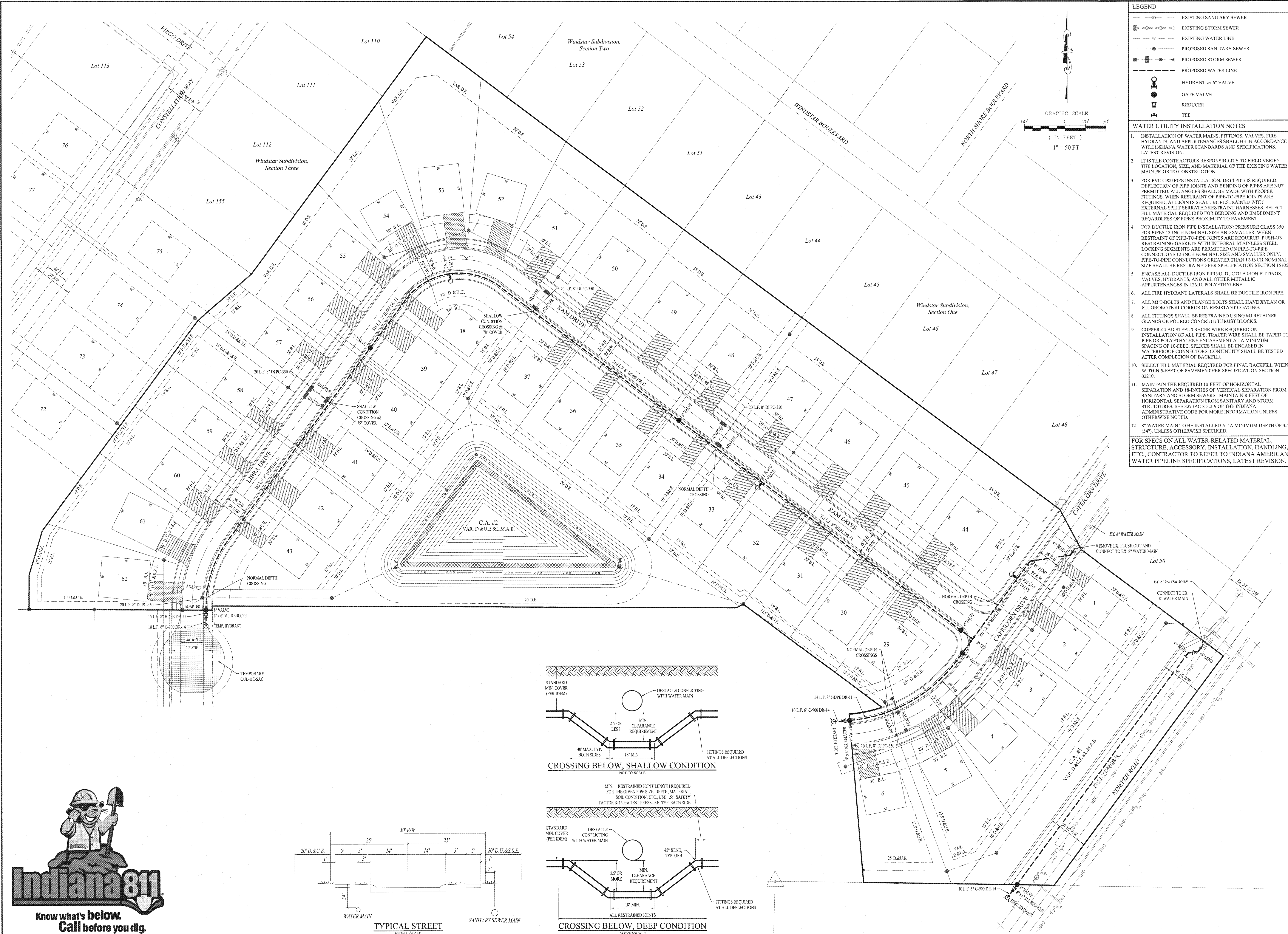
THIS DRAWING IS NOT INTENDED TO BE REPRESENTED AS A RETAINMENT OR ORIGINAL BOUNDARY SURVEY. A ROUTE REPORT, CERTIFIED 05/09/19, BY David J. Stoepfelwirth, PROFESSIONAL ENGINEER, No. 19358, STATE OF INDIANA.



STORM STRUCTURE DATA TABLE										
STR.#	STR. NAME	STR. TYPE	T.C.	CASTING	DIA. IN	DIR. IN	INV. IN	DIA. OUT	DIR. OUT	SLOPE
400	END SECTION				36"	W	740.08			
401	MANHOLE	MH TYPE K	749.61	R-1772	36"	SW	740.13	36"	E	0.24%
402	MANHOLE	MH TYPE J	750.93	R-1772	36"	W	740.96	36"	NE	0.24%
403	YARD INLET	MH TYPE L	748.89	R-4342	36"	N	741.11	36"	E	0.24%
403A	END SECTION				12"		741.11			
404	MANHOLE	MH TYPE K	760.16	R-1772	36"	NW	741.63	36"	S	0.24%
405	MANHOLE	MH TYPE J	756.00	R-1772	36"	W	742.13	36"	SE	0.24%
406	OUT CTRL STR	SEE DETAIL	747.83	(3) R-4853			742.50	36"	E	0.24%
407	MANHOLE	MH TYPE C	760.42	R-1772	12"	SE	751.80	12"	SW	2.00%
408	CURB INLET	CB TYPE K	759.80	R-3501-TL	12"	SE	754.83	12"	NW	2.00%
409	CURB INLET	CB TYPE K	759.80	R-3501-TR			752.13	12"	NW	0.50%
410	END SECTION				12"	NE	742.50			
411	MANHOLE	MH TYPE C	753.00	R-1772	12"	NE	746.66	12"	SW	2.00%
412	DBL CURB INL	SEE DETAIL	757.16	(2) R-3501-TR	12"	N	752.14	12"	SW	2.00%
413	DBL CURB INL	SEE DETAIL	756.89	(2) R-3501-TL	12"	NE	752.39	12"	S	0.50%
414	YARD INLET	INL TYPE E	756.47	R-4215-C			752.79	12"	SW	0.30%
415	END SECTION				12"	N	742.50			
416	MANHOLE	MH TYPE C	748.53	R-1772	12"	NE	744.36	12"	S	2.50%
417	DBL CURB INL	SEE DETAIL	750.13	(2) R-3501-TR	12"	NE	745.49	12"	SW	0.76%
418	DBL CURB INL	SEE DETAIL	750.13	(2) R-3501-TL			745.63	12"	SW	0.50%
419	END SECTION				18"	NW	742.50			
420	DBL CURB INL	SEE DETAIL	747.88	R-3501-TR & TL	18"	NW	743.24	18"	SE	0.35%
420A	CURB INLET	INL TYPE A	747.90	R-3501-TL			743.41	15"	NE	2.00%
421	DBL CURB INL	SEE DETAIL	747.88	R-3501-TR & TL	15"	SW	743.48	18"	SE	0.50%
421A	DBL CURB INL	SEE DETAIL	747.90	(2) R-3501-TR			743.69	15"	NE	2.00%
429	END SECTION				18"	SW	742.50			
430	MANHOLE	MH TYPE C	752.06	R-1772	18"	W	745.72	18"	NE	2.00%
431	CURB INLET	MH TYPE C	754.48	R-3501-TL	18"	SW	746.29	18"	E	0.30%
432	CURB INLET	MH TYPE C	754.88	R-3501-TR	18"	W	746.55	18"	NE	0.50%
433	YARD INLET	MH TYPE C	754.04	R-1772	18"	W	746.96	18"	E	0.30%
434	YARD INLET	MH TYPE C	752.36	R-4342	12"	W	747.30	18"	E	0.30%



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May 9, 2019 8:12:25 AM / jrichards
May 9, 2019 11:36:45 AM / Paul Richards
Plotted / By:



LEGEND

- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING WATER LINE
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- PROPOSED WATER LINE
- HYDRANT w/ 6" VALVE
- GATE VALVE
- REDUCER
- TEE

WATER UTILITY INSTALLATION NOTES

- INSTALLATION OF WATER MAINS, FITTINGS, VALVES, FIRE HYDRANTS, AND APPURTENANCES SHALL BE IN ACCORDANCE WITH INDIANA WATER STANDARDS AND SPECIFICATIONS, LATEST REVISION.
- IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION, SIZE, AND MATERIAL OF THE EXISTING WATER MAIN PRIOR TO CONSTRUCTION.
- FOR PVC C900 PIPE INSTALLATION: DR14 PIPE IS REQUIRED. DEFLECTION OF PIPE JOINTS AND BENDING OF PIPES ARE NOT PERMITTED. ALL ANGLES SHALL BE MADE WITH PROPER FITTINGS. WHEN RESTRAINT OF PIPE-TO-PIPE JOINTS ARE REQUIRED, ALL JOINTS SHALL BE RESTRAINED WITH EXTERNAL SPLIT SERATED RESTRAINT HARNESS. SELECT FILL MATERIAL REQUIRED FOR BEDDING AND EMBEDMENT REGARDLESS OF PIPES PROXIMITY TO PAVEMENT.
- FOR DUCTILE IRON PIPE INSTALLATION: PRESSURE CLASS 350 FOR PIPES 12-INCH NOMINAL SIZE AND SMALLER. WHEN RESTRAINT OF PIPE-TO-PIPE JOINTS ARE REQUIRED, PUSH-ON RESTRAINING GASKETS WITH INTEGRAL STAINLESS STEEL LOCKING SEGMENTS ARE PERMITTED ON PIPE-TO-PIPE CONNECTIONS 12-INCH NOMINAL SIZE AND SMALLER ONLY. PIPE-TO-PIPE CONNECTIONS GREATER THAN 12-INCH NOMINAL SIZE SHALL BE RESTRAINED PER SPECIFICATION SECTION 15105.
- ENCASE ALL DUCTILE IRON PIPING, DUCTILE IRON FITTINGS, VALVES, HYDRANTS, AND ALL OTHER METALLIC APPURTENANCES IN 12MIL POLYETHYLENE.
- ALL FIRE HYDRANT LATERALS SHALL BE DUCTILE IRON PIPE.
- ALL MJ T-BOLTS AND FLANGE BOLTS SHALL HAVE KYLAN OR FLUOROKOTE #1 CORROSION RESISTANT COATING.
- ALL FITTINGS SHALL BE RESTRAINED USING MJ RETAINER GLANDS OR POURED CONCRETE THRUST BLOCKS.
- COPPER-CLAD STEEL TRACER WIRE REQUIRED ON INSTALLATION OF ALL PIPE. TRACER WIRE SHALL BE TAPED TO PIPE OR POLYETHYLENE ENCASEMENT AT A MINIMUM SPACING OF 10-FEET. SPLICES SHALL BE ENCASED IN WATERPROOF CONNECTORS. CONTINUITY SHALL BE TESTED AFTER COMPLETION OF BACKFILL.
- SELECT FILL MATERIAL REQUIRED FOR FINAL BACKFILL WHEN WITHIN 5-FEET OF PAVEMENT PER SPECIFICATION SECTION 02210.
- MAINTAIN THE REQUIRED 10-FEET OF HORIZONTAL SEPARATION AND 18-INCHES OF VERTICAL SEPARATION FROM SANITARY AND STORM SEWERS. MAINTAIN 5-FEET OF HORIZONTAL SEPARATION FROM SANITARY AND STORM STRUCTURES. SEE 327 IAC 8-3.2-9 OF THE INDIANA ADMINISTRATIVE CODE FOR MORE INFORMATION UNLESS OTHERWISE NOTED.
- 8" WATER MAIN TO BE INSTALLED AT A MINIMUM DEPTH OF 4'-5" (54"), UNLESS OTHERWISE SPECIFIED.

FOR SPECS ON ALL WATER-RELATED MATERIAL, STRUCTURE, ACCESSORY, INSTALLATION, HANDLING, ETC., CONTRACTOR TO REFER TO INDIANA AMERICAN WATER PIPELINE SPECIFICATIONS, LATEST REVISION.

STOEPPELWERTH
REGISTERED PROFESSIONAL ENGINEER
No. 19358
STATE OF INDIANA
David J. Stoepelwerth
CERTIFIED: 05/09/19

WATER PLAN
THE BLUFFS AT YOUNGS CREEK
SECTION 1

C700
SHEET NO.
83540MMA-S1

ALWAYS ON
7965 East 10th Street, Fishers, IN 46038-2505
phone: 317.849.5795 fax: 317.849.2942

JOHNSON COUNTY, INDIANA
FRANKLIN, FRANKLIN TOWNSHIP

REVISIONS

DATE	MARK	REVISIONS
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May 9, 2015 11:37:41 AM / paul richards
Modified / By:
Plotted / By:

CITY OF FRANKLIN - STANDARD SPECIFICATIONS

SECTION 1

INTRODUCTION

1.01 General

The Franklin Department of Public Works is responsible for the installation of all sanitary and storm sewer facilities constructed in the City of Franklin. All sanitary sewer collection facilities shall be designed and constructed in full accordance with these Standards, Indiana Department of Environmental Management (IDEM), and Ten State Standards for Sewage Works latest edition.

The purpose of these Standards is to establish a minimum criteria for design and workmanship. The jurisdiction of the Standards includes the entire sanitary system and its appurtenances from the point of connection with the building plumbing to the final point of discharge at the treatment facility.

It shall be the Owner's Contractor's responsibility to comply with all requirements of the City or other authority having jurisdiction on work if such authority imposes greater requirements. Furthermore, the Owner shall be responsible for procuring all necessary permits and licenses, pay all charges and fees for acquiring and recording all easements, and giving all notices necessary and incidental to the work.

Addenda and/or revisions to these Standards may be issued periodically and will be distributed and made available to the public and contractor at the City Planning Department and the Wastewater Treatment Facility. Users shall be responsible to keep apprised of any changes and revisions to these Standards.

Any conflicts between these Standards and any other applicable Ordinance and State laws shall be superseded by such Ordinance or law. These Standards are approved and adopted by the City of Franklin, Board of Public Works and Safety.

SECTION 5

MATERIALS

5.01 General

This section provides a description of the materials acceptable for the construction of sanitary sewer facilities and storm sewers. Use of other materials which are not specifically named shall only be permitted with the written approval by the DPW and City Engineer.

5.02 Sanitary Sewer

A. General

The DPW currently allows the use of the following pipe material:

- Reinforced Concrete Pipe (RCP)
- Ductile Iron Pipe (DIP)
- Polyvinyl Chloride Pipe (PVC)
- High Density Polyethylene Pipe (HDPE)
- Composite Wall/Truss Pipe

All pipe shall be the bell and spigot type with elastomeric seal joints.

All pipe shall be required to withstand a hydrostatic pressure of twenty (20) feet of water (8.6 psi) for two (2) hours while being deflected to the maximum amount recommended by manufacturer. Containing the hydrostatic pressure, a shear load of one hundred (100) pounds per inch of nominal pipe diameter shall be applied to an unsupported spigot immediately adjacent to joint. During testing period, there shall be no visible leakage at joint.

B. Sanitary Sewer Pipe Materials

1. Reinforced Concrete Pipe

Reinforced concrete pipe shall be Reinforced Concrete Culvert, Storm Drain and Sewer Pipe conforming to ASTM Designation C 76. Pipes shall be wall thickness "D" or "C" as required by site conditions. Class shall be as required by loading conditions, but shall not be less than Class III.

Reinforced concrete pipe shall be tested in accordance with ASTM Designation C 497.

Joints for sewer pipe manufactured of reinforced concrete shall be flexible watertight joints conforming to "Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible, Watertight, Rubber Gaskets" (ASTM Designation C443). Joints shall be made using rubber or rubber-like materials manufactured to fit tongue and groove or bell-and-spigot type concrete pipe. The joint shall be installed in accordance with the manufacturer's recommendation.

Lateral connections to the RCP sewer shall be subject to DPW approval. Where lateral connections must be made to the RCP sewer, a rubber connector with stainless steel clamp shall be used. The connector shall be the sole element relied on to assure a flexible watertight seal of the pipe.

The rubber for the connector shall comply with ASTM C 923 and shall be resistant to ozone, weather elements, chemicals including acids and alkalis and oils.

The stainless steel elements of the connector shall be totally non-magnetic Series 304 stainless steel. The stainless steel clamp shall be capable of sustaining applied torque in excess of eighty (80) inch-pounds. It shall be the responsibility of the Contractor to submit details of the proposed connection to the DPW for approval. Connections not approved by the DPW shall be subject to removal and replacement with an approved adapter.

2. Ductile Iron Pipe (DIP)

All ductile iron pipe shall conform to the ANSI A21.51 and AWWA C 151, latest revisions. Ductile iron pipe shall be Class 350 for 8" through 12", For 14" through 18" Class shall be 250. Pipe shall have a 40 mil polyethylene coating in accordance with ANSI/ASTM D1248.

Fittings shall be standardized for the type of pipe and joint specified and shall comply with ANSI A21.10 and AWWA C110. Fittings shall be either mechanical joint or push-on type. Pipe joints shall use O-ring gaskets in accordance with ANSI 21.11 and AWWA C 111.

3. Polyvinyl Chloride Pipe (PVC)

a. Smooth Wall PVC

All PVC pipe 15 inches or less in diameter shall meet the requirements of ASTM Designation D 3034. All PVC pipe greater than 15 inches in diameter shall meet or exceed the requirement of ASTM F 679. For diameters 15 inches or less, the pipe shall have a minimum cell classification of 12454-B and for diameters greater than 15 inches, the pipe shall have a minimum cell classification of 12454-C with all pipe having a minimum tensile strength of 7000 psi as defined in ASTM D 1784.

All PVC pipe shall be tested in accordance with Standard Method of Test for External Loading Properties of Plastic Pipe by Parallel - Plate Loading, ASTM Designation 2412. Minimum pipe stiffness shall be 46 psi.

b. Ribbed Polyvinyl Chloride Pipe (PVCR)

All Ribbed PVC pipe shall conform to ASTM Designation F 794 for sewer pipes 8 inch through 48 inch in diameter. All 8 inch through 18 inch pipe supplied under this contract shall have a minimum uniform pipe stiffness of 60 psi. All pipe 21 inch and larger shall have a minimum uniform pipe stiffness of 46 psi. The minimum cell classification shall be 12454-B as defined by ASTM D 1784.

c. Polyvinyl Chloride Composite Pipe (PVCC)

All corrugated PVC pipe shall conform to ASTM F 949 for sewer pipes 6 inches through 18 inches. Minimum cell classification shall be 12454-B or 12454-C as defined by ASTM D 1784. PVC pipe shall have a minimum pipe stiffness of 50 psi in accordance with testing under ASTM D 2412.

Joints for plastic pipe shall be elastomeric gasket joints in accordance with ASTM Designation D 3212. Gaskets used in the push-on joints shall conform to ASTM Designation F 477. The pipe manufacturer shall provide "Horse Marks" on the uncoupled end of each piece of pipe.

Fittings shall be manufactured of PVC housing a Cell Classification of 12454-B or 12454-C as defined by ASTM D 1784.

Only smooth exterior pipe shall be used at manhole connections.

4. High Density Polyethylene Pipe (HDPE)

All High Density Polyethylene Pipe shall be manufactured from materials meeting the requirements of Type III, Class C, Category 5, Grade P34, as defined in ASTM D 1248, Standard Specifications for Polyethylene Plastics molding and extrusion materials. Pipe and fittings shall be made from high molecular weight high density polyethylene material meeting the requirements of ASTM D 3350, cell class PE 33443C. All HDPE shall have a minimum pipe stiffness of 46 psi when measured in complete accordance with ASTM D 2412. The Ring Stiffness Constant (RSC) classification value for pipe between bell and spigot shall comply with the minimum value of 36 lb/ft.

This pipe shall be installed in accordance with the manufacturer's recommendations for this particular application.

The joints shall be manufactured with bell and spigot end construction with a rubber gasket to form a positive seal when assembled in the trench. The rubber gasket material and manufacture shall conform to ASTM F 477.

Only manufactured vyes, tees, adapters of the bell and spigot type shall be used. No saddle connections shall be permitted.

5.04 Building Services/Service Laterals

Building services shall be SDR 35 PVC pipe conforming to ASTM D 3034. Joints shall be gasket push-on, compression type conforming to ASTM D 3212. Gaskets shall conform to ASTM F 477.

5.05 Sanitary Sewer Manholes

A. General

Location of manholes shall be as required in Section 4.02(D)(1).

B. Types of Manholes

Manholes shall be either monolithic (cast-in-place) or precast. If monolithic manholes are to be used, the Contractor shall submit drawings showing all reinforcement, dimensions, and connections for DPW approval. All drawings shall be certified by a registered Professional Engineer.

C. Pre-Cast Manholes

Manholes shall be constructed in accordance with the ASTM Specifications for "Precast Reinforced Concrete Manhole Risers and Tops," Designation C 478. The minimum wall thickness shall be five (5) inches for manholes four (4) feet in diameter. When the depth of the manhole exceeds twelve (12) feet, then the depth in excess of twelve (12) feet shall be reinforced with two cages of reinforcement the same as required for reinforced concrete sewer pipe of same diameter as the riser of the manhole per ASTM Specification Designation C 76 for Class III Pipe. The precast tops shall be of the eccentric cone type. Precast flat covers shall be not less than eight (8) inches thick and reinforced with two layers of steel with a minimum area of 0.39 square inches per linear foot in both directions in each layer. Precast flat bottoms of manholes shall also be reinforced the same as specified herein for precast flat top. Hoisting lugs or hooks shall be cast in place for handling and setting of the rings. Openings of proper size and suitable design shall be cast in place for receiving the sewer and/or drop pipes and connections. Adjusting riser rings shall be provided as approved by the DPW.

All manhole joints shall be tongue and groove and they shall be sealed with an O-ring and joint seal conforming to Federal Specifications SS-8-00210 and similar to "Ken-Seal No. 2" as manufactured by the Hamilton Kent Manufacturing Co., of Kent, Ohio; "RAM-NEK" as manufactured by the K.T. Snyder Co. of Houston, Texas, or equal. Cracked or damaged barrel joints shall be rejected.

D. Manhole Steps

The steps provided shall be manufactured of reinforced plastic and shall be twelve (12) inches wide and one (1) inch square.

E. Manhole Bases

Manhole bases shall be of cast-in-place monolithic concrete or precast concrete. Where sewer lines pass through or enter manholes, the invert channels shall be smooth and semi-circular in cross section and may be formed directly in the concrete of the manhole base, may be half tile laid in the concrete, or may be constructed by laying the sewer lines continuously through the manhole and break-hardened and neatly trimming the edges. Changes of direction of flow within the manholes shall be made with a smooth curve with as long as a radius as possible. The floor of the manhole outside the channels shall be smooth and slope

toward the channel not less than one (1) inch per foot.

No mortar or concrete shall be placed in water, and no pipe shall be allowed to flow over or against the concrete before it has set for a period of time deemed sufficient by the DPW to prevent movement of the water. The invert channel through manholes should be made to conform in shape and slope to that of the sewer. All invert channels are to have a properly mortared apron on either side, sloped to prevent solid deposition.

F. Adjusting Rings

Where one (1) solid riser or barrel section cannot be used, final adjustments in elevation of the frame and cover shall only be accomplished by the use of precast concrete adjusting rings conforming to ASTM C 478.

Rings shall be of a nominal thickness of not less than four (4) inches and not more than twelve (12) inches total of adjusting rings shall be allowed for adjustment of the manhole frame and cover to required elevation.

G. Sewer Pipe to Manhole Connections

To connect a sanitary sewer to a manhole, either a flexible boot KOR-N-SEAL 1 or 2, flexible connector, cast-in-place Dura-Seal gasket, "A"-lock gasket or an approved equal shall be used. Connections to an existing manhole shall be a flexible boot KOR-N-SEAL or approved equal.

If the flexible boot connection is used, it shall be placed in the reinforced concrete manhole base and secured to the pipe by a stainless steel clamp. Flexible connectors shall conform to ASTM C 923.

The cast-in-place inflatable gasket shall conform to ASTM C 923.

All connections shall provide for a watertight seal between the pipe and manhole. The connector shall be the sole element relied upon to assure a flexible watertight seal of the pipe to the manhole.

The rubber for the connector shall comply with ASTM C 923 and shall be resistant to ozone, weather elements, chemicals, including acids and alkalis, animal and vegetable fats, oils and petroleum products.

The stainless steel elements of the connector shall be totally non-magnetic Series 304 stainless steel. The stainless steel clamp shall be capable of sustaining applied torque in excess of eighty (80) inch-pounds. It shall be the responsibility of the Contractor to submit details of the proposed connection to the DPW for approval. Connections not approved by the DPW shall be subject to removal and replacement with an approved adapter.

H. Castings

Standard manholes shall have a R-1772 CVH frame and lid by Neenah Foundry, 1875-3 by East Jordan Iron Works, or approved equal. Material shall be in compliance with ASTM A 48, CL 35B. Each lid shall have 2 inch high letters indicating "City of Franklin Sanitary Sewer".

Where watertight castings are required, the manholes shall have a R-1916F frame and lid by Neenah Foundry, 1045 HD by East Jordan Iron Works, or approved equal. The frame shall be anchored to through the riser rings (if provided) to the cone section with four (4) galvanized rods.

I. Frame Chimney Seal

An internal or external rubber seal shall be installed on all sanitary manholes. A rubber seal extension, to cover any additional heights of chimney not covered by the seal itself, shall be used when required. The internal and external rubber seal and seal extensions shall be as manufactured by Cretek Specialty Products, or equal.

The sleeves shall be extruded from a high grade rubber compound conforming to the applicable requirements of ASTM C 923. The bands used for compressing the sleeve and extension against the manhole shall be fabricated from 1/6 gauge stainless steel conforming to ASTM A 240 type 304, any screws, bolts or nuts used on this band shall be stainless steel conforming to ASTM F 593 and 594, type 304.

The joint between the manhole frame and chimney or cone shall be 3/4" thick and made using cement mortar. Any sealant used between the adjustment or grade rings of the chimney shall not be used in this joint. Installation of these rubber seals shall be in accordance with the manufacturer's recommendation.

5.06 Storm Sewers

A. General

The DPW currently allows the use of the following pipe materials:

- Reinforced Concrete Pipe
- Reinforced Concrete Horizontal Elliptical Pipe
- Precast Reinforced Concrete Box Sections
- Fully Bituminous Coated Fully Paved Corrugated Steel Pipe
- 14 gauge aluminum coated Type II or precast galvanized, 12"-36"
- 12 gauge aluminum coated Type II or precast galvanized, 42" and larger
- Fully Bituminous Coated, Half Paved Steel Helical Ribbed Pipe (Type IR)
- 14 gauge aluminum coated Type II, 12"-36"
- 12 gauge aluminum coated Type II, 42" and larger
- 16 Gauge Aluminum Alloy Helical Ribbed Pipe (Type IR)
- 16 Gauge Aluminum Alloy Helical Ribbed Pipe (Type IR)
- High Density Polyethylene Pipe (HDPE), 12"-18"
- Polyvinyl Chloride Pipe (PVC), 12"-18"

B. Materials

All pipe shall be in conformance to these specifications and all applicable sections of the latest edition of the Indiana Department of Transportation Standard Specifications, American Association of State Highway and Transportation Officials (AASHTO), and American Society for Testing and Materials (ASTM). RCP shall be used at all road crossings. HDPE and PVC pipe shall only be used in non-loading areas only with prior approval of the DPW.

C. Material Standard References

The following standard shall be used for materials used in the City:

- Corrugated Steel Culvert Pipe and Pipe Anchors
- IDOT
- Bituminous Coated Corrugated Steel or Aluminum Pipe, Pipe-Arch, or Underdrain
- 908.07
- Fiber Bonded Fully Bituminous Coated Corrugated Steel Culvert
- 907.16
- Corrugated Aluminum Alloy Culvert Pipe and Pipe-Anchors
- 907.02
- ASTM C 76
- ASTM C 50
- Reinforced Concrete Pipe
- 907.15
- Acrylonitrile-Butadiene-Styrene (ABS) Composite Sewer Piping
- 907.16
- Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings
- 907.19
- Type PSM SDR-35 PVC Sewer Pipe
- 906.04
- Rubber Gaskets
- 907.05
- Precast Reinforced Concrete Box Sections
- AASHTO M294
- ASTM F 714
- ASTM F 894
- High Density Polyethylene Pipe (HDPE)
- AASHTO M294
- ASTM F679
- Polyvinyl Chloride Pipe (PVC)

5.07 Storm Manholes

Storm manholes shall be in accordance with Section 5.05 (C), (D), (E) and (F). Castings shall be R-192CVTH by Neenah Foundry, 1875-3 by East Jordan Iron Works, or approved equal. Where more than five castings are required, each shall have 2 inch high letters indicating "City of Franklin Storm Sewer".

5.08 Storm Inlets and Catch Basins

A. General

All standard inlets shall be constructed of reinforced precast concrete sections. Joints between sewer pipe and inlet walls shall be sealed with non-shrink grout.

B. Materials

1. Inlets/Basins

Precast concrete inlets shall be constructed in accordance with ASTM Standard C 478. Adjustment to final grade of inlet casting shall be accomplished by utilizing precast concrete adjusting rings. Adjusting rings when required should be sized to adjust to final grade by using a maximum of three (3) adjusting rings. Adjusting rings shall be limited to less than one (1) foot of inlet depth.

All inlet joints, along with the adjusting rings and top casting are to be sealed with 1/2 inch extrudable gasket (Kent Seal, or equal) to produce soil-tight joint.

Precast box inlets shall be constructed in accordance with Indiana Department of Transportation (IDOT) Standard Specifications.

2. Castings

Inlet castings shall be Neenah Type R-3501-TP, or equal for rolled curbs.

Inlet castings for vertical curb shall be Neenah Type R-3085-DL, or equal.

Inlet castings for round catch basins shall be Neenah Type R-2502-B-D, or equal.

5.09 Pipe End Sections

A. General

Pipe end treatment shall be either precast concrete with end footings, or prefabricated galvanized steel.

SECTION 7

INSTALLATION/CONSTRUCTION

7.01 General

This section shall provide general, minimum requirements for the installation and construction for DPW service area.

7.02 Dewatering and Control of Surface Water

Where groundwater is encountered, the Contractor shall make every effort necessary to secure a dry trench bottom before laying pipe. The Contractor shall provide, install and operate sufficient trenches, sumps, pumps, hose, piping, well points, etc. necessary to depress and maintain the groundwater level below the base of the excavation. If the Contractor is unable to remove the standing water in the trench, the Contractor shall over-excavate the proposed bottom grade of the sewer bedding, and place not less than three (3) inches of Class No. 2 crushed stone (Indiana Department of Highway Advance Classification) in the over-excavated area.

The Contractor shall keep the site free of surface water at all times and shall install drainage ditches, dikes, pumps and perform other work necessary to divert or remove rainfall and other accumulation of surface water from excavations. The diversion and removal of surface water and/or groundwater shall be performed in a manner which will prevent the accumulation of water within the construction area.

UNDER NO CIRCUMSTANCES SHALL SURFACE WATER AND/OR GROUNDWATER BE DISCHARGED TO, DISPOSED OF, OR ALLOWED TO FLOW INTO THE CITY'S SANITARY SEWER SYSTEM.

A. Clearing

Preparatory to excavation, the site of all open cut excavations, embankments, and fills shall be first cleared of obstructions and existing facilities (except those which must remain temporarily or permanently in service). On all public or private property where grants or easements have been obtained, and on the property of the City, the Contractor shall remove and keep separate the top soil, and shall carefully replace it after the backfilling is completed.

B. Pavement Cutting

Prior to excavating paved areas all excavation edges falling within the pavement shall be saw cut in a neat, straight manner. Cutting shall be performed with a saw designed specifically for this purpose. The cut shall penetrate the entire pavement thickness where possible. If the existing pavement is more than 6 inches thick, then a cut of not less than 6 inch depth shall be made. If pavement cuts are made in streets which are opened to traffic prior to excavation, then the cuts shall be thoroughly filled with sand and maintained full until the excavation is performed.

C. Protection of Existing Improvements

Before any excavation is started, adequate protection shall be provided for all existing utilities and City structures.

D. Protection of Trees and Shrubs

No existing trees or shrubs in street right-of-ways and easements shall be damaged or destroyed. Where branches of trees or shrubs interfere with the Contractor's operations, they shall be protected by tying back wherever possible. No limbs or branches shall be cut. If this operations will not permit saving certain trees, the Contractor shall be wholly responsible for satisfying all claims for restoration or restitution resulting from their damage or removal.

If small trees and shrubs are moved or pruned to permit more working space, pruning shall be done in accordance with Home and Garden Bulletin No. 83, U.S. Department of Agriculture, "Pruning Shade Trees and Repairing Their Injuries". However, the Contractor shall obtain, in writing, the City's permission to move or prune trees or shrubs. All such work shall be authorized by the Tree Board.

E. Maintenance of Public Travel

The Contractor shall carry on the WORK in a manner which will cause a minimum of interruption to traffic, and may close to through travel not more than two (2) consecutive blocks, including the cross street crossings. Where traffic must cross open trenches, the Contractor shall provide suitable bridges to street intersections and driveways. The Contractor shall post suitable signs indicating that a street is closed and necessary detour signs for the proper maintenance of traffic. Prior to closing of any streets the Contractor shall notify responsible municipal authorities.

F. Utility Interruption

The Contractor shall proceed with caution in the excavation and preparation of the trench or pit so that the exact location of underground structures may be determined. Prior to proceeding with trench excavation the Contractor shall contact all utility companies in the area to aid in locating their underground services.

The Contractor shall take all reasonable precautions against damage to existing utilities. However, in the event of a break in an existing water main, gas main, sewer or underground cable, he shall immediately notify the responsible official of the organization operating the utility interrupted. The Contractor shall lend all possible assistance in restoring services and shall assume all costs, charges, or claims connected with the interruption and repair of such services.

G. Open Cut Excavation

Open cut excavation shall be safely supported and of sufficient width and depth (and only to such width and depth) to provide adequate room for the excavation or installation of the work to the lines, grades and dimensions.

1. Trench Dimensions

The bottom width of the trench at and below the top of the pipe and inside the shoring and bracing, if used, shall not exceed the recommendations as contained in the applicable ASTM Standard for the pipe being used.

Trench sheeting and bracing or a trench shield or box shall be used as required by the rules and regulations of OSHA. The bottom of the trench shall still meet the above standards.

If the trench widths are exceeded without the written permission of the City Engineer and DPW, the pipe shall be installed with a concrete cradle or with concrete encasement or other ASTM approved methods as approved by the City Engineer and DPW.

2. Excavations With Sloping Sides, Limited

The Contractor may, at his option, where working conditions and right of way permit (as determined by the City Engineer and DPW), excavate pipe line trenches and pits for structures with sloping sides, but with the following limitations:

- a. In general, only braces and vertical trench walls will be permitted in traveled streets, alleys, narrow easements and for pit excavations more than 10 feet deep.
- b. Where pipe line trenches with sloping sides are permitted, the slopes shall not extend below the top of the pipe, and trench excavations below this point shall be made with vertical-sided walls with widths not exceeding those specified herein before.
- c. Slopes shall conform to all OSHA regulations.

H. Earth Excavation

Earth materials shall be excavated so that the open cuts conform with the required lines, grades and dimensions.

1. Unstable Foundation

When the bottom of the excavation is unstable as a foundation, it shall be excavated below grade and then refilled with concrete or crushed stone to the grade as the DPW or its representative may direct. The crushed stone refill shall be mechanically compacted in six (6) inch layers or as directed by the DPW.

2. Unauthorized Excavation

Unauthorized excavation below grade shall be filled with crushed stone or concrete and compacted as ordered and directed by the DPW or its representative.

3. Excavated Earth For Backfill

Excavated earth materials may be used for backfill subject to the approval of the City Engineer and Such material may be used only where its class is allowed. For example: Excavated material conforming to "Class II" description may be used where "Class II" material is required.

I. Boring and Jacking

Construction of the pipeline by boring and jacking methods will be permitted unless otherwise specified on the plans.

1. Backlogs

The backlogs shall be of sufficient strength and positioned to support the thrust of the boring equipment without incurring any vertical or horizontal displacement during such boring operations.

2. Guide Rails

The guide rails for the boring equipment may be of a timber or steel. They shall be laid accurately to line and grade and maintained in this position until completion of the boring operation.

3. Casing Pipe

Steel casing pipe shall be new, conform to ASTM A 139 and shall be of the size (diameter) shown on the plans. The length of pipe shall be welded as they are installed. Where lengths of casing pipe are joined during the boring operations, care shall be taken to insure that the proper line and grade is maintained.

The minimum wall thickness for casing pipes under highways, railroads and streams shall be 0.375 inches. Steel shall be Grade B under railroads and Grade A at all other locations.

7.04 Bedding and Backfill

A. General

All trenches or excavations shall be backfilled to the original surface of the ground or such other grades as required or directed. In general the backfilling shall be carried along as specified as possible.

B. Backfill Materials

The following materials shall be used for backfill in accordance with and in the manner indicated by the requirements specified herein.

- Class I - Angular, 6 to 40 mm (1/4 to 1 1/2 inches), graded stone such as crushed stone.
- Class II - Coarse sands and gravel with maximum particle size of 40 mm (1 1/2 inches), including various grades of sands and gravel containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Soil types GW, GP, SW and SP are included in this class.
- Class III - Fine sand and clayey gravel including fine sands, sand-clay mixtures and gravel-clay mixtures. Soil types GM, GC, SM and SC are included in this class.
- Class IV - Silty, silty clays and clays, including inorganic clays and silts of medium to high plasticity and liquid limits. Soil types MH, ML, CH and CL are included in this class. These materials are not recommended for bedding. This class also include any excavated material free from rock (3 inches and concrete, roots, stumps, rubbish, frozen material and other similar articles whose presence in the backfill would cause excessive settlement.

C. Backfill of Trench Excavations for Pipes and Conduits

Bedding and Backfill materials samples shall be submitted to the City Engineer and DPW prior to start of construction.

D. Bedding

1. Rigid Pipe and Conduit Bedding

For purposes of this specification, rigid pipe and conduits shall include those made of steel, ductile iron, concrete, RCP, PVC/ABS Truss and other materials as determined by the City Engineer and DPW.

All rigid conduit and pipe shall be laid to the lines and grades unless otherwise directed by the DPW. All rigid conduit and pipe shall be bedded in compacted Class I or II material, placed on a flat trench. The bedding shall have a minimum thickness of 4" or one-fourth (1/4) the outside pipe diameter below the pipe and shall extend halfway up the pipe barrel at the sides. All material shall be placed in the trench in approximately six (6) inch layers. Each layer, shall be leveled and evenly distributed on both sides of the pipe so as not to disturb, displace or damage the pipe and shall be thoroughly compacted. When Class I or II materials is used compaction may be accomplished by hand or mechanical tamping or by "walking" the material in. Bedding from the halfway point on the pipe to a point twelve (12) inches above the top of the pipe shall be a Class I, II, III, or IV material placed in six (6) inch layers and thoroughly compacted to prevent settlement. Class I and IV material shall not be used where the trench is located in an area subject to vehicular traffic.

2. Flexible and Semi-rigid Conduit Bedding

For purposes of this specification, flexible and semi-rigid conduits and pipes shall include those made of PVC, HDPE, and other materials as determined by the City Engineer and DPW.

All flexible

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May 9, 2019 7:56:14 AM / rchands
Modified / By:
Plotted / By: May 9, 2019 11:38:01 AM / Paul Richards

CITY OF FRANKLIN - STANDARD SPECIFICATIONS (CONT.)

SECTION 8

RESTORATION OF SURFACES

8.01 General

Restoration of surfaces within the public right-of-way and easements shall include the removal of the existing surface, the disposal of the surplus material and the construction of new surfaces and adjusting all new and existing structures for proper grade prior to paving as indicated on the plans and/or as specified in these Specifications.

8.02 Restoration of Paved Surfaces

A. Restoration

After all excavations within the limits of paved surfaces have been properly backfilled and compacted, the paved surfaces shall be restored to a condition as good as or better than existed prior to the beginning of the work, in accordance with the following specifications:

Paved Surfaces: Streets, alleys, sidewalks, driveways, curbs and gutters, not constructed or maintained by the State Highway Department, but paved with asphalt, concrete, cinders, crushed stone, waterbound macadam, oil-bound macadam, or heterogeneous paving materials, which are wholly or partially removed, damaged, or disturbed by the Contractor's operations, shall be restored with like or better materials, acceptable to the City Engineer and DPW, to a condition as good as or better than existed prior to the beginning of the work, so that movement of traffic, both vehicular and pedestrian, through the restored way shall be as free, safe and unimpeded as before.

B. Temporary Surface

Temporary trench surface shall be installed and maintained in accordance with these specifications. This temporary surface shall be maintained by the Contractor until the permanent pavement is placed. Before placing permanent pavement, all or parts of the temporary surface shall be removed, as necessary, and hauled from the site of the work.

C. Temporary Pavement Replacement

Trench surfaces of highly traveled streets and roads may be, at the direction of DPW, required to receive a temporary pavement replacement of cold mixed bituminous pavement. This temporary pavement shall be surface mixture Class A or B prepared and placed in accordance with Section 406 - Cold Mix. Bituminous Pavement of the latest edition of the Indiana State Highway Department Specifications. Prime and tack coats shall not be required. All temporary pavement shall be maintained by the Contractor to proper grade so as not to impede the safe flow of traffic until the permanent pavement replacement is made.

D. Permanent Paving

Permanent paved surfaces shall be restored in accordance with the following requirements, unless otherwise set forth by the City Engineer, in all cases, the methods and materials of restoration shall meet the requirements of the Indiana State Highway Department, as applicable.

1. Class "B" Concrete Pavement

Existing local streets, roads, alleys, driveways and parking areas consisting of concrete pavement shall be restored according to the following requirements.

Areas subjected to excavation or damage by the Contractor are to be replaced as a whole. Sidewalks to be replaced in complete sections, streets and driveways as complete sections or replaced with sections that coincide with the original pattern, and to the DPW's and/or City Engineer's satisfaction.

Prior to placing concrete, the existing edges are to be saw-cut in a neat straight manner, sub-base compacted, wetted down and edges swept. The use of flexible joint material is required as needed. All chunks of existing material larger than three by three (3 x 3) inches are to be removed.

Class "B" concrete pavement shall consist of a cast in place, layer of Class A concrete with one (1) layer of woven wire fabric (6 x 6 - W14 x W1.4) meeting ASTM Designation #97. The concrete layer shall be six inches thick. All rigid concrete pavement work and materials shall meet the latest specifications of the Indiana State Highway Department.

2. Class "C" Asphalt Pavement

Existing local streets and roads consisting of asphalt paving shall be restored with binder and surface of the thickness specified and as follows:

Areas subject to Class C asphalt pavement replacement shall have the existing edges (those created by cutting prior to excavation) re-cut in a neat straight manner as to remove irregularities and damaged areas. Manholes, service line trenches and existing valve areas are to be boxed out in a neat manner. All cuts shall be parallel or perpendicular to the Curved or diagonal cuts shall not be allowed. All chunks of existing material larger than three by three (3 x 3) inches are to be removed.

The aggregate base course, including the previously placed temporary surface or pavement, shall have the upper portions removed to allow placement of the binder and surface. After the base is cutback, it shall be re-compacted with a ten (10) ton roller or other suitable equipment if approved by the City Engineer. Care shall be taken to assure that not less than six (6) inches of compacted aggregate base remains below the permanent pavement.

The binder course(s) shall consist of compacted Hot Asphaltic Concrete, Type A, Size No. 9 as defined by the latest edition of the Indiana State Highway Specifications. Compaction shall be accomplished with suitable smooth wheel rollers. Generally, conventional self-propelled rollers of not less than 10 tons gross weight shall be used. The City Engineer may allow other specialized rollers for narrow trenches or lighter rollers with vibratory action. The City Engineer shall consider alternate equipment only if Contractor requests same in writing and includes technical data on the specific equipment to be considered.

The quantity and thickness of binder courses required shall match the existing pavement, but not less than one (1) course, two (2) inches in thickness.

The surface course shall consist of compacted Hot Asphaltic Concrete Surface Type A, (Size No. 11 or 12) as defined by the latest edition of the Indiana State Highway Specifications and placed in the same manner as described above for binder. The surface thickness shall match the existing pavement, but not less than one (1) inch.

3. Adjustments of Shoulders Necessitated by Resurficing

The shoulders of the road shall be adjusted to the elevation of the resurfacing with all materials (i.e., earth, sod, gravel, crushed stone, asphalt, etc.) necessary. The transition may be made within a distance of one (1) foot to one and one-half (1 & 1/2) feet from the edge of paving except in unusual cases where a greater distance is required. Existing driveways shall be primed and wedged from a featheredge to the final height of the resurfaced street paving.

8.03 Restoration of Ground Surfaces

All ground surfaces in public Rights of Way and easements that have been damaged or destroyed by the Contractor's operations shall be restored in accordance with the following specifications. All surplus material, rock, trees, shrubs, concrete pipes, asphalt, crushed stone, etc., not to be used in the Contractor's restoration operations shall be removed from the site and disposed of in an acceptable manner.

1. Restoration of Grassed Areas with Sod

Where shown on the plans or required by the DPW or City Engineer, established grassed areas shall be restored with sod containing grasses of comparable quality. Sod shall be placed and rolled so that the final elevations of the area being restored are the same as existed prior to the beginning of construction. Sod shall be pugged where necessary, and shall be watered and cared for to assure its survival.

2. Restoration of Grassed Areas with Seed and Mulch

The Contractor shall seed and mulch in one of the following manners:

a. The ground shall be loosened approximately three (3) inches deep with a disc or a harrow and fertilized with twenty-five (25) pounds of 10-10-10, or equivalent, and one hundred (100) pounds of agricultural lime per one thousand (1,000) square feet.

The mixture of seed applied shall be as follows:

35% Kentucky Bluegrass
30% Perennial Ryegrass (Lolium Perenne)
30% Kentucky 31 Fescue
5% Inert Matter

The seed shall be applied at a rate of four (4) pounds per one thousand (1,000) square feet and shall be well raked or boarded into the soil and mulched with straw of sufficient thickness to hold the seed until it is germinated.

b. Mulching Material: Materials for mulching shall be wheat, oats, barley or rye straw only. All materials shall be reasonably free from weed seeds, foreign material, and other grasses and chaff, and shall contain no Johnson Grass. The straw shall be reasonably bright in color and shall not be rusty, moldy, caked, or of otherwise low quality. The straw shall be dry on delivery, and spread evenly.

Mulch net may be required on special areas designated by the DPW to hold mulch in place until turf is established. The net shall be made of a tightly twisted craft paper yarn, into woven with a wrap count of one (1) pair of yarns per two (2) inches and a filling count of two (2) per inch. Salvage edges and center shall be reinforced with polyethylene filament. The material shall have a minimum width of forty-five (45) inches.

SECTION 9

INSPECTION, TESTING AND ACCEPTANCE

9.01 General

This section describes the minimum requirement and general procedures for the inspection, testing and acceptance of systems dedicated to the DPW.

Connection Permits for sanitary service will not be issued until all the requirements of this section are fulfilled.

9.02 Inspection

Inspection of the construction shall occur for the duration of the project, including the installation of service laterals. The Owner shall execute the Agreement with DPW for such services if the DPW does not have staff available to perform such inspections.

A. Estimated Cost

The DPW shall send a letter to the Owner stating the estimated manhours and amount of the inspection fee to be paid to the City for services performed by representatives of the DPW. The amount provided in the letter shall be 75% of the total estimated cost of the inspection services based upon the estimated payment manhours multiplied by the base hourly rate.

The estimated manhours shall be based upon the following assumptions:

Average daily production = 250 ft./day
Final inspection = Verification of As-Built = 8 hours
Inspection Time = 20 - 30 hrs/week

Where a lift station is required, additional time for the inspection during construction and final start-up shall be added.

The fee provided is a pre-construction estimate only. The actual inspection time may vary for project to project and may exceed or be less than the estimate based upon the actual project duration. Inspection time at the site shall be verified by the Owner or a representative of the Owner.

The remaining cost, 25% shall be paid prior to final acceptance by the DPW.

B. General Requirements

1. Contractor and/or Owner shall provide notice to the DPW and his representative of the planned commencement of construction forty-eight (48) hours prior to such commencement.

2. Once the construction starts, the Contractor shall be responsible for informing and/or notifying the inspection representative assigned of the following:

- a. Daily work schedule, including any changes in schedule;
- b. Prior notification; if work is to be performed on weekends and/or holidays;
- c. Date tests are to be performed; and
- d. Date as-built verification is to be performed.

3. The DPW, upon request of the Contractor and/or Owner, will schedule the Final Inspection.

All testing required shall be performed under the observation of the DPW or DPW's representative. It shall be the Contractor's responsibility to schedule the testing with the DPW representative and/or DPW. Test results obtained in the absence of the presence of the DPW will not be accepted.

9.03 Testing

A. Leakage Testing

1. General

All sanitary sewers shall be tested for infiltration and exfiltration.

Contractor shall furnish all labor, materials and equipment required for making tests. Tests shall be made at times arranged with the DPW and his representative. Sections of sewers shall be isolated and measurements of infiltration and exfiltration shall be made by approved means. The DPW or his representative must be present during all final tests.

Sewers whose crowns are below ground water level at time of testing shall be tested for infiltration. Where crown of pipe is above ground water level, sewer shall be tested for exfiltration. If ground water level varies during period of construction, sewers may be tested for both. Spans are not to be tested for Final Acceptance until complete.

Immediately preceding all leakage tests (exfiltration, infiltration and air) the sewer to be tested shall be cleaned by flushing a ball through the The Contractor shall furnish an inflatable rubber ball of a size that will inflate to fit snugly into the pipe to be tested. The ball may, at the option of the Contractor, be a new glow-in-the-dark tag line; or a rope or cord may be fastened to the ball to enable the Contractor to know and control its position at all times. The ball shall be placed in the last cleanout or manhole on the pipe to be cleaned, and water shall be introduced behind the ball shall pass through the pipe with only the pressure of the water impelling it. All debris flushed out ahead of the ball shall be removed at the first manhole where its presence is noted. In the event cemented or wedged debris, or a damage/ plug shall stop the ball, the Contractor shall remove the obstruction.

2. Infiltration Tests

Sanitary sewers which are constructed with ground water level above Crown of pipe shall be tested for infiltration after sewers have been installed and backfilling has been substantially completed. A convenient section of sewer shall be selected between manholes. The upper section of sewer shall be plugged watertight with temporary bulkhead. A suitable measuring device shall be installed at the lower end.

The amount of water flowing through the outlet shall be measured periodically through the next twenty-four (24) hours. The flow thus measured shall then be converted by gallons per day per inch diameter per mile and compared with the maximum allowable limit of two hundred gpd/in./mile.

3. Exfiltration Tests

A section or sections of sanitary sewer between manholes shall be isolated by water tight bulkheading. Isolated sections shall then be filled with water to a level three (3) feet above the crown of the pipe at the upstream end of the section; water level at the downstream end of the section shall not more than six (6) feet above the crown of the pipe. After allowing the system to stabilize overnight, the section shall be refilled with water to the original level. After one (1) hour more, the volume of water lost in the section shall be determined by measuring the drop in the water level.

4. Allowable Leakage

Infiltration or exfiltration of any given segment of sewer pipe shall not be permitted to exceed a rate of two hundred (200) gallons per twenty-four hours per mile of sewer per inch of pipe diameter (0.158 gpd/in./100 ft.).

5. Low Pressure Air Testing

For gravity sanitary sewers installed with the pipe crown above the ground water level, air pressure testing may be used in lieu of the exfiltration test. Low pressure air testing is used to determine the existence of pipe leaks; however, it does not indicate water leakage limits.

Prior to the low pressure air testing, all wyes, tees, or end of side sewer stubs shall be plugged with flexible-joint caps, or acceptable alternate, securely fastened to withstand the internal test pressures. Such plugs or caps shall be readily removable, and their removal shall provide a socket suitable for making a flexible-jointed lateral connection or extension.

All plugs shall be securely braced to prevent possible blowout due to internal air pressure. One plug shall have an inlet tap, or other provision for connecting a hose to a portable air supply source. Air hose shall be connected to the inlet tap and a portable air supply source.

Air equipment shall consist of all necessary valves and pressure gauges to control rate of air flow into the test section and to enable monitoring of air pressure within the test section. Testing apparatus shall also be equipped with pressure relief device to prevent the possibility of loading test section with full capacity of compressor.

Air shall be slowly added to test section until pressure inside pipe is raised to 4.0 psig. After a pressure of 4.0 psig is obtained, air supply shall be regulated such that pressure is maintained between 3.5 and 4.0 psig for a period of two (2) minutes, to allow air temperature to stabilize in equilibrium with temperature of pipe walls. Pressure will normally drop slightly until equilibrium is obtained. During this period, all plugs shall be checked with soap solution to detect any plug leak.

After this two (2) minute air stabilization period, air supply shall be disconnected and test pressure allowed to decrease. Time required for test pressure to drop from 3.5 psig to 2.5 psig is determined by means of stop watch, and this time interval is then compared with required time to determine if rate of air loss is within the allowable limit. Required time to arrive at the allowable air loss is calculated by means of following formula:

$$T = \frac{0.0850 \cdot DK}{Q}$$

Where: T = time in seconds

K = .000419 Dk, but not less than 1.0

Q = Rate of loss (<0.003 cfm/sq. ft. of internal surface)

D = Diameter of pipe in inches

L = length of pipe tested in feet

Upon completion of test, the bleeder valve shall be opened and all air allowed to escape. Plugs shall not be removed until all air pressure in test section has been released. Also, no one shall be allowed in trench or manhole while test is being conducted.

All pipe lines thirty (30) inch diameter and over shall be tested one joint at a time with joint testing apparatus. Joint shall be isolated with an expanding shield equipped with gaskets which fit tightly against pipe walls on each side of joint to be tested. Allowable leakage for such a test is equal to that which would occur on the basis of allowable leakage for one length of pipe.

If measured time interval for the pressure to drop from 3.5 psig to 2.5 psig is less than the required time as calculated, sewer section shall be deemed to have failed test. Contractor shall then proceed to repair pipe at his cost as necessary until the sewer section passes the test. All testing shall be conducted in presence of DPW or his representative (inspector).

6. Excessive Leakage

If infiltration or exfiltration rate of sewer exceeds maximum rate specified, contractor shall make all necessary repairs to reduce leakage below the allowable. Such repairs shall be made at Contractor's expense. Under no circumstances will granting be considered an acceptable means of repair. When repairs have been completed, but not more than thirty (30) days after first test, sewer sections shall be subjected to a second leakage test as specified above.

If the second test should again indicate leakage in excess of the allowable amount, the Contractor shall, at his own expense, provide complete internal inspection of entire section in question, by means of videotape recording of television inspection or by color photography with exposures every two (2) to four (4) feet along the sewer. Contractor shall employ an independent sewer testing service to inspect pipe. Inspection service shall prepare a written report and shall review videotape or films with DPW, Contractor, and DPW's representative. Contractor shall then submit a written plan for correction of leakage. Contractor, DPW, and DPW's representative shall meet as necessary to develop actual program for inspection and repair. Contractor shall not proceed to repair until he receives written authorization to proceed from City Engineer, DPW or DPW's representative. All inspections, reports, repair, replacement, and compensation for additional professional expense shall be paid by the Owner/Contractor.

B. Deflection Testing of Installed Flexible Plastic Pipe

1. Final Acceptance Test

Prior to the final deflection test, the DPW or his representative may, at his option, order the lamping of certain or all sections. Lamping must show a "full moon" and no excessive puddling effects in the span.

The main line shall be flushed prior to the vertical ring deflection tests. The vertical ring deflection tests shall not be performed prior to successful completion of leakage testing requirements.

All main line plastic pipe and PVC/ABS Trench sewers eight (8) inch in diameter and greater shall be measured for vertical ring deflection at least thirty (30) days after installation, but no later than thirty (30) days prior to final acceptance of the project. Maximum ring deflection of the pipeline under load shall be limited to five percent (5%) of the vertical internal pipe diameter. All pipe exceeding this deflection shall be considered to have reached the limit of its serviceability and shall be relaid or replaced by the Owner/Contractor.

The cost of all deflection testing shall be borne by the Contractor and shall be accomplished by using a deflectometer, which will produce a continuous record of pipe deflection, or by pulling a mandrel, sphere, or pie-type go-no-go device through the pipeline. The diameter of the go-no-go device shall be ninety-five percent (95%) of the undeformed inside diameter of the flexible pipe. The mandrel shall be pulled through the sewers by one man, by hand and specifically without the aid of mechanical devices.

C. Sanitary Manhole Testing

All manhole vacuum tests shall be conducted in the presence of a representative of the DPW.

The vacuum test equipment shall consist of: inflatable plugs for all incoming and outgoing sewer lines; an inflatable test collar to seal the manhole at the manhole frame; and a vacuum pump. A vacuum gauge shall be located in-line between the test collar and the pump to accurately indicate the vacuum in inches of mercury within the manhole. The vacuum gauge shall have a range to no more than thirty (30) inches of mercury, with scale markings of no greater than one-half (1/2) inch of mercury vacuum and an accuracy to within a two percent (2%) of true vacuum.

The vacuum test shall be conducted by plugging all incoming and outgoing sewer lines in the manhole at a location beyond the connection of the sewer pipe with the manhole. All plugs shall be blocked in place so as not to move during the The vacuum testing collar shall be inflated in the frame in accordance with the equipment manufacturer's recommendations. A vacuum of ten (10) inches of mercury shall be drawn and the vacuum pump turned off and the valve between the vacuum pump and the vacuum gauge shall be tested off.

The time period which is taken for the vacuum to fall from ten inches (10") of mercury to nine inches (9") of mercury shall be determined. If the time taken for the vacuum to reduce the ten inches (10") of mercury to nine inches (9") of mercury is less than the time indicated in the following Table, then the manhole work shall be considered not acceptable and shall be rejected. If the time is equal to or exceeds the time indicated below, the manhole work shall be accepted.

Manhole Depth (ft.)	Diameter = 48"	60"	72"
8	20	26	33
10	25	33	41
12	30	39	49
14	35	46	57
16	40	52	65
18	45	59	73
20	50	65	81
22	55	72	89
24	59	78	97
26	64	85	105
28	69	91	113
30	74	98	121

For each add1/2 add:

5	7	8
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Contractor shall submit to the DPW the results of each manhole vacuum test. Such reports shall include a description of the location of the manhole, the time, date and weather of the test, a list of all persons present, the diameter and depth of the manhole and the allowable test results, and the actual test results.

All manholes shall be repaired by Contractor and retested as described above until a successful test is made. After each test, the temporary plugs shall be removed.

Once all manholes have been tested, the manholes will be given a field visual inspection. The inspection shall be performed at the discretion of the DPW during the warranty period following a rainfall sufficient enough to raise the groundwater table above the problem areas. All leakage problems determined by this inspection shall be corrected by the Contractor within an agreed upon time to the satisfaction of the DPW. Where necessary to complete the work, the Contractor shall be responsible for the bypassing and/or blocking of the flow in the manholes and must have prior approval by the City Engineer or DPW. It will be the Contractor's responsibility to supply his own traffic control as required by the particular location and/or jurisdiction.

D. Storm Sewer Testing

All rigid pipe shall be lamped; any misalignment shall be repaired.

All flexible pipe shall receive a deflection test as required by paragraph B. Deflection test shall be limited to 7% of the vertical, internal pipe diameter.

9.04 Lateral Location Forms

The Owner/Contractor shall submit a lateral location form for each lot. The form shall be completed and signed by the Contractor, the DPW or his representative during lateral inspection. This form shall include one (1) Polaroid type photo taken from the point of connection to the public sewer, looking back along the lateral to the building.

SECTION 10

EROSION CONTROL

10.01 General

This section provides the general guidelines for the control of erosion and sediment for construction sites. Control of sedimentation for construction sites may be accomplished through utilization of a variety of control practices. The complexity of the erosion and sediment control plan will vary depending upon individual site conditions. The goal of such a plan is to limit the quantity of sediment leaving the construction site. The Contractor's plan must be approved by the DPW and City Engineer.

In addition, the Contractor must also comply with Rule 5.327 IAC 15-5 for land alteration which disturbs 5 acres or more.

10.2 Permitting Requirements

If the Owner/Contractor is required to submit a soil erosion control plan to the State under Rule 5.327 IAC 15-5, such plan shall be deemed in compliance with DPW requirements. In this case all applicable State and Federal permits or notices for land disturbing activities shall be obtained or filed prior to beginning land disturbing activities. Copies of all applications, letter of intent, submittals, plans and other erosion and sediment control related information shall be submitted to the DPW and City Engineer.

10.3 Design Guidelines

In order to fully achieve an acceptable level of erosion and sediment control on the construction site, the following design principles shall be fully adhered to during site analysis and development of the erosion and sediment control plan:

- A. Existing site contours should be followed as close as reasonably possible in order to minimize cut and fill.
- B. Existing natural vegetation should remain undisturbed for as long as possible during the construction activities. Naturally vegetated areas along property lines, jurisdictional wetlands, lakes, and watercourses, both natural and man-made, should be left undisturbed during all phases of the site construction. These vegetative filter strips will be required at the discretion of the DPW.
- C. A logical sequencing of site construction activities must be provided in order to minimize the size of exposed land areas, and the length of time land areas are left without some form of temporary or permanent soil protection.
- D. Soil stockpiles shall be stabilized utilizing either vegetative establishment, sediment trapping barriers, or erosion control measures such as tamping or mulching, singly or in combination.
- E. Storm sewer inlets which are made operable either before or during the construction phase of development shall be provided with protection from siltation.
- F. Stable, properly maintained construction traffic access routes and stream crossings shall be identified on the site erosion and sediment control plan as needed. These construction access routes shall be installed as part of the site perimeter sediment control barriers, prior to the initiation of on-site land alteration activities. Where sediment is transported onto public street or road surfaces, these streets or roads shall be cleaned thoroughly at the end of each day. Sediment shall be removed by either scraping, shoveling or sweeping and be transported to a controlled fill area. Street washing will be allowed only if wash water flows to a controlled sediment trapping area.
- G. Runoff velocities shall be kept as low as possible.
- H. A thorough maintenance and follow-up program, and identification of the person(s) responsible for its implementation will be required.

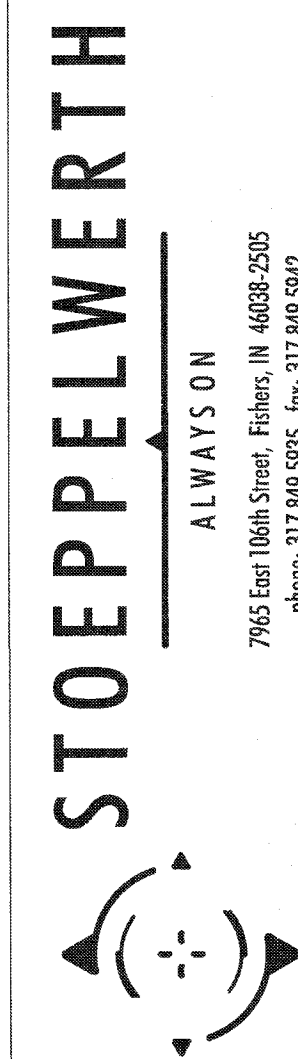
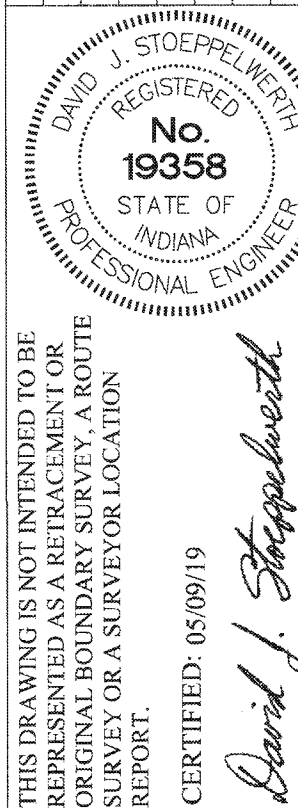
The latest edition of the Indiana Handbook for Erosion Control in Developing Areas shall be used for detailed technical guidance for all erosion and sediment control practices. The following general practice guidance applies to the development of all control plans:

- A. Perimeter Control - Perimeter control measures shall be installed as specified on the approved plan, including: construction access drives, straw bale dams and fabric fencing, temporary sediment traps, sediment basins, and diversions.
- B. Vegetative Control - Disturbed areas which are at final grade shall be permanent seeded within seven (7) days. At the discretion of the DPW, barren areas to be rough graded and left undisturbed for more than thirty (30) days shall be established with temporary vegetation; and dormant seeding will be required during seasonal periods (October through February) for those barren areas to be left undisturbed for one hundred and twenty (120) days or longer.
- C. Slope Protection - Slope protection shall be provided by use of temporary and permanent diversion levees, vegetative cover, and slope drains. Concentrated stormwater flows shall not be allowed to flow down cut or fill slopes without proper slope stabilization.
- D. Sediment Trapping - To achieve the goal of preventing sediment from leaving the construction site, the DPW will require the use of sediment barriers such as fabric fencing, straw bale dams, and sediment basins.
- E. Protection of Outlet Channel - Concentrated stormwater runoff leaving a development site shall be outletted to an open channel, storm sewer pipe or culvert which is capable of receiving this discharge. Runoff velocities shall be controlled during all storm events so that the peak runoff velocity during and after the completion of the land alteration approximates existing conditions.

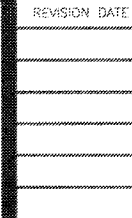
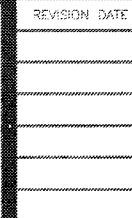
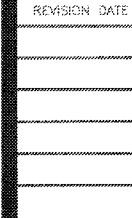
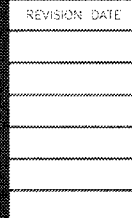
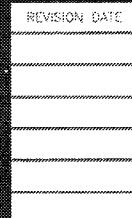
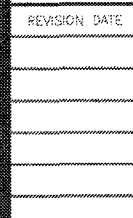
The principles and practices provided by the State in Rule 5 are to be followed in the development of all control plans. Rule 5 does not give specific requirements for use of various practices leaving that to the localities. Individual practices can be modified or waived upon request to the DPW based on special site characteristics and conditions.

The designer should rely on the Indiana Handbook for Erosion Control in Developing Areas (IEECDA) for detailed design, construction and maintenance criteria for all erosion control practices. Such criteria shall be required by the DPW unless waived in writing. The manual can be obtained from:

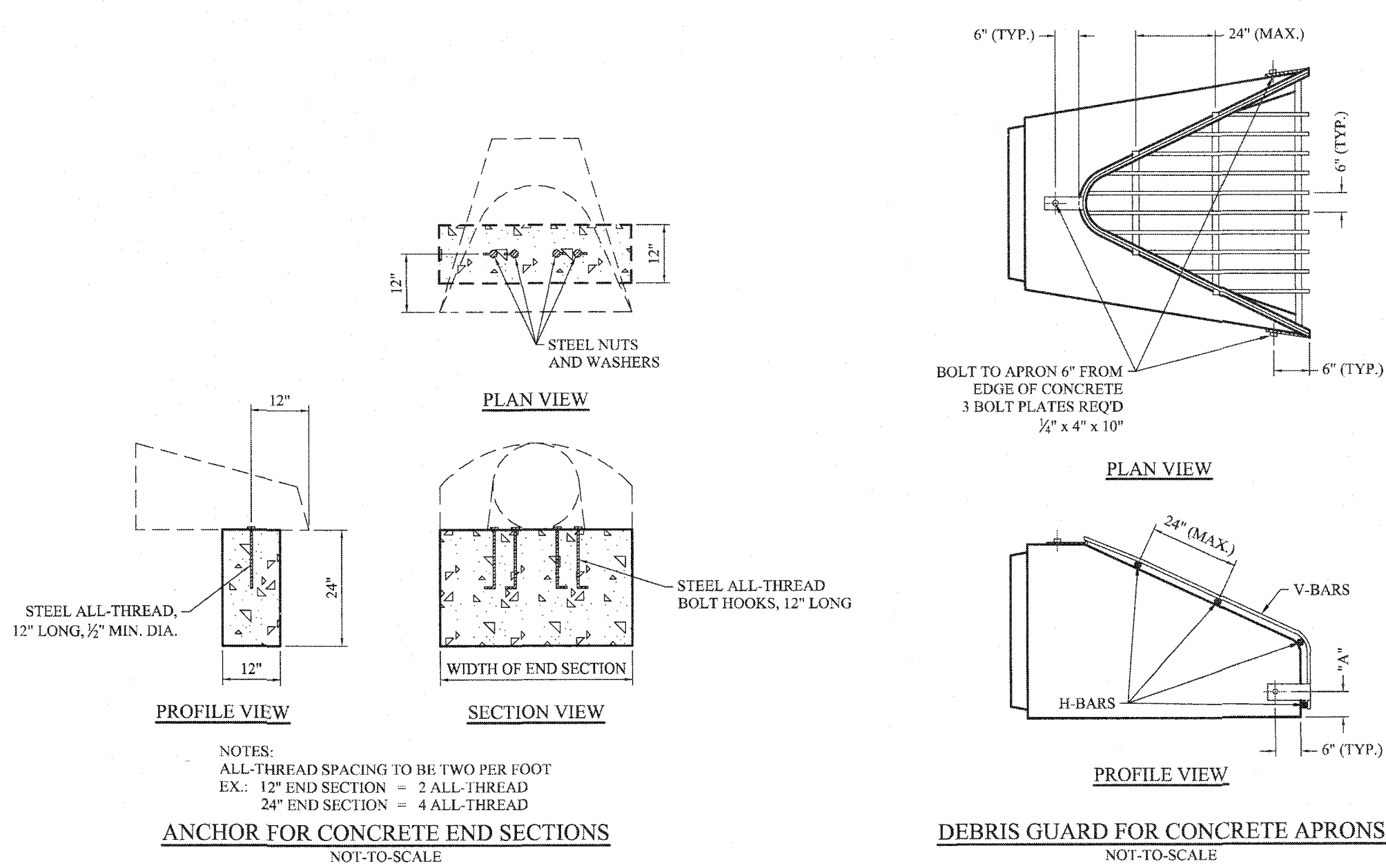
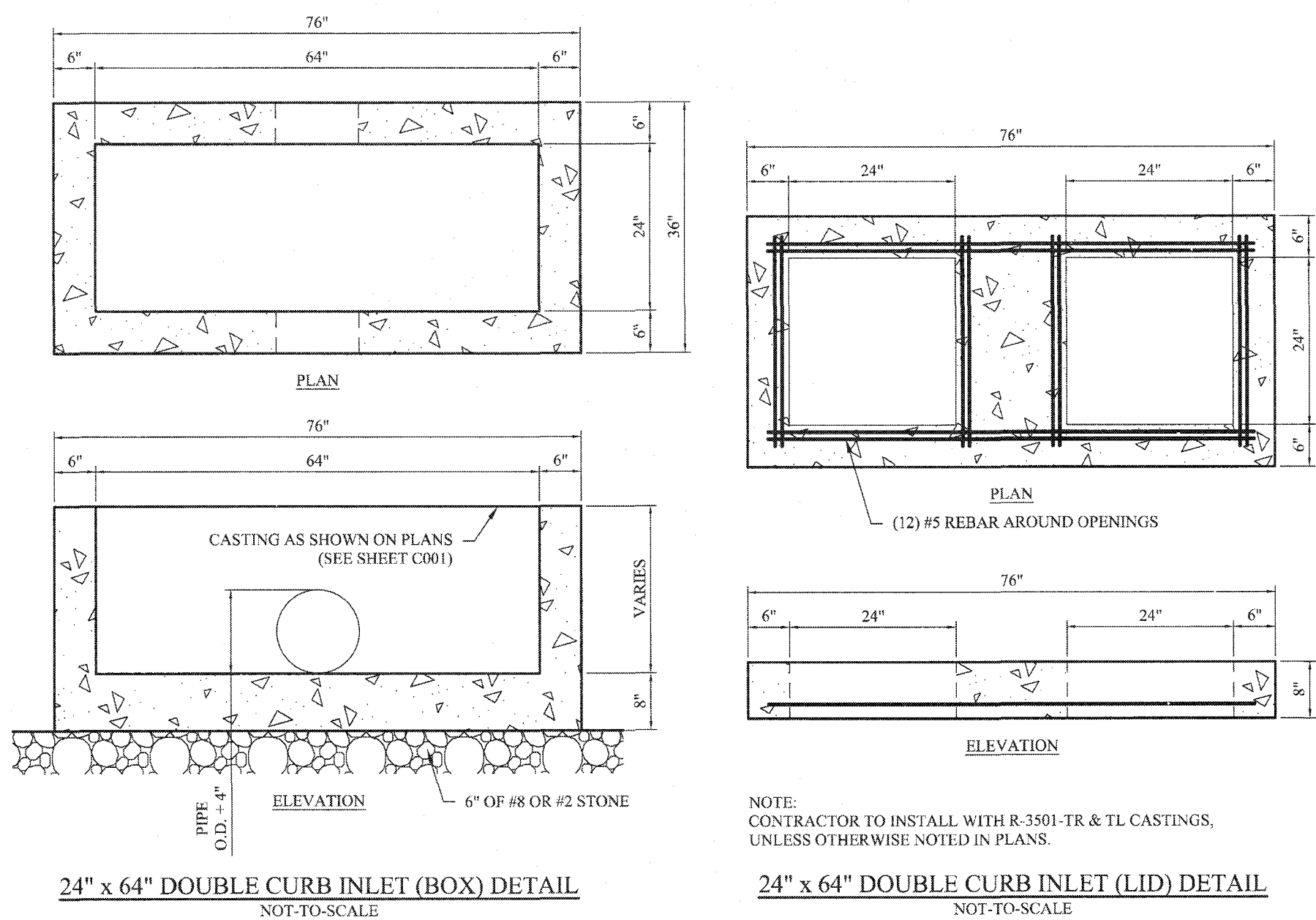
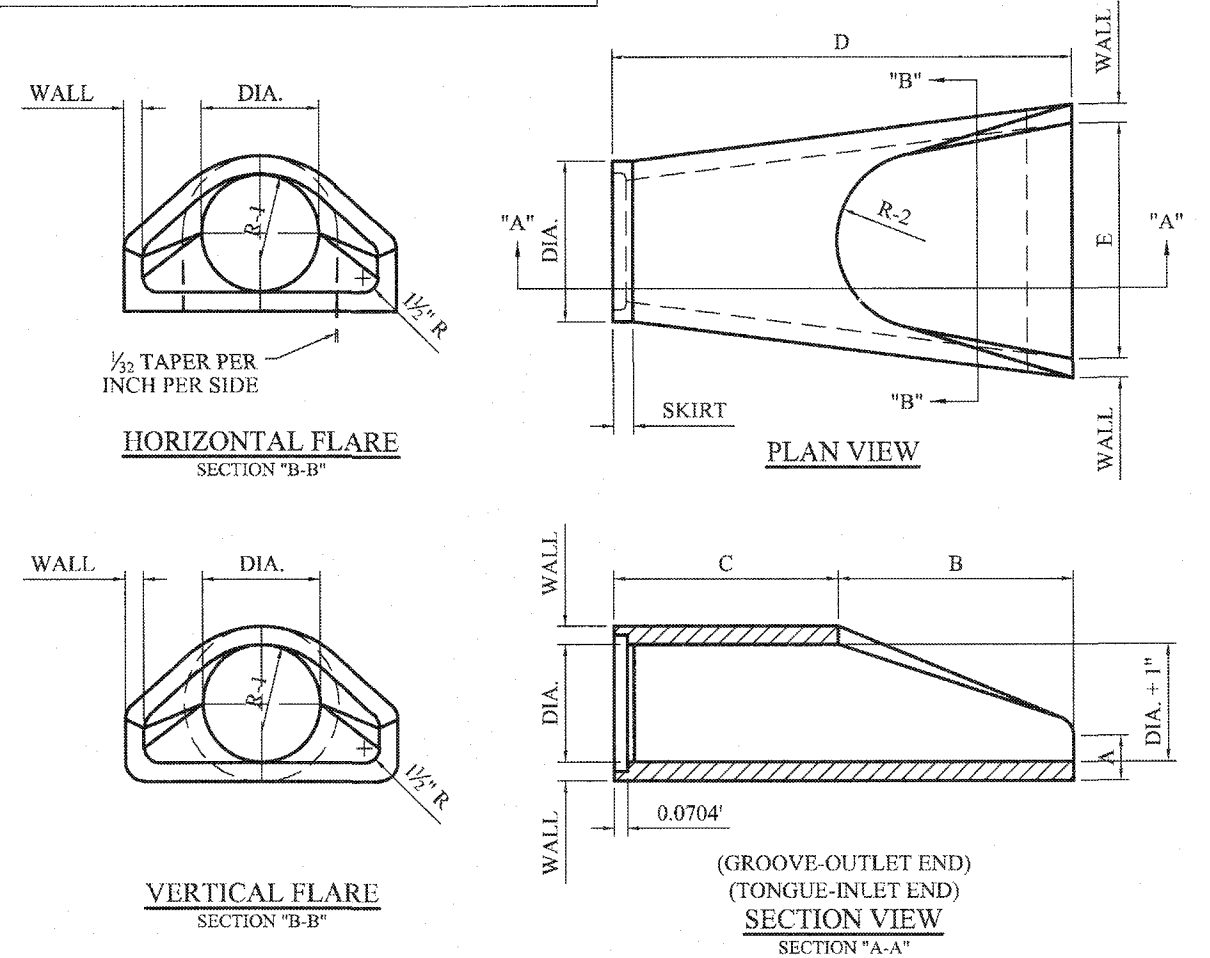
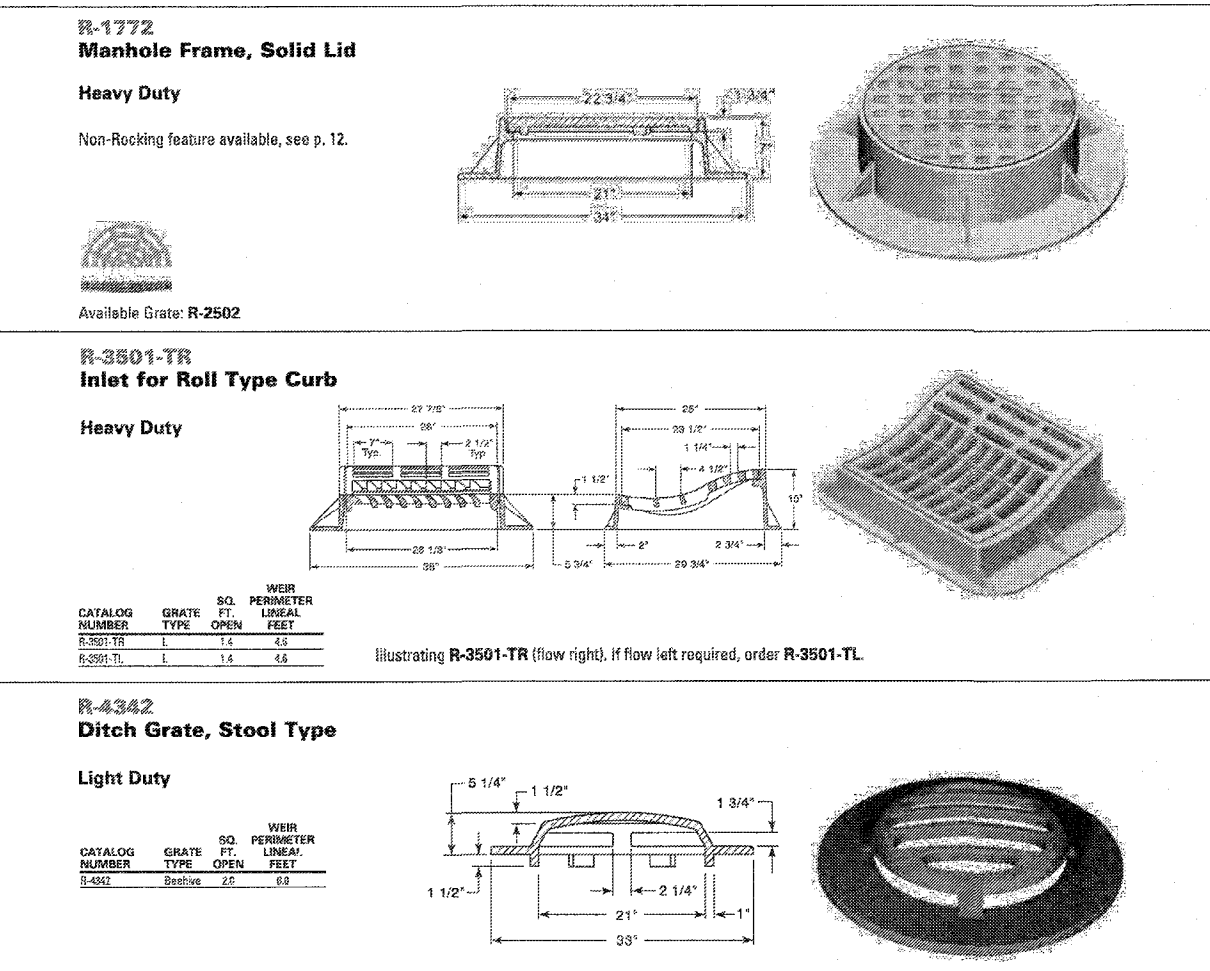
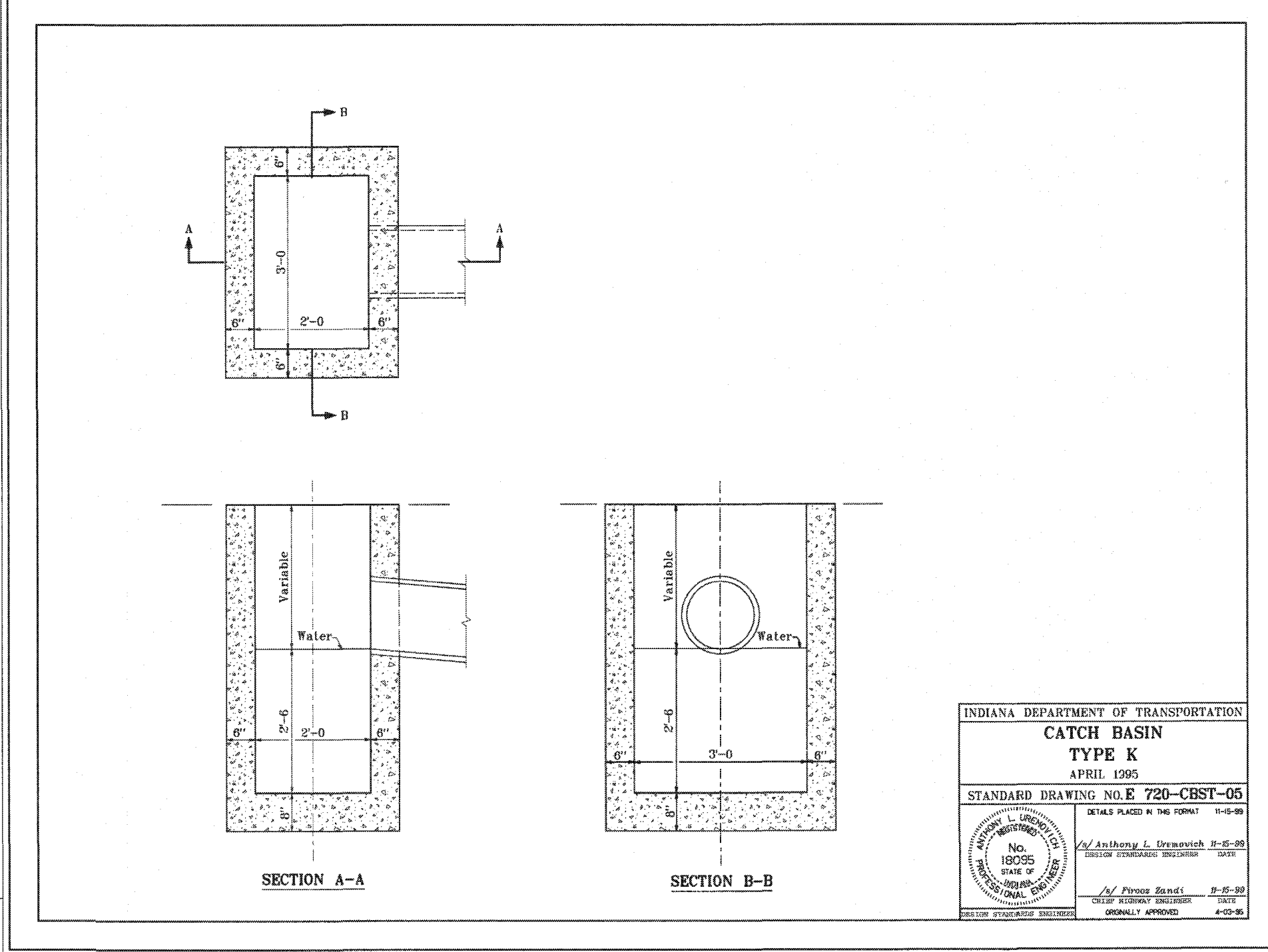
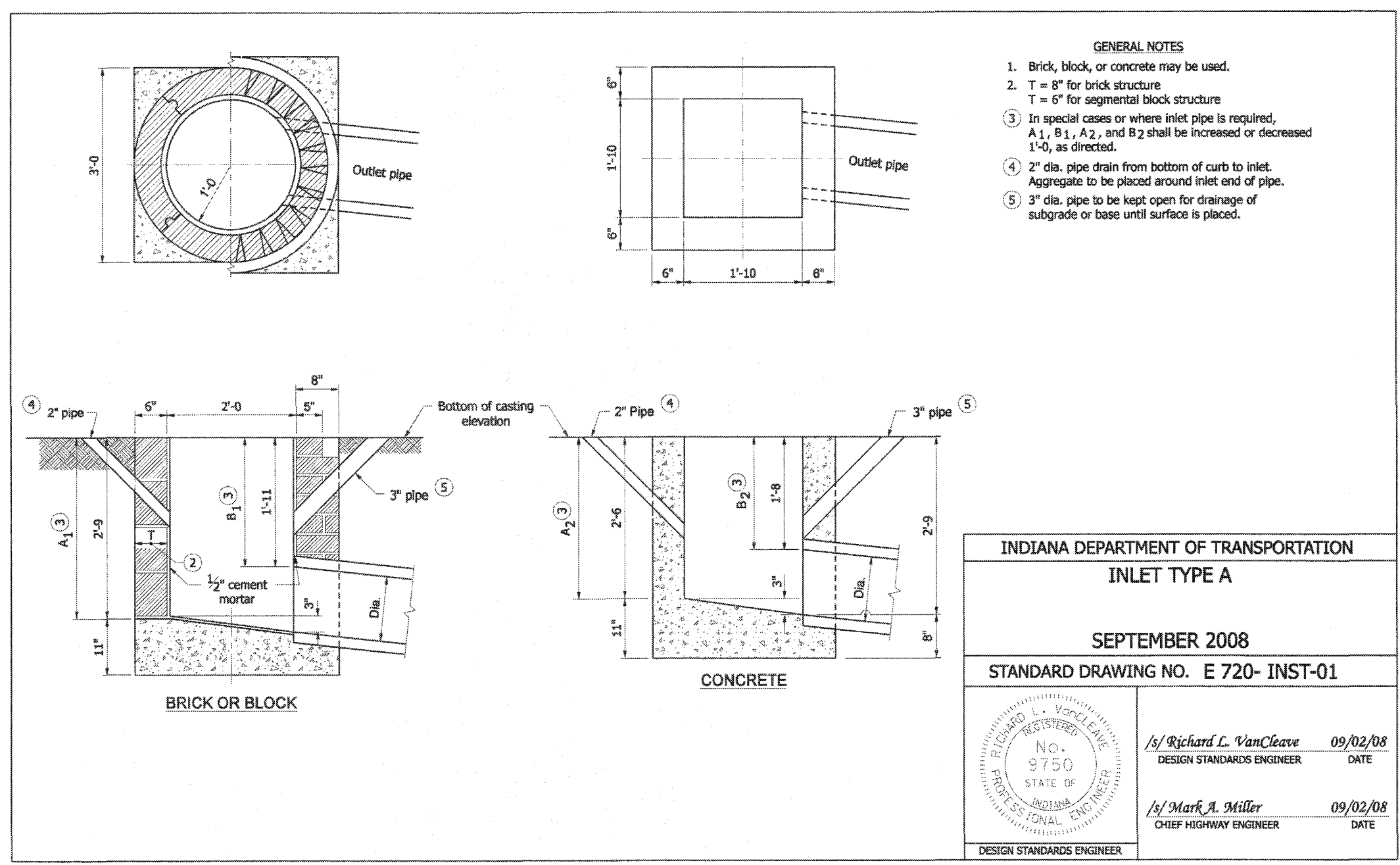
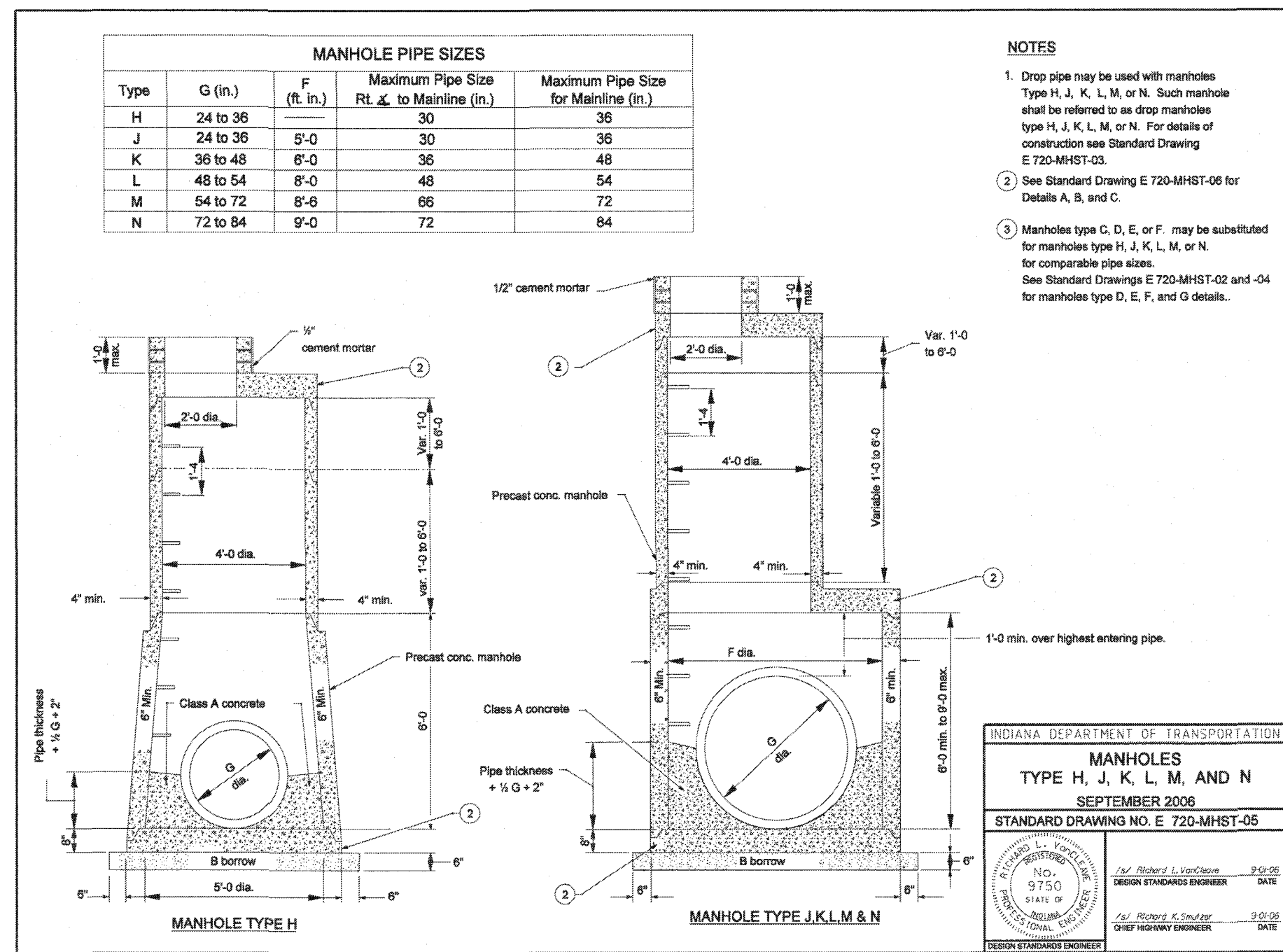
Urban Conservation Program
Division of Soil Conservation
Indiana Department of Natural Resources
402 West Washington Street, Rm. W-265
Indianapolis, Indiana 46204-2748



CONSTRUCTION DETAILS
THE BLUFFS AT YOUNGS CREEK
SECTION 1
FRANKLIN, FRANKLIN TOWNSHIP
JOHNSON COUNTY, INDIANA
DRAWN BY: PDR
CHECKED BY: BKR
SHEET NO.
C800B
S & A RCH NO.
83540MMA-S1



DRAWN BY: PDR	CHECKED BY: BKR
SHEET NO.	
C800C	
S & A JOB NO.	
83540MMA-S1	



APRON SIZE (INCHES)	V-BAR SIZE (INCHES)	No. OF BARS REQ'D	H-BAR SIZE (INCHES)	BOLT DIA. (INCHES)	"A" DIM. (INCHES)
ARCH PIPE APRONS					
18	1/2	3	5/8	1/2	5
24	5/8	4	3/4	1/2	7
30	5/8	4	3/4	1/2	7 1/2
36	3/4	4	1	1/2	10 1/2
42	3/4	4	1	3/4	11
48	3/4	4	1 1/2 PIPE	3/4	12
54	3/4	4	1 1/2 PIPE	3/4	12
60	3/4	5	1 1/2 PIPE	3/4	14
72	3/4	5	1 1/2 PIPE	3/4	14
84	3/4	6	1 1/2 PIPE	3/4	15
ROUND PIPE APRONS					
12	1/2	3	5/8	1/2	4
15	1/2	3	5/8	1/2	4 1/2
18	1/2	4	5/8	1/2	4 1/2
21	1/2	4	5/8	1/2	5
24	5/8	4	3/4	1/2	5
27	5/8	4	3/4	1/2	5 1/2
30	5/8	4	3/4	1/2	5 1/2
36	3/4	4	1	3/4	8
42	3/4	4	1	3/4	8
48	3/4	5	1	3/4	8
54	3/4	5	1 1/2 PIPE	3/4	8
60	3/4	5	1 1/2 PIPE	3/4	8
66	3/4	6	1 1/2 PIPE	3/4	8
72	3/4	6	1 1/2 PIPE	3/4	9
84	3/4	7	1 1/2 PIPE	3/4	10
90	3/4	7	1 1/2 PIPE	3/4	14

NOTES:

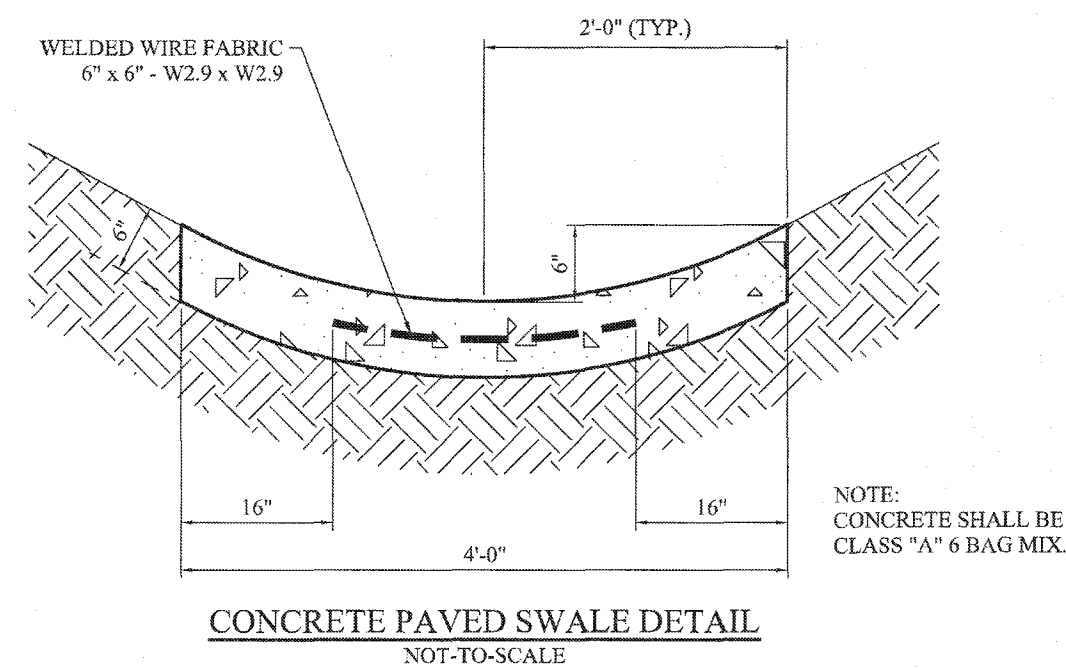
1. BARS AND PLATES ARE HOT-ROLLED STEEL.
2. BARS, PLATES, AND PIPE ARE FINISHED WITH 2 COATS OF ALUMINUM PAINT.
3. BOLTS ARE GALVANIZED.
4. SEE STANDARD PLATES A-10 AND A-11 FOR APRON DIMENSIONS.
5. TRASH GUARDS WITH DIFFERENT DIAMETER BARS ARE AVAILABLE, SPECIAL ORDER.

DIA.	WALL	G / T	WT. SEC.	A	B	C	D	E	DIA. - 1"	R-1	R-2	SKIRT
12"	2"	1 1/2"	5300L	4"	24"	48 3/4"	72 3/4"	24"	13"	10 1/2"	9"	3 3/4"
15"	2 1/2"	2"	7400L	6"	27"	46"	73"	30"	16"	12 1/2"	11"	3 1/2"
18"	2 3/4"	2 1/2"	9900L	9"	27"	46"	73"	36"	19"	15 1/2"	12"	4"
21"	2 3/4"	2 1/2"	1,2800L	9"	35"	38"	73"	42"	22"	16 1/2"	13"	4"
24"	3"	2 1/2"	1,5200L	9 1/2"	43 1/2"	30"	73 1/2"	48"	25"	16 1/2"	14"	4 1/2"
27"	3 1/2"	2 1/2"	1,9300L	10 1/2"	48"	25 1/2"	73 1/2"	54"	28"	17 1/2"	14 1/2"	4 1/2"
30"	3 3/4"	3"	2,1900L	12"	54"	19 1/2"	73 1/2"	60"	31"	18 1/2"	15"	5"
36"	4"	3 3/4"	4,1000L	15"	63"	34 3/4"	97 1/4"	72"	37"	24 1/2"	20"	5 1/2"
42"	4 1/2"	3 3/4"	5,3800L	21"	63"	35"	98"	78"	43"	27 1/2"	22"	5 1/2"
48"	5"	4 1/2"	6,5500L	24"	72"	26"	98"	84"	49"	28 1/2"	22"	5 1/2"
54"	5 1/2"	4"	8,0400L	27"	65"	35"	100"	90"	55"	32 1/2"	24"	6 1/2"
60"	6"	5"	8,7500L	30"	60"	39"	99"	96"	61"	36 1/2"	24"	6 1/2"
66"	6 1/2"	5"	10,6300L	34"	78"	21"	99"	102"	67"	35 1/2"	24"	7 1/2"
72"	7"	6"	12,5200L	34"	78"	21"	99"	108"	73"	38 1/2"	24"	7 1/2"
78"	7 1/2"	6 1/2"	14,4300L	34"	78"	21"	99"	114"	79"	41 1/2"	24"	8 1/2"
84"	8"	7"	16,3500L	24"	78"	21"	99"	120"	85"	44 1/2"	24"	9"

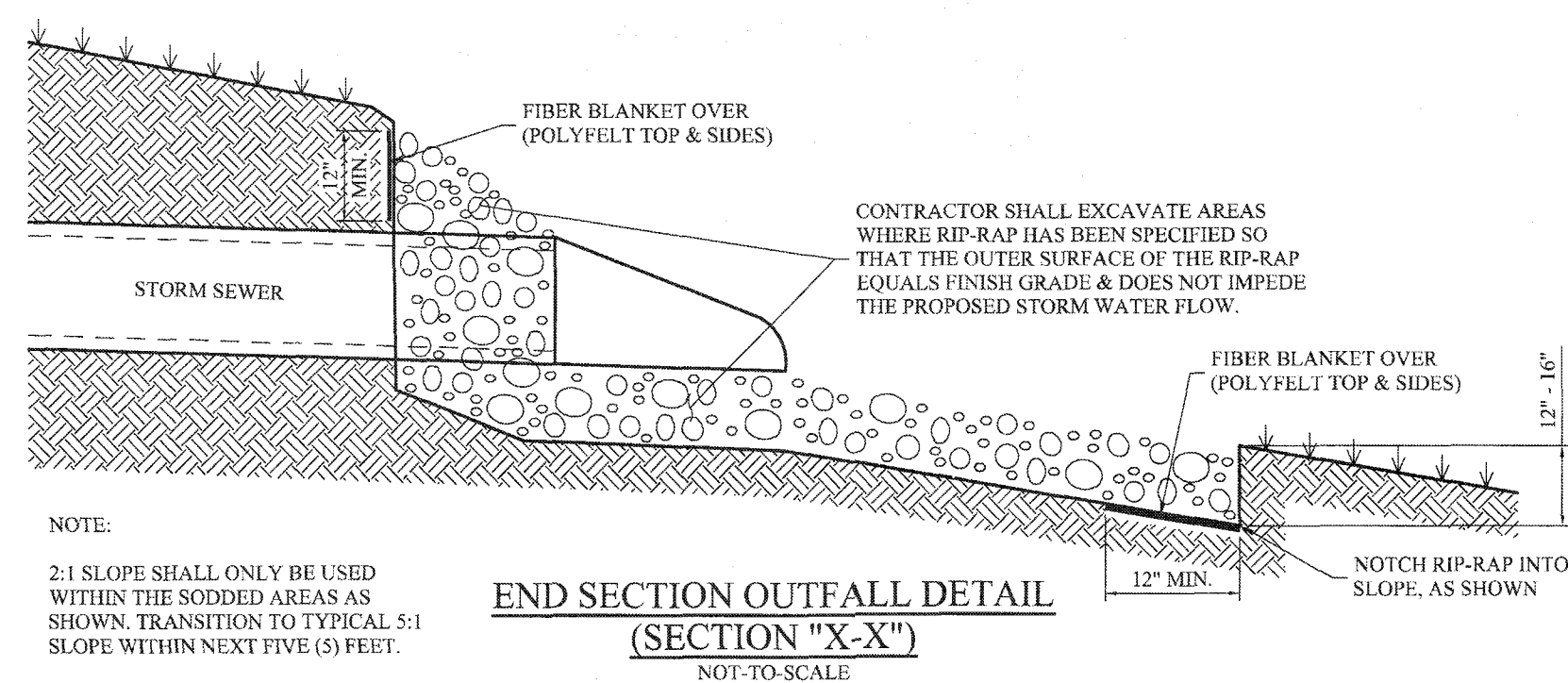
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MANUFACTURE OF END SECTION IS IN ACCORDANCE WITH APPLICABLE PORTIONS OF A S.T.M. SPECIFICATION C76

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NOT-TO-SCALE

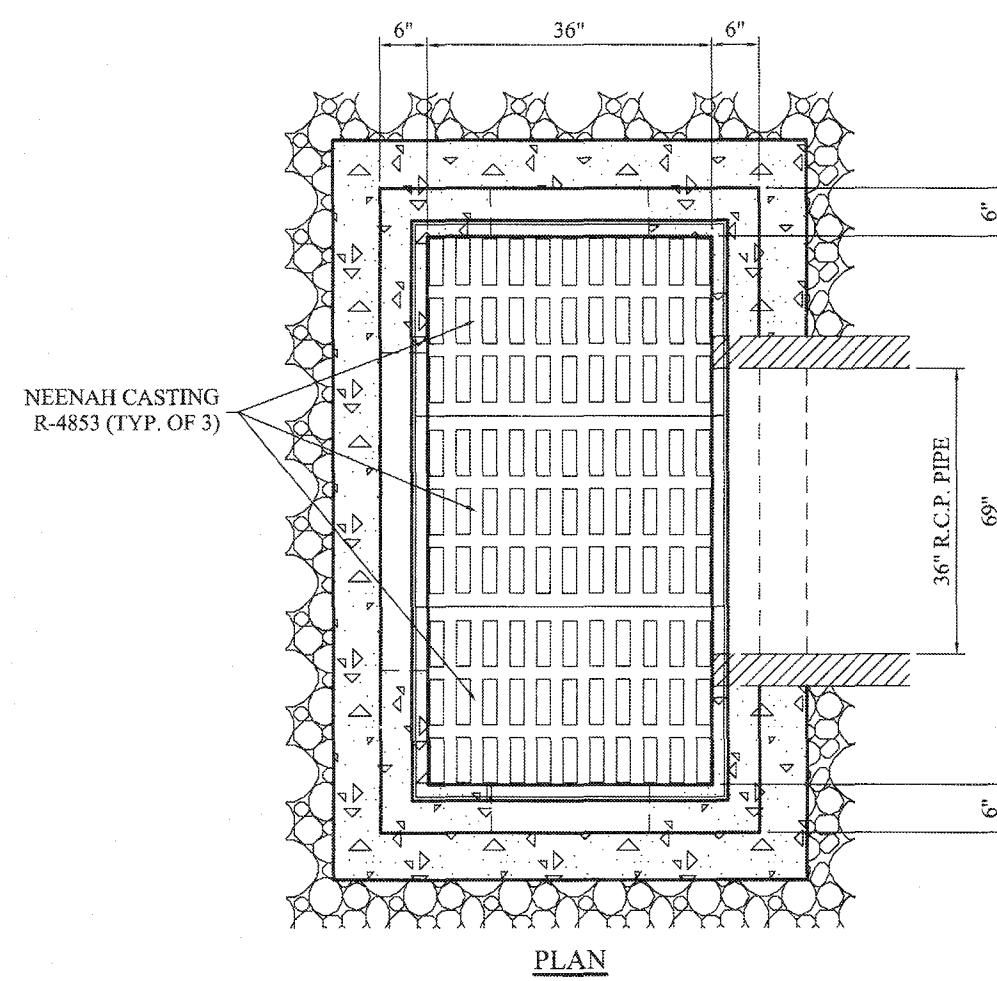
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Plotted / By: May 9, 2019 11:38:36 AM / Paul Richards



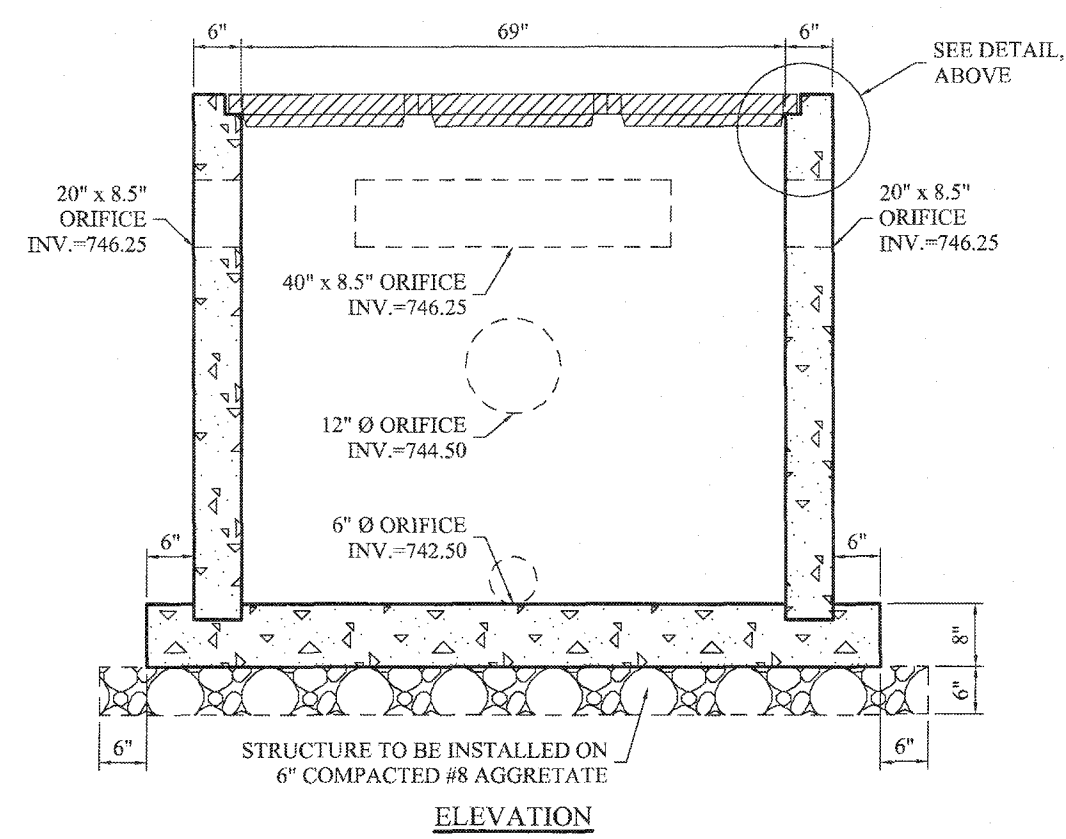
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END SECTION OUTFALL DETAIL
(SECTION "X-X")
NOT-TO-SCALE

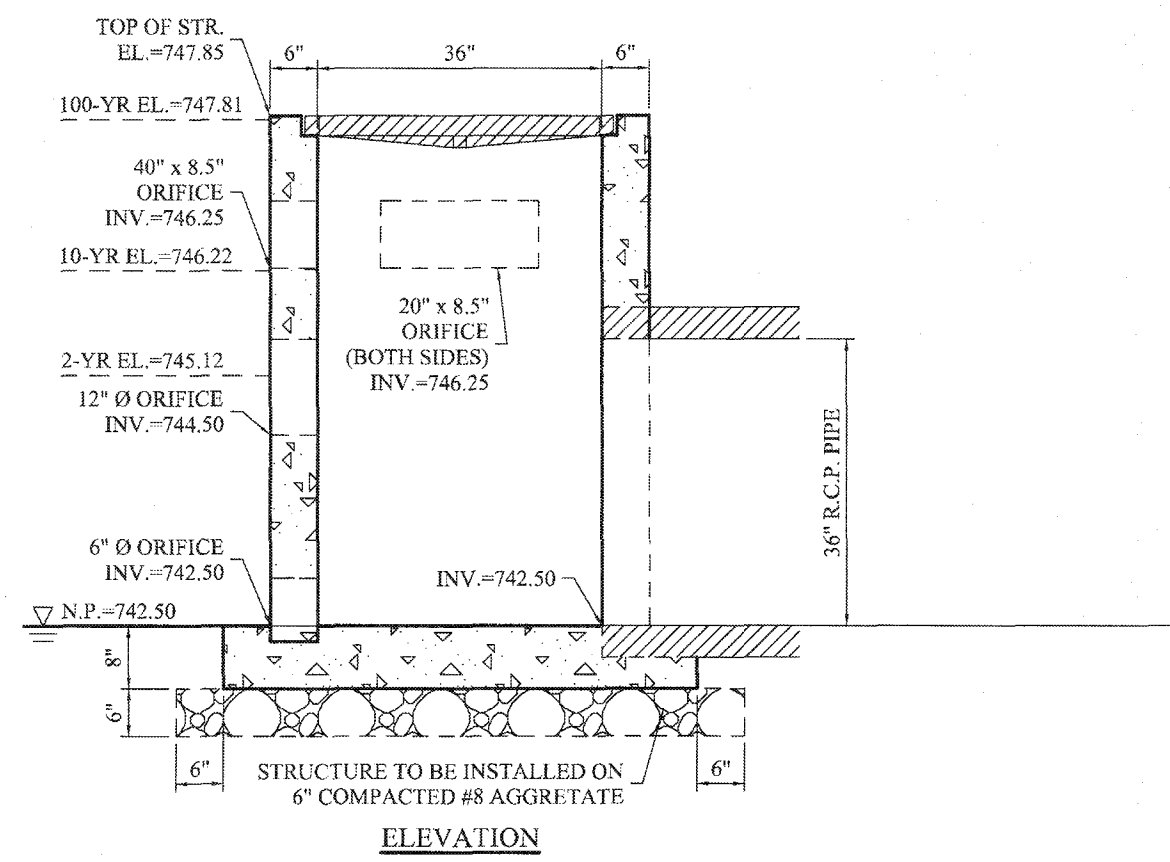


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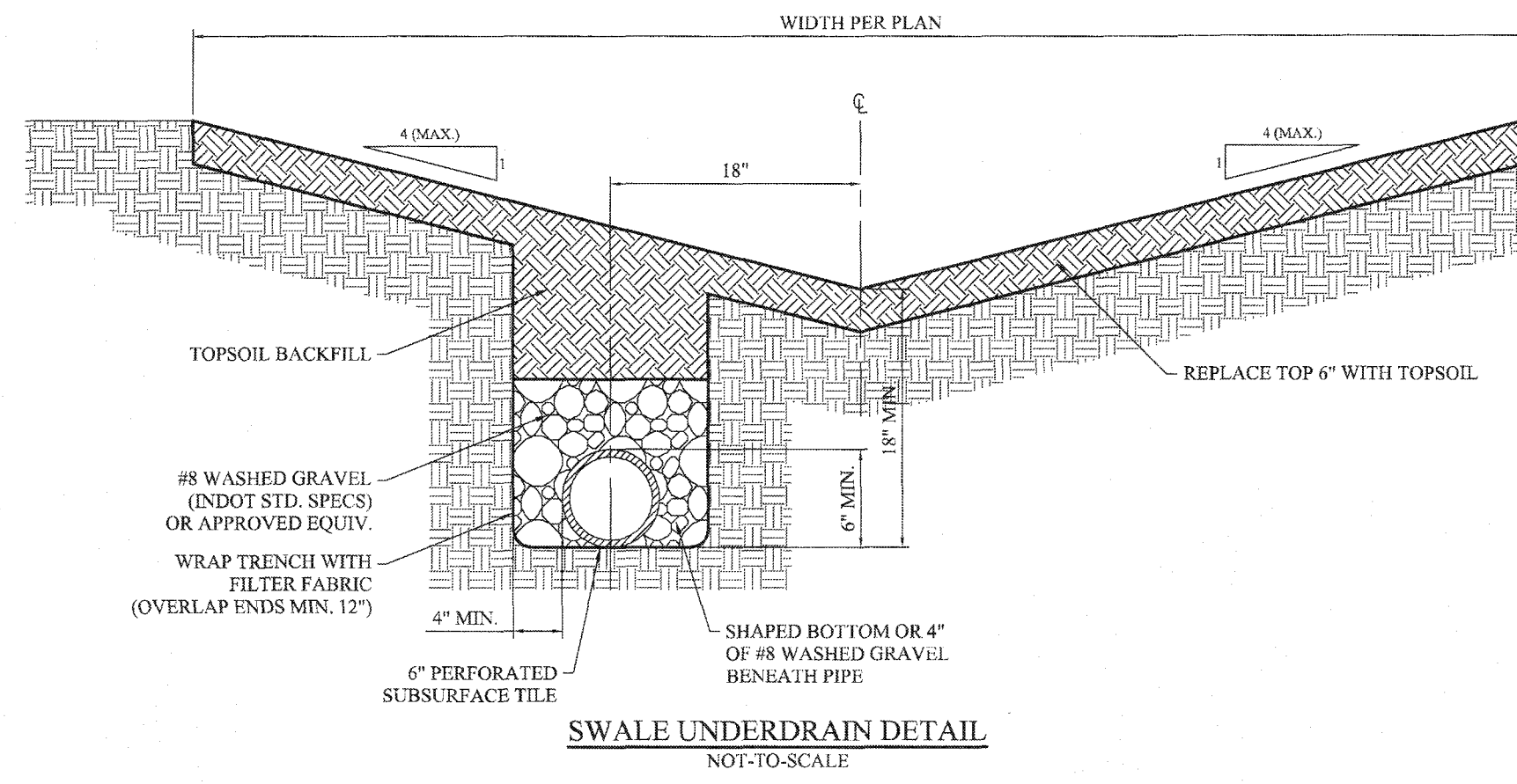


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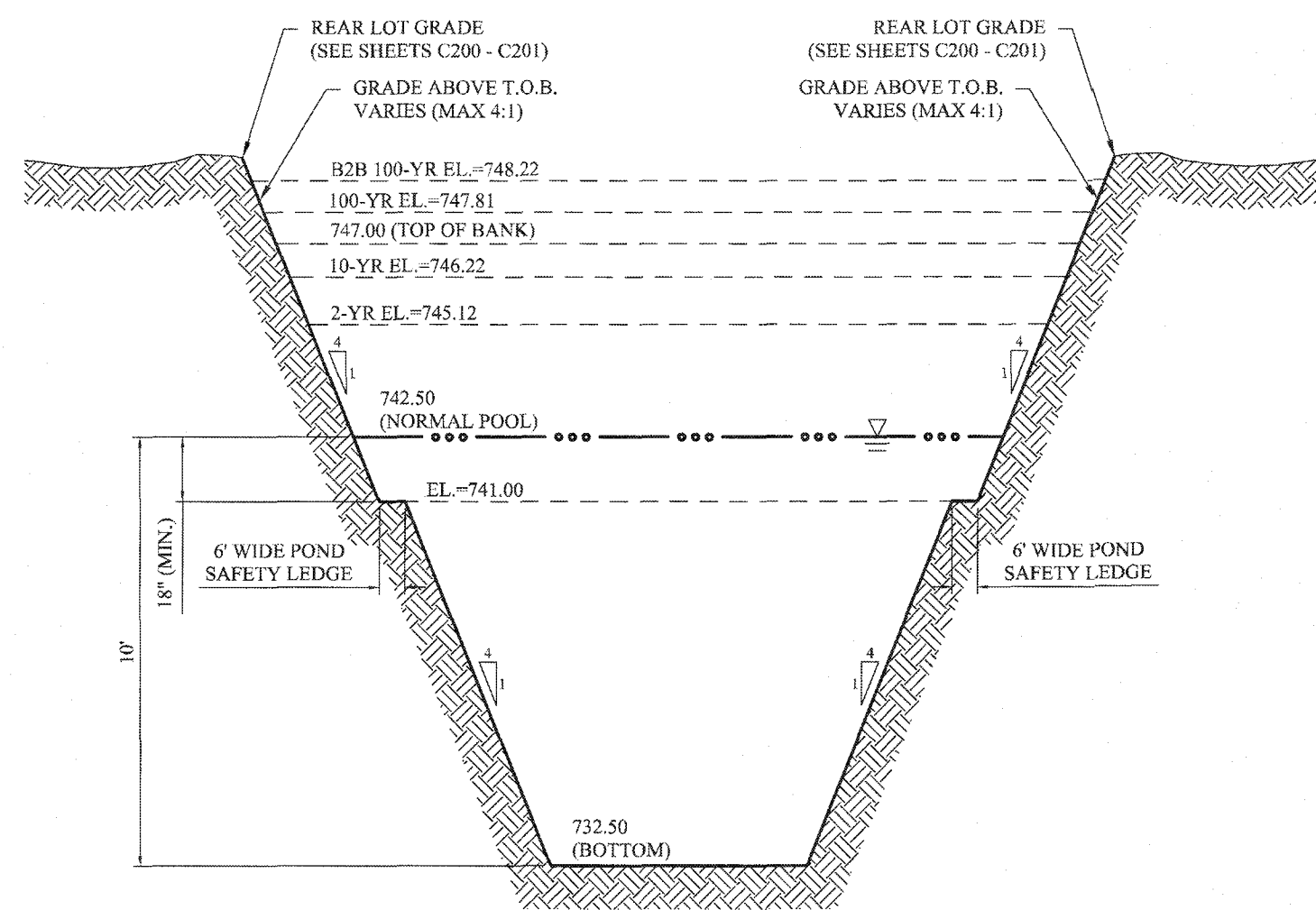
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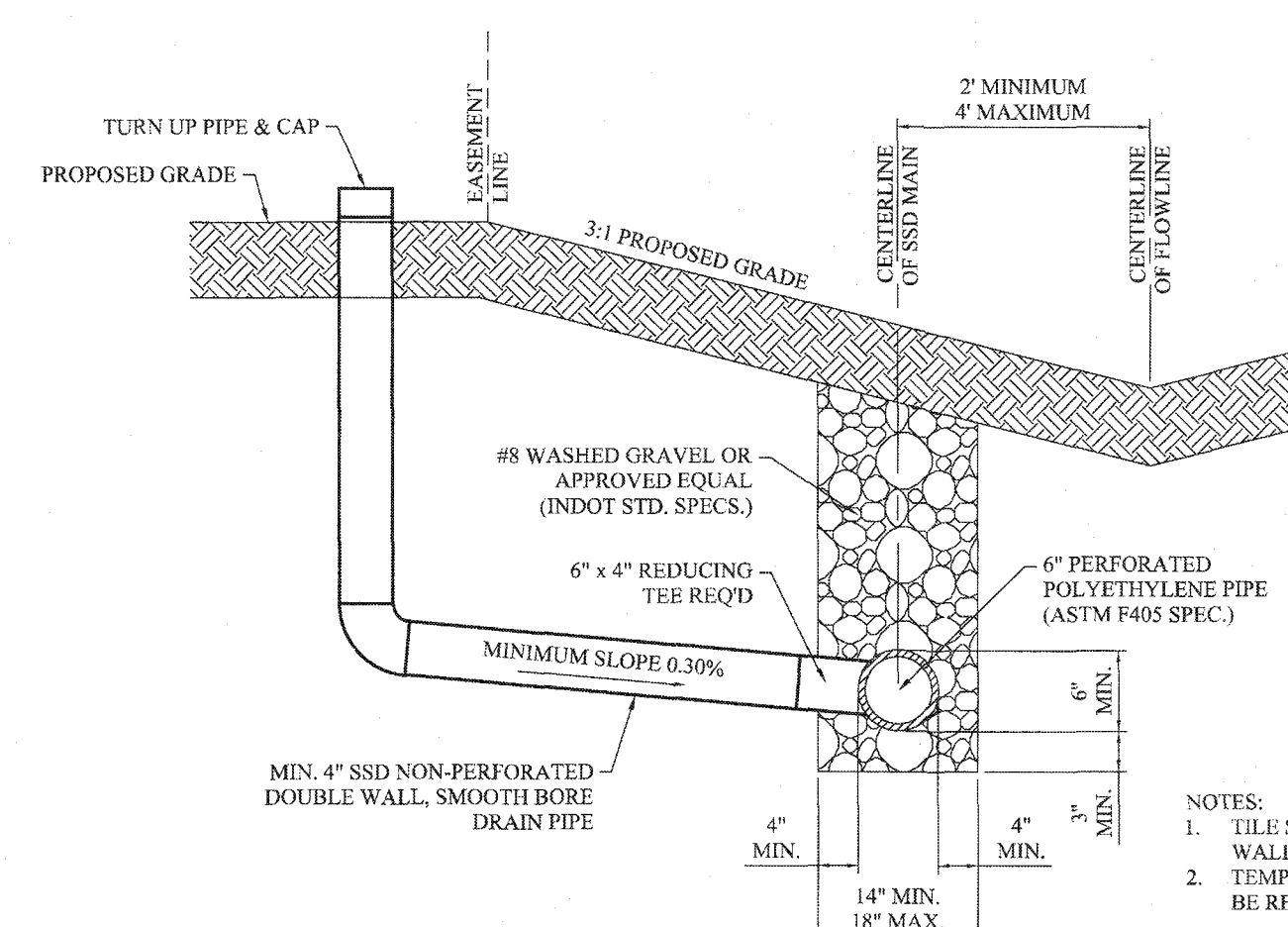
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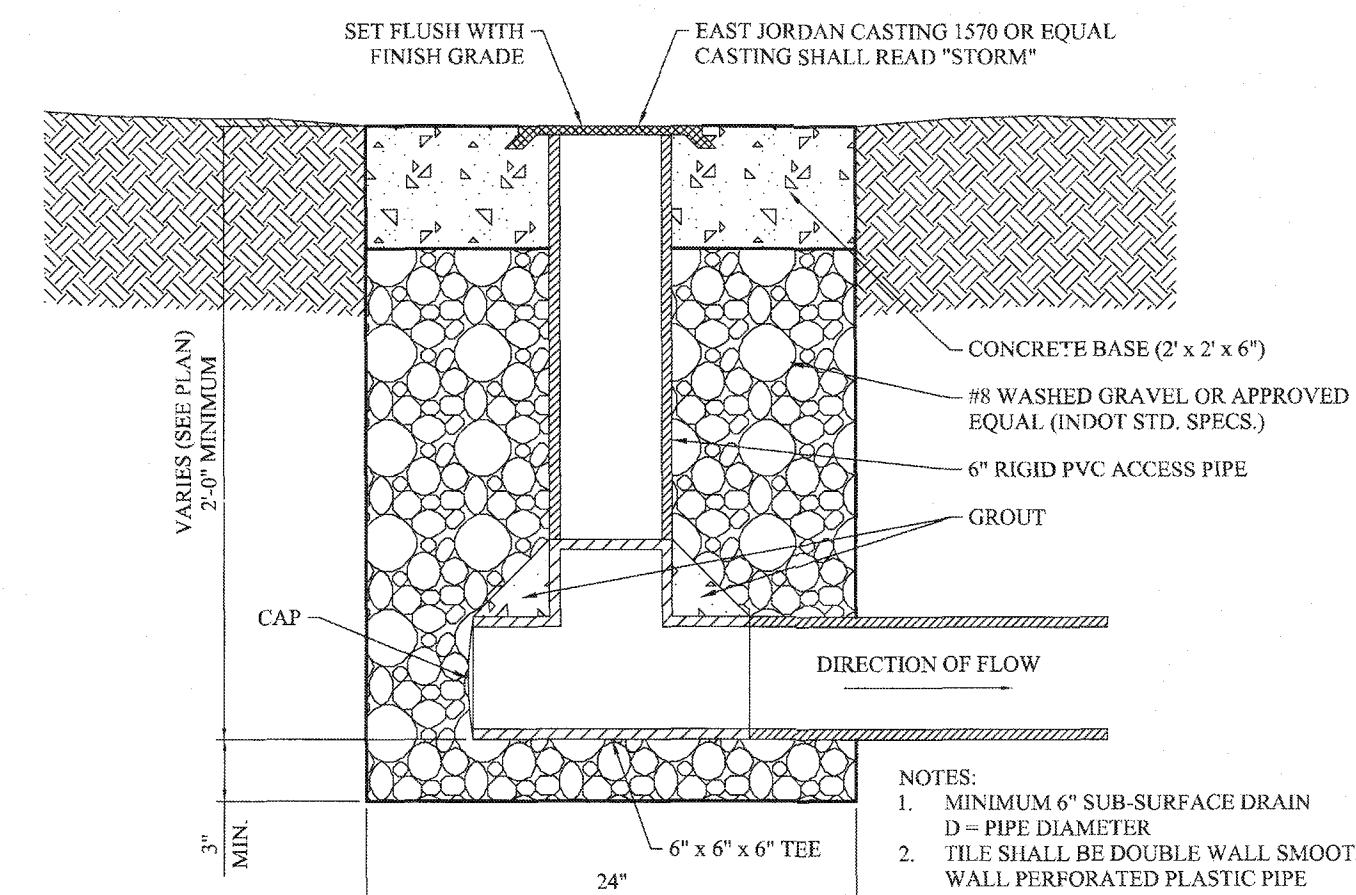
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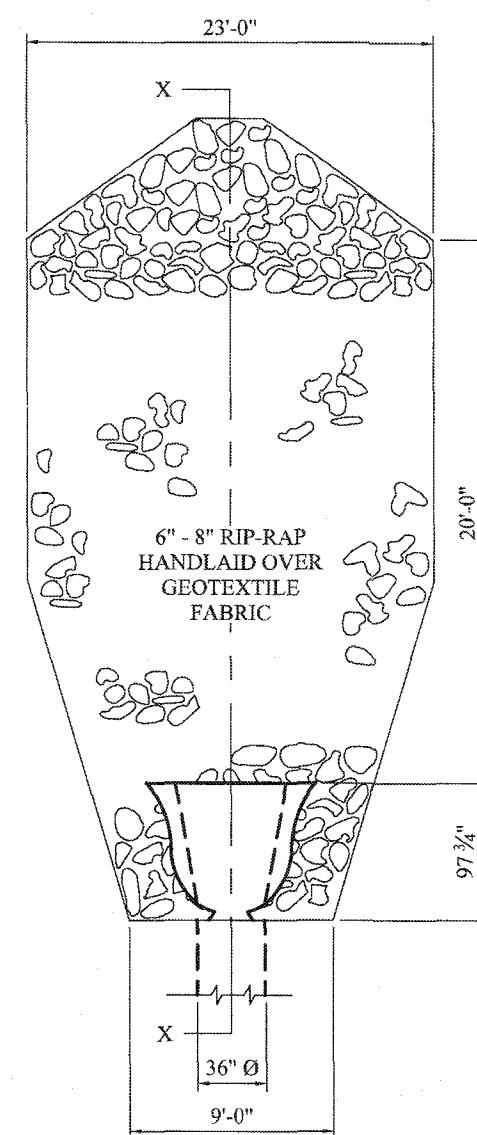
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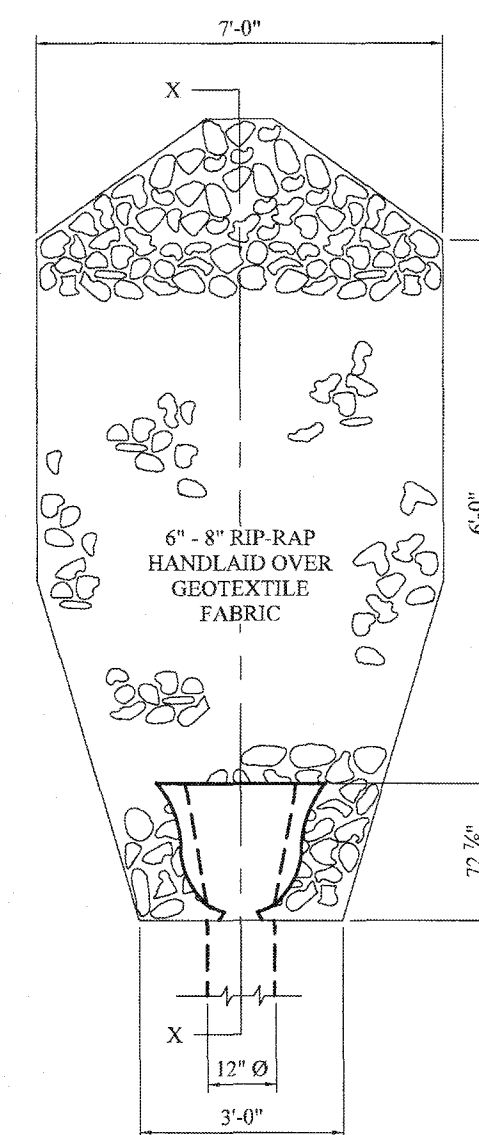
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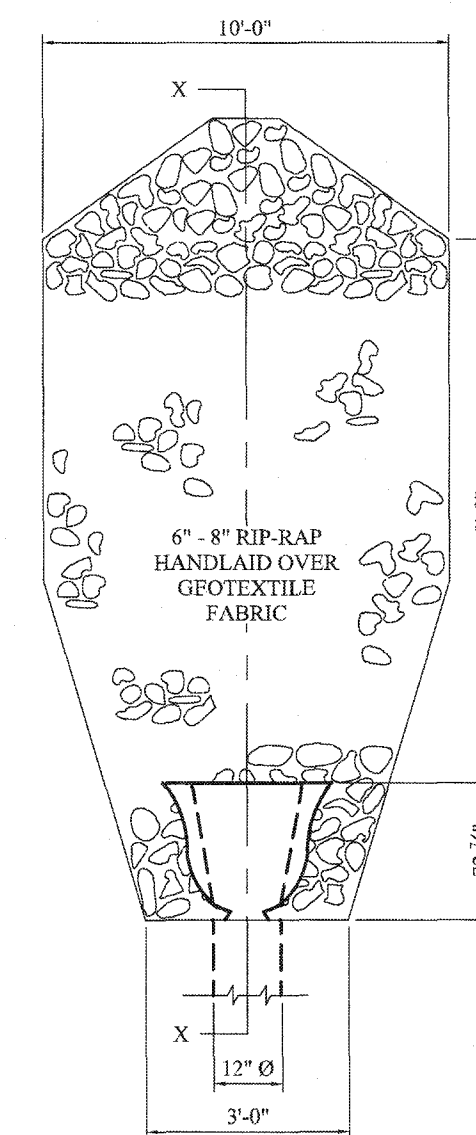
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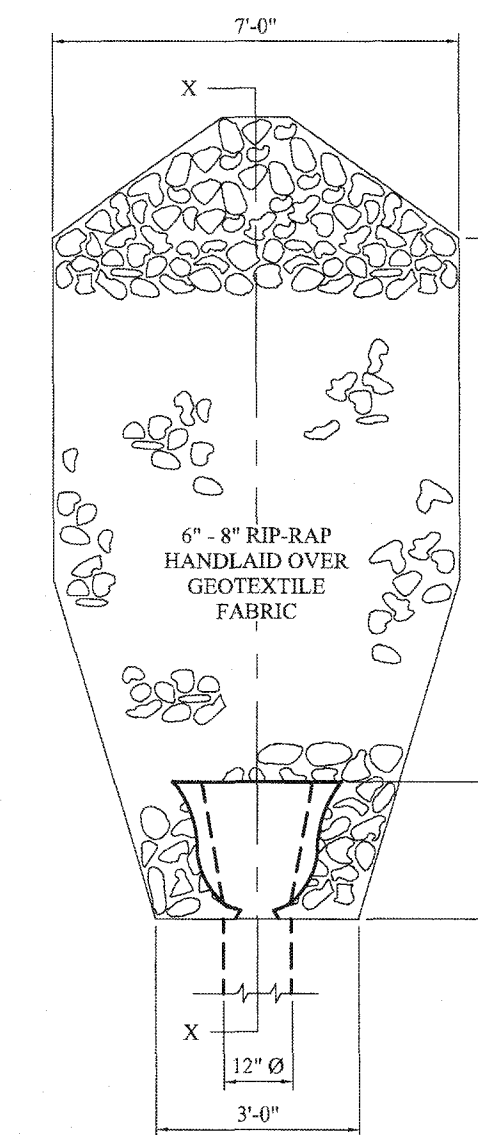
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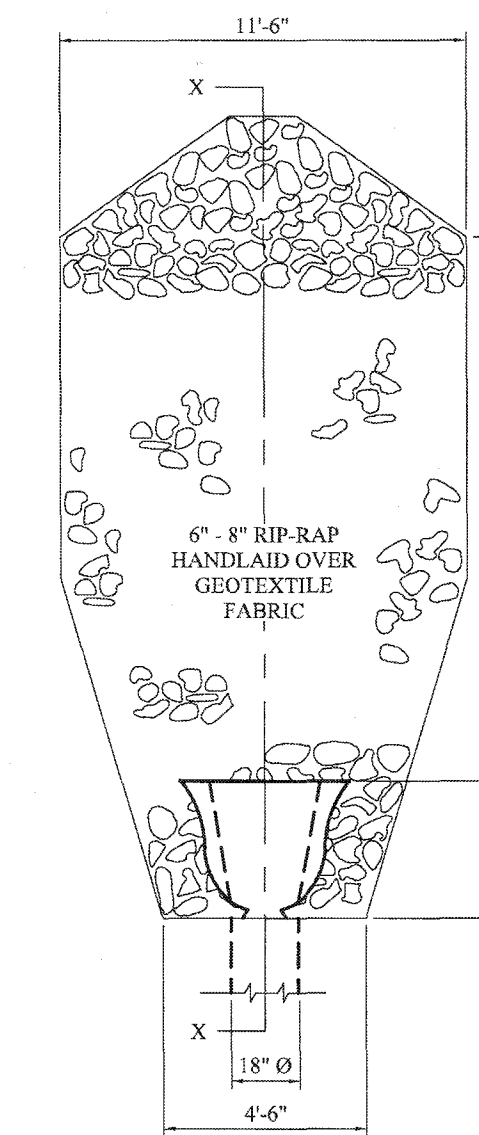
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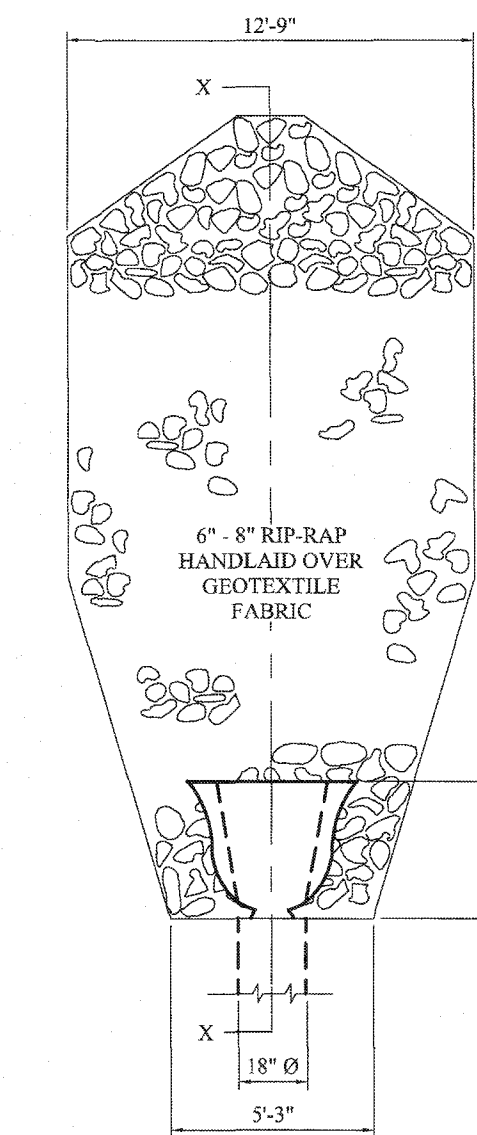
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NOT-TO-SCALE



RIP-RAP DETAIL @ STR. #429
NOT-TO-SCALE

CONSTRUCTION DETAILS

THE BLUFFS AT YOUNGS CREEK
SECTION 1

FRANKLIN, FRANKLIN TOWNSHIP JOHNSON COUNTY, INDIANA

DRAWN BY: PDR CHECKED BY: BKR
SHEET NO. C801B
S & A JOB NO. 83540MMA-S1

STOEPPELWERTH

REGISTERED
No. 19358
STATE OF INDIANA
PROFESSIONAL ENGINEER
David J. Stoepelwerth
CERTIFIED (05/09/19)
THIS DRAWING IS NOT INTENDED TO BE
ORIGINAL BOUNDARY SURVEY OR A ROUTE
SURVEY OR A SURVEYOR LOCATION
REPORT.

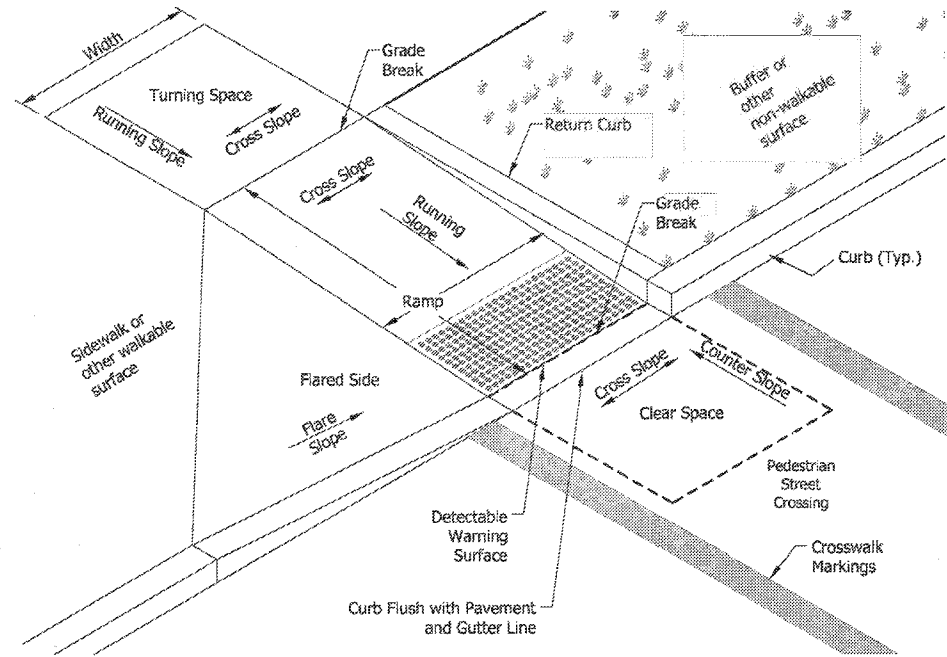
ALWAYS ON
7905 East 106th Street, Fishers, IN 46038-2505
phone: 317.840.5955 fax: 317.840.5942

REVISIONS
DATE MARK

SHEET NO.	INDEX	SUBJECT
1	Curb Ramp Drawing Index and General Notes	
2-3	Perpendicular Curb Ramp Typical Placement	
4	Perpendicular Curb Ramp Component Details	
5	One-Way Directional Perpendicular Curb Ramp Typical Placement	
6	One-Way Directional Perpendicular Curb Ramp Component Details	
7	Parallel Curb Ramp Typical Placement	
8	Parallel Curb Ramp Component Details	
9	Blended Transition Curb Ramp, Depressed Corner and Diagonal Curb Ramp Typical Placement	
10	Blended Transition Curb Ramp Component Details	
11	Median Curb Through and Median Perpendicular Curb Ramp Typical Placement	
12-13	Detectable Warning Surface Placement and Configuration	
14	Detectable Warning Surface Details	

GENERAL NOTES:

- All slopes are absolute rather than relative to the sidewalk or roadway grade. Slopes at least 0.50% less than the maximum are preferred.
- Ramp or Blended Transition. A ramp or blended transition shall be used to lower or raise the sidewalk to connect with the street or highway.
- Turning Space. A turning space shall be provided at the top of a perpendicular ramp, bottom of a parallel ramp, or where the pedestrian travel requires a change in direction. A common turning space may be shared by adjacent ramps. The turning space shall have a minimum clear dimension of 4 ft x 4 ft. Where the turning space is constrained at the back of the sidewalk by a curb, retaining wall, building, or feature over 2 inches in height, the minimum clear dimension shall be 4 ft x 5 ft, with the 5 ft dimension in the direction of the ramp running slope.
- Flared Side. A flared side shall be used adjacent to a walkable surface. A flared side may be used adjacent to a non-walkable surface. A flared side shall have a maximum slope of 10.00% measured parallel to the back of the curb.
- Return Curb. A return curb is placed perpendicular to the roadway curb. A return curb may be used adjacent to a non-walkable surface. A return curb shall not be used adjacent to a walkable surface. The return curb may be omitted where the non-walkable surface is flared and the curb adjacent to the roadway is tapered to meet the flush curb at the bottom of the ramp.
- Clear Space. A clear space shall be provided beyond the bottom grade break of a curb ramp wholly contained within the crosswalk and wholly outside the parallel vehicular travel path. The clear space shall have a minimum clear dimension of 4 ft x 4 ft.
- Detectable Warning Surface. A detectable warning surface shall consist of truncated domes and be placed at each street, highway, or railroad crossing. The detectable warning surface shall extend a minimum of 2 ft in the direction of pedestrian travel and be placed the entire width of a ramp, blended transition, or turning space.
- Running Slope. The running slope of a ramp, blended transition, or turning space shall be measured parallel to the direction of pedestrian travel.
 - A running slope of 2.00% or less is considered flat.
 - A ramp shall have a maximum running slope of 8.33%, but shall not require a ramp length to exceed 15 ft.
 - A blended transition shall have a maximum running slope of 5.00%.
 - A turning space shall have a maximum running slope of 2.00%.
- Width. Unless otherwise noted, minimum width of a ramp, blended transition, or turning space, excluding flared sides or return curbs, shall be 4 ft.
- Grade Break. A grade break at the top and bottom of a ramp, blended transition, or turning space shall be perpendicular to the running slope. Grade breaks shall not be within the ramp, blended transition, turning space, or detectable warning surface. Grade breaks shall be flush. Vertical discontinuities shall not be greater than 1/2 in. Where a discontinuity is greater than 1/4 in, the surface shall be beveled with a slope not steeper than 1V:2H.
- Cross Slope Exceptions. The cross slope of a ramp, blended transition, or turning space shall be measured perpendicular to the direction of pedestrian travel.
 - The maximum cross slope at a pedestrian street crossing without yield or stop control shall be 5.00%.
 - The maximum cross slope at a pedestrian street crossing with yield or stop control shall be 2.00%.
 - The maximum cross slope at a midblock crossing shall be the established grade of the adjacent roadway.
- Counter Slope. A counter slope is the cross slope of the gutter or street adjacent to the running slope of the ramp, blended transition, or turning space. See Standard Drawing E 604-SWCR-14 for counter slope details.
- Objects such as a utility cover, vault, frame, and grating shall be placed outside the curb ramp.
- Curb ramps shall be placed within the marked crosswalk area.
- Drainage inlets should be located uphill from a curb ramp to prevent ponding in the path of pedestrian travel.



TYPICAL CURB RAMP COMPONENTS

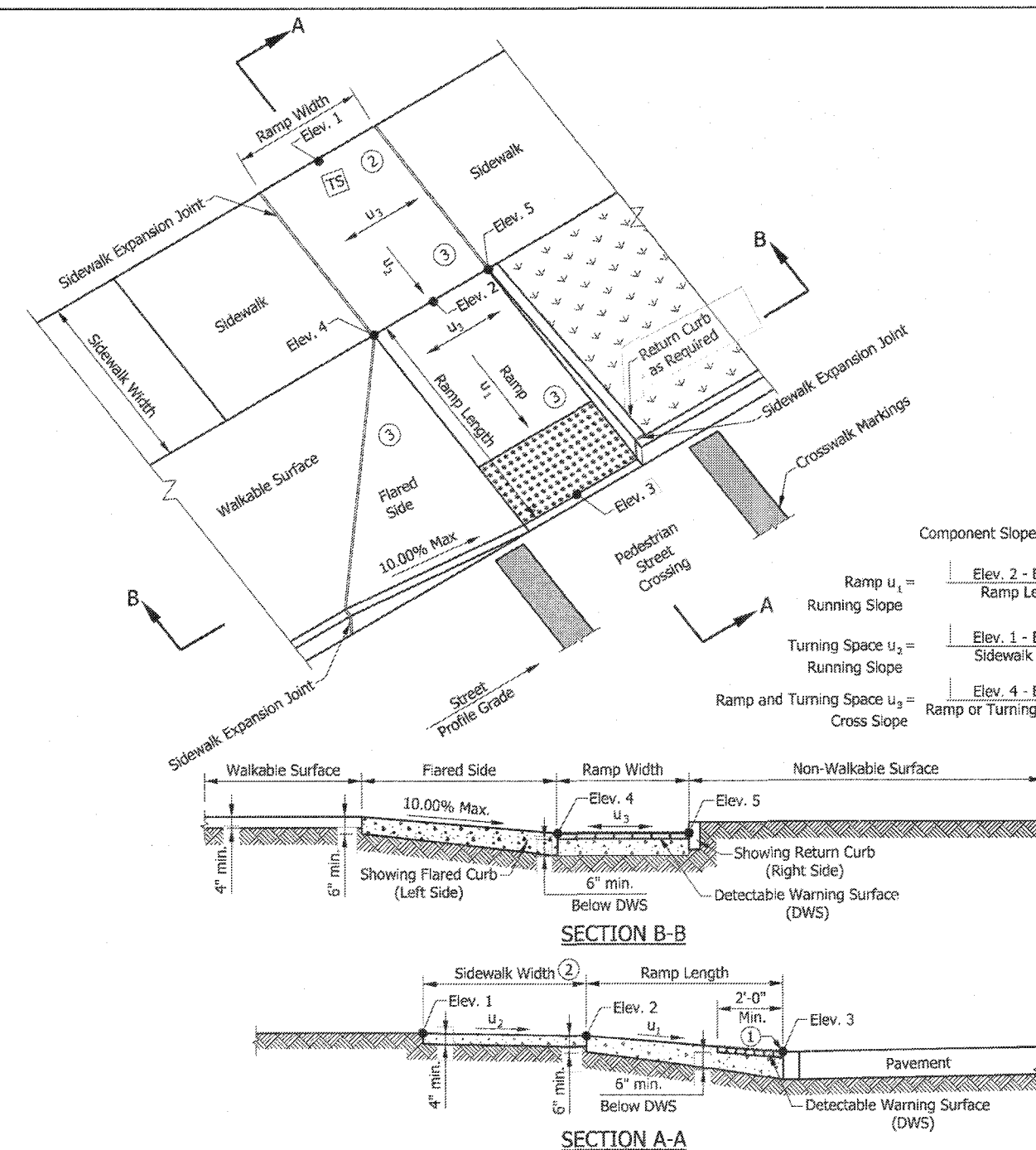
INDIANA DEPARTMENT OF TRANSPORTATION

CURB RAMP DRAWING INDEX AND GENERAL NOTES

SEPTEMBER 2018

STANDARD DRAWING NO. E 604-SWCR-01

	<i>/s/ Elizabeth W. Phillips</i> DESIGN STANDARDS ENGINEER DATE 03/29/18
	<i>/s/ John Leckie</i> CHIEF ENGINEER DATE 04/25/18



NOTES:

- The bottom edge of the ramp and top of curb shall be flush with the edge of adjacent pavement and gutter line.
- The turning space shall have a minimum clear dimension of 4 ft x 4 ft. Where the turning space is constrained at the back of the sidewalk, the minimum clear dimension shall be 4 ft x 5 ft, with the 5 ft dimension in the direction of the ramp running slope. Where a tiered perpendicular curb ramp is used, a constrained turning space shall have a minimum clear dimension of 5 ft x 5 ft.
- Curb ramp surface shall be coarse broomed transverse to the running slope.
- See Standard Drawing E 604-SWCR-01 for cross slope exceptions.
- See Standard Drawing E 604-SWCR-12, -13, and -14 for Detectable Warning Surface placement, configuration, and details.
- See Standard Drawing E 604-CCS-01 for sidewalk expansion joint details.

LEGEND:

- Buffer or Other Non-Walkable Surface
- Ramp
- Detectable Warning Surface
- Turning Space

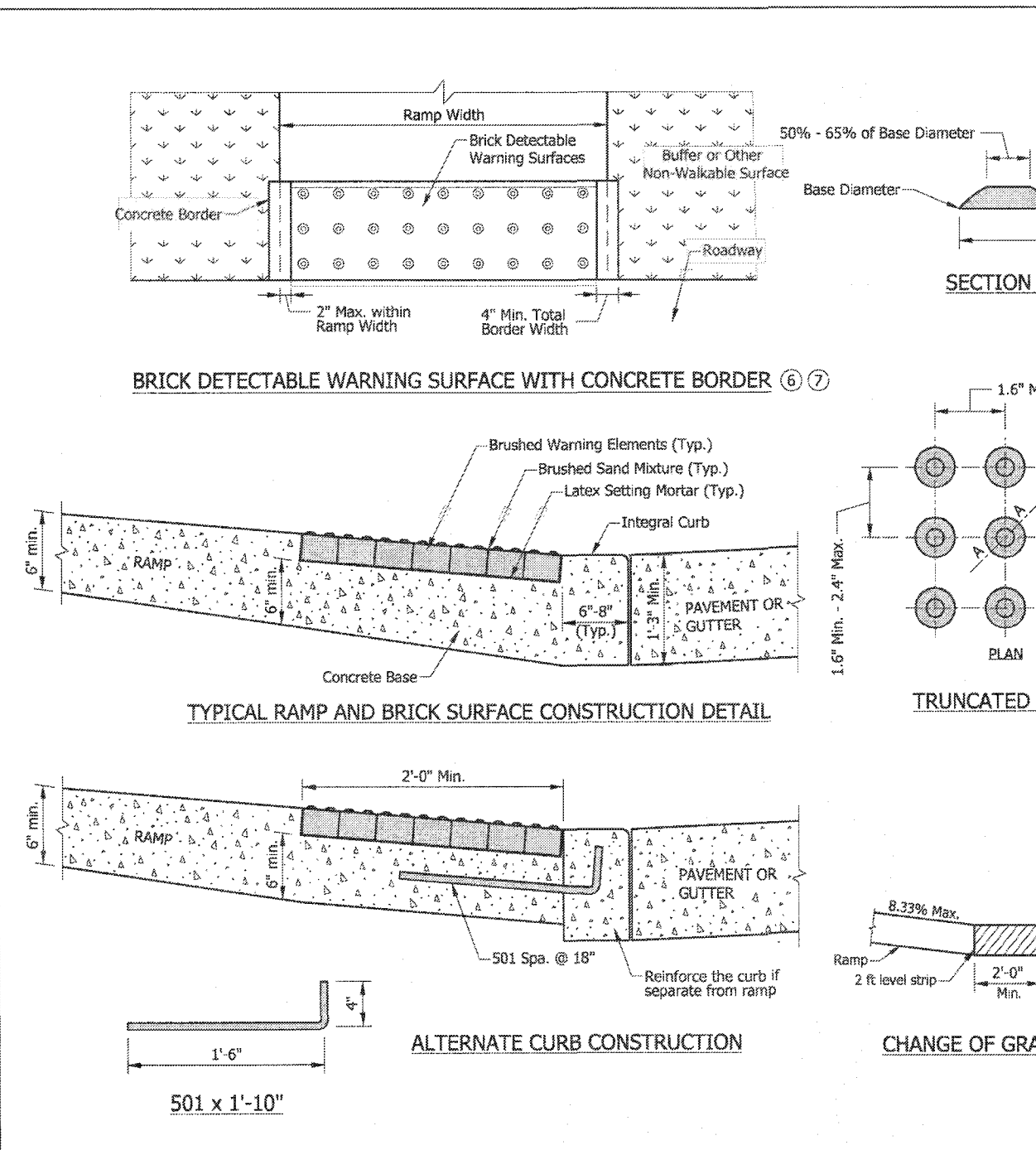
INDIANA DEPARTMENT OF TRANSPORTATION

PERPENDICULAR CURB RAMP COMPONENT DETAILS

SEPTEMBER 2018

STANDARD DRAWING NO. E 604-SWCR-04

	<i>/s/ Elizabeth W. Phillips</i> DESIGN STANDARDS ENGINEER DATE 03/29/18
	<i>/s/ John Leckie</i> CHIEF ENGINEER DATE 04/25/18



NOTES:

- Detectable warning surface shall consist of truncated domes. Domes shall be aligned in a square or radial grid pattern with diameter and center-to-center spacing within the ranges specified.
- The detectable warning surface may be field cut. Truncated dome spacing between adjacent panels shall be within the ranges specified.
- The detectable warning surface shall contrast visually with adjacent surfaces, either light-on-dark or dark-on-light.
- The detectable warning surface shall extend a minimum of 2 ft in the direction of pedestrian travel and extend the full width as shown. The detectable warning surface shall not be placed across a grade break.
- The maximum counter slope of the gutter or street at the bottom of the ramp shall be 5.00%. Where the algebraic difference between the running slope and the counter slope exceeds 11%, a 2-ft minimum level strip should be provided at the bottom of the ramp.
- Where a concrete border is used for forming, the border shall be cast monolithically with the curb ramp concrete. The concrete border shall not reduce the ramp width by more than 2 in. on each side.
- Where forming other than a concrete border is used, the edge restraint shall not encroach upon the ramp width.

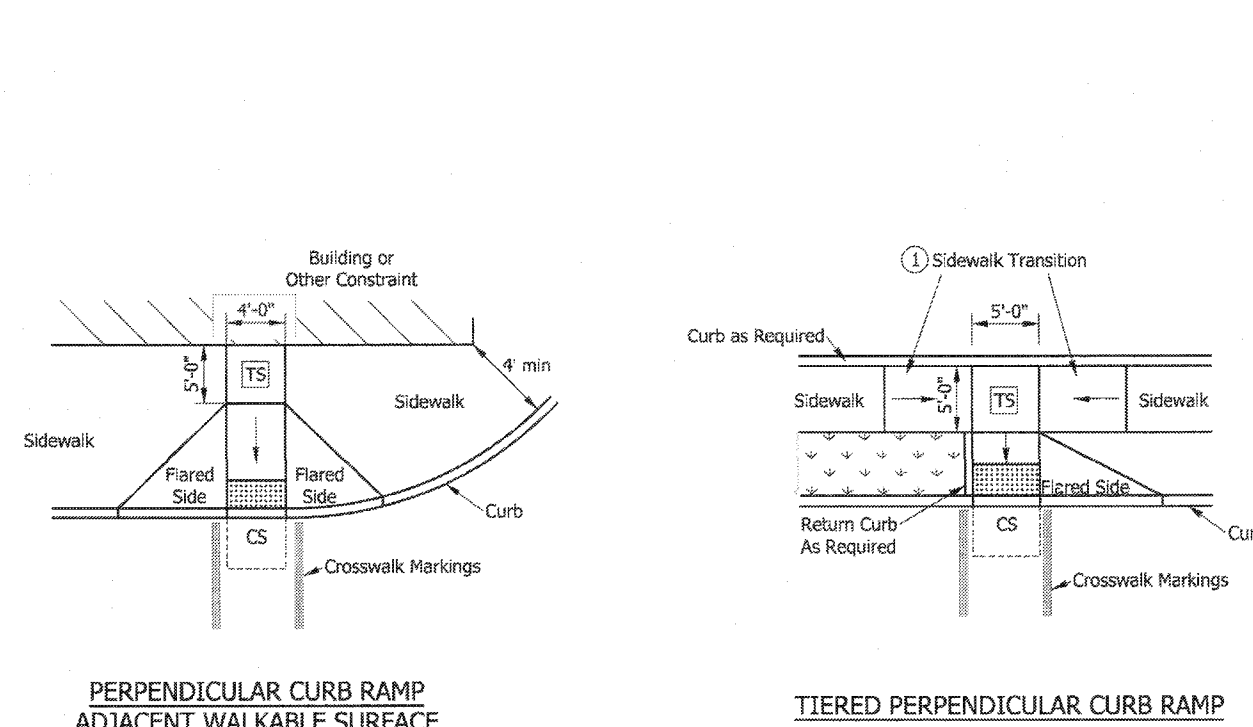
INDIANA DEPARTMENT OF TRANSPORTATION

DETECTABLE WARNING SURFACE DETAILS

SEPTEMBER 2018

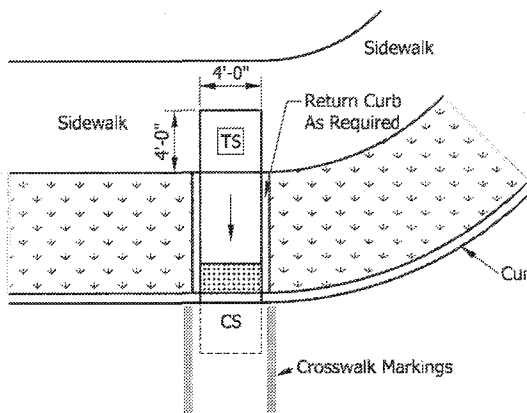
STANDARD DRAWING NO. E 604-SWCR-14

	<i>/s/ Elizabeth W. Phillips</i> DESIGN STANDARDS ENGINEER DATE 03/29/18
	<i>/s/ John Leckie</i> CHIEF ENGINEER DATE 04/25/18



PERPENDICULAR CURB RAMP ADJACENT WALKABLE SURFACE

TIERED PERPENDICULAR CURB RAMP



PERPENDICULAR CURB RAMP ADJACENT NON-WALKABLE SURFACE

NOTES:

- Where sufficient width between the curb and back of sidewalk prevent a standard perpendicular curb ramp running slope, a sidewalk transition may be used to lower the sidewalk grade. The sidewalk transition running slope shall not exceed 8.33%. See Standard Drawing Series E 604-SDWK for sidewalk details.
- The turning space shall have a minimum clear dimension of 4 ft x 4 ft and a running slope of 2.00% maximum. Where the turning space is constrained at the back of the sidewalk, the minimum clear dimension shall be 4 ft x 5 ft, with the 5 ft dimension in the direction of the ramp running slope.

LEGEND:

- Buffer or Other Non-Walkable Surface
- Ramp
- Detectable Warning Surface
- Turning Space
- Clear Space

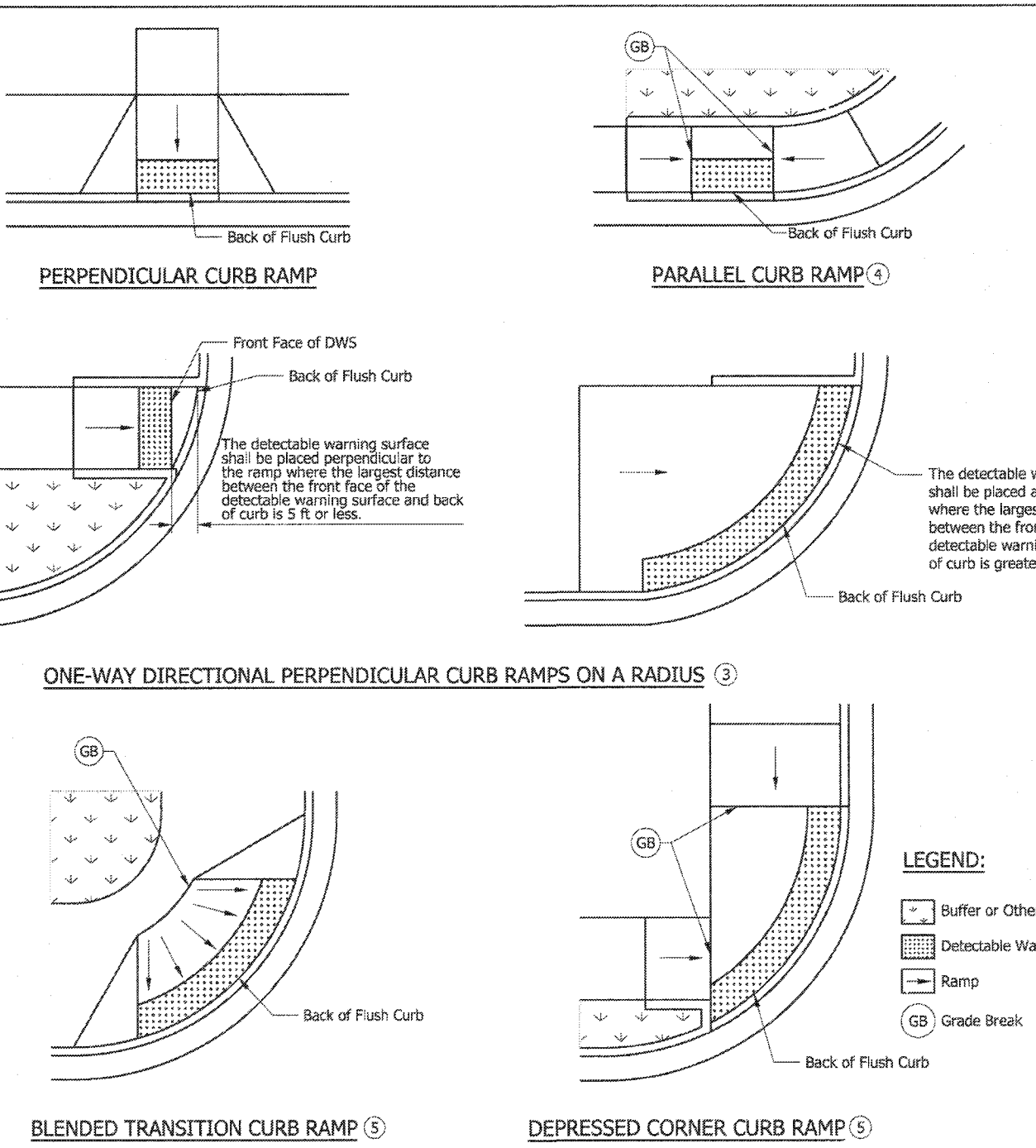
INDIANA DEPARTMENT OF TRANSPORTATION

PERPENDICULAR CURB RAMP TYPICAL PLACEMENT

SEPTEMBER 2018

STANDARD DRAWING NO. E 604-SWCR-02

	<i>/s/ Elizabeth W. Phillips</i> DESIGN STANDARDS ENGINEER DATE 03/29/18
	<i>/s/ John Leckie</i> CHIEF ENGINEER DATE 04/25/18



NOTES:

- A detectable warning surface shall be placed at each street, highway, or railroad crossing. See Standard Drawing E 604-SDWK-03 for a detectable warning surface placement at a sidewalk driveway crossing.
- The detectable warning surface shall extend a minimum of 2 ft in the direction of pedestrian travel and extend the full width as shown. The detectable warning surface shall not be placed across a grade break.
- Where the distance from the face of the detectable warning surface is 5 ft or less from the back of curb, the detectable warning surface shall be placed perpendicular to the ramp. Where the distance from the face of the detectable warning surface is more than 5 ft from the back of curb, the detectable warning surface shall be placed at the back of curb as shown or in an alternate placement configuration. See Standard Drawing E 604-SWCR-13 for alternate detectable warning surface placement.
- The detectable warning surface on a parallel curb ramp shall be placed on the turning space at the flush transition between the street and turning space at the back of curb.
- The detectable warning surface on a blended transition or depressed corner shall be placed at the back of curb as shown or in an alternate placement configuration. See Standard Drawing E 604-SWCR-13 for alternate detectable warning surface placement.
- See Standard Drawing E 604-SWCR-14 for detectable warning surface details.

LEGEND:

- Buffer or Other Non-Walkable Surface
- Detectable Warning Surface (DWS)
- Ramp
- GB Grade Break

INDIANA DEPARTMENT OF TRANSPORTATION

DETECTABLE WARNING SURFACE PLACEMENT AND CONFIGURATION

SEPTEMBER 2018

STANDARD DRAWING NO. E 604-SWCR-12

	<i>/s/ Elizabeth W. Phillips</i> DESIGN STANDARDS ENGINEER DATE 03/29/18
	<i>/s/ John Leckie</i> CHIEF ENGINEER DATE 04/25/18

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Modified / By: May 9, 2018 7:56:14 AM / jrichards
Plotted / By: May 9, 2018 11:35:57 AM / Paul Richards

<div>Return to Table of Contents</div> <div>SECTION 15105 DUCTILE IRON PIPE AND FITTINGS</div> <div>PART 1: GENERAL</div> <div>1.01 SCOPE OF WORK</div> <p>The work under this section consists of providing all labor, materials, tools, equipment, and services required to install and test all ductile iron (DI) pipe and fittings (4 inch through 48 inch nominal diameter) for water distribution and transmission as indicated on the Drawings and as specified within this section and related sections of the Specification. Contractor shall furnish and install all required pipe restraint components and other related components that are not furnished by the Owner. Refer to Sections 01000, 01011, and 01075 for materials to be furnished by the Owner.</p> <div>1.02 SUBMITTALS</div> <p>A. Contractor shall submit Shop Drawings, manufacturer's literature and product data, installation instructions, and certifications for all products furnished under this section in accordance with Section 01300.</p> <p>B. Required certifications include those specified under Quality Assurance below.</p> <div>1.03 QUALITY ASSURANCE</div> <p>A. Ductile iron pipe and fittings shall meet the minimum quality requirements by conforming to the below-referenced AWWA/ANSI standards as modified herein. Ductile iron pipe and fittings will be accepted on the basis of the Manufacturer's certification that the materials conform to this section.</p> <p>B. The certification for ductile iron fittings shall list a fitting description, quantity, bare fitting weight, source, and applicable AWWA standard (C110 or C153). The certification shall accompany each delivery of the material to the project site.</p> <p>C. Owner reserves the right to sample and test these materials subsequent to delivery at the project site.</p> <p>D. Bolt manufacturer's certification of compliance must accompany each shipment.</p> <p>E. If foreign-manufactured fittings are furnished, Contractor shall notify the Engineer in the Shop Drawing submittal and provide the necessary documentation to satisfy the Engineer and the Owner that the materials furnished meet the specified AWWA standards and, among other documentation that may be required, provide certificates of compliance on the components supplied.</p> <p>A. ASME / ANSI B1.1 - Unified Inch Screw Threads</p>		<div>1.04 RELATED WORK</div> <p>A. Section 01000 Summary of Work</p> <p>B. Section 01011 Special Provisions</p> <p>C. Section 01075 Basis of Payment</p> <p>D. Section 01300 Submittals</p> <p>E. Section 01600 Products</p> <p>F. Section 02210 Trenching, Backfilling and Compacting</p> <p>G. Section 02558 Identification/Location Guide</p> <p>H. Section 15000 Piping - General Provisions</p> <p>I. Section 15020 Disinfecting Pipelines</p> <p>J. Section 15025 Flushing and Cleaning Pipelines</p> <p>K. Section 15030 Pressure and Leakage Tests</p> <p>L. Section 15130 Piping Specialties</p> <p>M. Section 15150 Gate Valves</p> <p>N. Section 15155 Butterfly Valves</p> <p>O. Section 15170 Tapping Sleeves, Saddles, and Valves</p> <p>P. Section 15180 Fire Hydrants</p> <p>Q. Section 15185 Abandonment of Mains and Hydrants</p> <p>R. Section 15190 Air Valves, Blow-off Assemblies and Sampling Taps</p> <p>S. Section 15200 Service Lines</p> <div>1.05 REFERENCE</div> <p>Unless otherwise indicated, all references herein to other standards (e.g. AWWA, ASTM, ASME, ANSI etc.) shall mean the most current available revision. The following referenced documents are a part of this section. Comply with all applicable provisions and recommendations of the following documents, except as otherwise specified herein. Where a referenced document contains references to other standards, those other standards are included as references under this section as if referenced directly. In the event of a conflict between the requirements of this section and those of the referenced documents, the requirements of this section shall prevail.</p> <p>A. ASME / ANSI B1.1 - Unified Inch Screw Threads</p>		<div>B. ASME / ANSI B16.42 - Ductile Iron Pipe Flanges and Flanged Fittings. Classes 150 and 300</div> <div>C. ASME / ANSI B16.2 - Square and Hex Bolts and Screws (Inch Series)</div> <div>D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength</div> <div>E. ASTM A536 - Standard Specification for Ductile Iron Castings</div> <div>F. AWWA C104 / ANSI A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings</div> <div>G. AWWA C105 / ANSI A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems</div> <div>H. AWWA C110 / ANSI A21.10 - Ductile-Iron and Gray-Iron Fittings</div> <div>I. AWWA C111 / ANSI A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings</div> <div>J. AWWA C115 / ANSI A21.15 - Flanged Ductile-Iron Pipe with Threaded Flanges</div> <div>K. AWWA C116 / ANSI A21.16 - Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Service</div> <div>L. AWWA C150 / ANSI A21.50 - Thickness Design of Ductile-Iron Pipe</div> <div>M. AWWA C151 / ANSI A21.51 - Ductile-Iron Pipe, Centrifugally Cast</div> <div>N. AWWA C153 / ANSI A21.53 - Ductile-Iron Compact Fittings</div> <div>O. AWWA C600 - Installation of Ductile-Iron Mains and their Appurtenances as described in the DIFRA Guideline, Installation Guide for Ductile Iron Pipe, as follows:</div> <div>P. NSF/ANSI 61 Drinking Water System Components - Health Effects</div> <div>PART 2: PRODUCTS</div> <div>2.01 GENERAL</div> <p>A. No foreign-manufactured pipe or appurtenances, except for ductile iron fittings, shall be allowed. All pipe and restraints shall be produced solely in the United States.</p> <p>B. All materials that come in contact with potable water, including lubricants, shall be evaluated, tested, and certified for conformance with ANSI/NSF Standard 61.</p>		<div>2.02 DUCTILE IRON PIPE</div> <p>A. Ductile iron pipe shall conform to the latest specifications as adopted by the American National Standards Institute, Inc. (ANSI) and the American Water Works Association (AWWA). Specifically, ductile iron pipe shall conform to AWWA C151 in standard specified sizes, except as modified herein. Pipe shall be supplied in 18 or 20 foot nominal lengths or as required to meet the requirements of the Drawings.</p> <p>B. The pipe exterior shall be coated with an asphaltic coating in accordance with AWWA C151. The pipe interior shall be cement mortar lined and asphaltic seal coated in compliance with the latest revision of AWWA C104.</p> <p>C. <u>Pipe Class:</u> Pipe wall thickness shall be the required pressure or thickness class based on the design conditions in accordance with AWWA C150. The pressure or thickness class of pipe to be furnished shall be as required on the Drawings and/or as specified in Section 01011 but shall not be less than recommended by the pipe manufacturer or less than the minimum requirements indicated in Table 1.</p> <table><tr><th colspan="2">Table 1</th></tr><tr><th>MINIMUM RATED WORKING PRESSURE FOR DUCTILE IRON PIPE MANUFACTURED IN ACCORDANCE WITH AWWA STANDARD C151</th><th></th></tr><tr><th>Pipe Nominal Size (Inches)</th><th>Pressure Class</th></tr><tr><td>12 and smaller</td><td>350</td></tr><tr><td>16 – 20</td><td>300</td></tr><tr><td>24 and larger</td><td>250</td></tr></table> <p><u>Note:</u></p> <p>1. The noted pressure class is adequate to support 3/4 and 1-inch corporation stops by direct tapping. Provide a full tapping sleeve or saddle in accordance with Section 15170 and/or 15200 (as appropriate) for taps larger than 1-inch due to limited wall thickness.</p> <p>D. Plain ends shall be suitably beveled to permit easy entry into the bell and shall have home marks to indicate when the spigot is fully seated in the bell.</p> <p>E. All non-restrained joints for pipe to pipe connections shall be standard push-on joints recommended by the pipe manufacturer and conforming to AWWA C151 and C111. Mechanical joints are not allowed for pipe to pipe connections. Push-on joints shall be of a type which employs a single elongated groove gasket to effect the joint seal.</p> <p>F. <u>Restrained Joint Pipe (12-inch and smaller):</u> Unless otherwise indicated on the Drawings or in Section 01011 or furnished by the Owner, restrained joints for pipe to pipe connections 12-inch nominal size and smaller shall use push-on restraining gaskets with integral stainless steel locking segments recommended by the pipe manufacturer and conforming to AWWA C111. Restraint system</p>		Table 1		MINIMUM RATED WORKING PRESSURE FOR DUCTILE IRON PIPE MANUFACTURED IN ACCORDANCE WITH AWWA STANDARD C151		Pipe Nominal Size (Inches)	Pressure Class	12 and smaller	350	16 – 20	300	24 and larger	250	<p>shall be UL-listed and rated for a working pressure of 350 psi. Restraining gaskets shall not be used on connections to valves or fittings or for connections to pipe materials other than ductile iron (e.g. gray cast iron). If required by the Drawings or Section 01011 and/or if furnished by the Owner, restrained-joint pipe such as specified below for 16-inch and larger pipe shall be used for 12-inch and smaller piping.</p> <p>G. <u>Restrained Joint Pipe (16-inch and larger):</u> Restrained joints for pipe to pipe connections (16-inch and larger) shall consist of factory-welded retainer bead or ring on the pipe spigot, and either factory manufactured bolted retainer rings, ductile iron locking segments held in place by rubber retainers, or ductile iron retaining rings that lock over the bell of the joint and are secured to prevent rotation. All components of the bolted or snap rings assemblies shall be constructed of corrosion-resistant, high-strength, low-allow steel and shall conform to AWWA C111 as applicable. Restrained joint pipe shall be U.S. Pipe TR Flex, Bolt-Lok, or HP LOK. Clow TR Flex or Super Lok, American Flex-Ring or Lok-Ring. Restrained system shall be suitable for the following minimum working pressures:</p> <table><tr><th>Size (inch)</th><th>Pressure (psi)</th></tr><tr><td>Less than 20</td><td>350</td></tr><tr><td>20</td><td>300</td></tr><tr><td>24</td><td>250</td></tr><tr><td>30 - 48</td><td>200</td></tr></table> <p>Gaskets utilizing integral locking segments such as Field Lok gaskets are not permitted for restraint of pipe 16-inch or larger. Restrained joint pipe per this article shall not be acceptable where ball and socket pipe is required by the Drawings, Section 01000, and/or Section 01011. Restrained joint ductile iron pipe installed by horizontal directional drill method shall also comply with Section 02458.</p> <p>H. <u>Ball and Socket Pipe:</u></p> <p>Ball and socket pipe shall comply with AWWA C150 and C151 and shall be U.S. Pipe USIFLEX Boltless Flexible Joint Pipe, American Flex-Lok Ball Joint Pipe, McWane Ball and Socket Joint Pipe.</p> <p>I. Flanged piping shall be Thickness Class 53 ductile iron unless otherwise required by the Drawings or Section 01011.</p> <p>J. Acceptable ductile iron pipe manufacturers are:</p> <ol style="list-style-type: none">United States Pipe & Foundry Co. (including Griffin Pipe)McWane Family of Companies (Clow, Atlantic States, etc.)American Cast Iron Pipe Company.		Size (inch)	Pressure (psi)	Less than 20	350	20	300	24	250	30 - 48	200
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<div>Return to Table of Contents</div> <div>2.03 FITTINGS</div> <p>A. <u>Ductile Iron Fittings:</u> Standard fittings shall be ductile iron conforming to AWWA C110. Compact ductile iron fittings shall meet the requirements of AWWA C153. Fittings shall be suitable for the following working pressures unless otherwise noted in AWWA C110 or C153. <u>No gray cast iron fittings are permitted.</u></p> <table><tr><th colspan="3">Working Pressure Rating (psi)</th></tr><tr><th>Size (inch)</th><th>MJ Fittings</th><th>Flanged Fittings</th></tr><tr><td>3 – 24</td><td>350</td><td>250</td></tr><tr><td>30 – 48</td><td>250</td><td>200</td></tr></table> <p>B. <u>Coating and Lining:</u> The fittings shall be coated on the outside with either asphaltic coating in accordance with AWWA C110 or fusion-bonded epoxy in accordance with AWWA C116, and the fittings shall be lined inside with either cement-mortar and asphaltic seal coating in accordance with AWWA C104 or fusion-bonded epoxy in accordance with AWWA C116.</p> <p>C. All fittings shall have mechanical joint bell ends conforming to AWWA C111 unless otherwise shown on the Drawings. However, for pipe 16-inch and larger, fittings with restrained ball joints compatible with the restrained joint pipe used will be permitted when authorized by the Engineer or Owner.</p> <p>D. <u>Restrained MJ Joints (all sizes):</u> Restrained joints shall be used for all connections to valves and fittings, and all such connections shall be restrained mechanical joint type using retainer glands as specified in Section 15130. However, when restrained joint pipe with factory-welded retainer bead or ring on the pipe spigot is used, fittings manufactured with restrained joints compatible with the restrained joint pipe may be used in lieu of fittings with restrained mechanical joints. Restraining gaskets with integral stainless steel locking segments (including MJ Field-Lok gaskets) are not permitted on valves or fittings.</p> <p>E. Non-restrained mechanical and push-on joints are not allowed for connections to valves, hydrants, or fittings.</p> <p>F. Acceptable ductile iron fittings manufacturers are:</p> <ol style="list-style-type: none">Sigma through United States Pipe & Foundry Co. (domestic or foreign)McWane Cast Iron Pipe Co. (Tyler Union domestic only)Star Pipe Products (domestic or foreign) <div>2.04 JOINTS – ADDITIONAL REQUIREMENTS</div> <p>A. All gaskets for buried pipe and fittings shall be of styrene butadiene rubber (SBR), unless otherwise required by the Drawings, Section 01011, or as directed by the Engineer.</p> <p>B. Anti-rotation T-bolts shall be used on mechanical joints, except where special bolts are supplied with the approved restraint device, and shall be of domestic</p>		Working Pressure Rating (psi)			Size (inch)	MJ Fittings	Flanged Fittings	3 – 24	350	250	30 – 48	250	200	<p>origin meeting the current provisions of AWWA C111. T-bolts and nuts shall be high-strength, corrosion-resistant low-alloy steel with the characteristics listed in Table 6 of AWWA C111. T-bolts shall be Xylan or Fluorokote #1 (corrosion resistant).</p> <p>C. Retainer glands of any style are not acceptable for pipe to pipe joints.</p> <p>D. <u>Anchor Couplings:</u> Anchor couplings for anchoring the hydrant valve to pipeline tee's branch and for anchoring the hydrant to the valve shall consist of a plain end mechanical joint pipe with a rotating follower gland, retained by a welded ring, on one or both ends. Anchor couplings shall be installed for each hydrant branch and other locations where shown on the Drawings. Anchor couplings shall be manufactured from Thickness Class 53 ductile iron and shall meet the applicable requirements for both ductile iron pipe and fittings as specified in this section. Standard MJ gaskets as specified herein shall be used with anchor couplings.</p> <p>E. <u>Flanged:</u> Flanged joints shall conform to AWWA C110 (for fittings) or AWWA C115 (for pipe) and also to ANSI B16.42 Class 150. Unless otherwise noted on the Drawings (including bridge couplings), all exposed ductile iron pipe and fittings shall have flanged joints. Flanged joints are not permitted in underground installations except where exposed within structures or if allowed for tapping sleeves, saddles, and valves as specified in Sections 15150 and/or 15170.</p> <ol style="list-style-type: none">Gaskets for all flanged joints shall be 1/8-inch thick, styrene butadiene rubber (SBR) or EPDM gaskets. Paper flange gaskets are not permitted.The bolts shall have American Standards heavy unfinished hexagonal head and nut dimensions all as specified in ANSI B16.2. Bolts and nuts shall be threaded in accordance with ASME/ANSI B1.1, Unified Inch Screw Threads (UN and UNR Thread Form) class 2A external and class 2B internal. Material for bolts and nuts shall conform to ASTM A307, 80,000 psi tensile strength, Grade 5, unless otherwise specified in Section 01011. Xylan or Fluorokote #1 hex bolts (corrosion resistant) shall be used on any buried flange joints used with ductile or gray cast iron flanges.Each flange shall be fully compatible with its mating flange. <p>F. <u>Connections to existing piping shall comply with Section 15000.</u> When connecting to existing ductile iron pipe, connection shall be made either as described in this section or using couplings in accordance with Section 15130. A restrained mechanical joint sold alone as specified above for ductile iron fittings may be used to connect an existing plain spigot end to a new pipe plain spigot end. When connection is to be made to an existing pipe with a joint type not allowed within this section, the existing pipe shall be cut to a plain spigot end unless otherwise approved by the Engineer.</p>		<p>provided, to the following normal torques as specified in AWWA C111 Table A.1:</p> <table><tr><th>Bolt Size (inch)</th><th>Pipe Nominal Size (inches)</th><th>Range of Torque in Foot-Pounds</th></tr><tr><td>3/8</td><td>3</td><td>45 - 60</td></tr><tr><td>3/4</td><td>4 – 24</td><td>75 - 90</td></tr><tr><td>1</td><td>30 – 36</td><td>100 - 120</td></tr><tr><td>1-1/4</td><td>42 - 48</td><td>120 - 150</td></tr></table> <p>2. Secure restrained joint device to pipe barrel in accordance with Section 15130 and the restraint device manufacturer's recommendations.</p> <p>E. <u>Ball and Socket Joints:</u></p> <p>Assemble and install the ball and socket joint according to the manufacturer's recommendations. Thoroughly clean and lubricate the joint. Check the retainer ring fastener.</p> <p>F. <u>Pipe Protection</u></p> <ol style="list-style-type: none">Comply with requirements of Section 15000. Lift pipe in accordance with AWWA Standards C600 and manufacturer's recommendations, subject to the restrictions herein and in Section 15000.Protect cement-mortar lining from damage during transportation (off- and on-site), preparation and installation. Transporting or lifting pipe by inserting lifting forks, chains, hooks, or any other device inside the pipe shall not be permitted. No exception shall be made during application of polyethylene encasement or any other time.Protect asphaltic coating from damage during off- and on-site transportation, preparation and installation. Contractor shall not utilize metal chains, steel cable, etc. to lift or transport pipe. Transporting or lifting pipe using forks on construction equipment shall not be permitted unless the pipe is supported on pallets or lumber and lifted indirectly with the forks.Protect pipe from damage from the jacking device (backhoe bucket, pipe jack, etc.) when assembling each pipe joint (i.e. "pushing home" every pipe). Wood or other suitable (non-metallic) material consistent with the pipe manufacturer's recommendations shall be used to push home the pipe. <p>END OF SECTION</p>		Bolt Size (inch)	Pipe Nominal Size (inches)	Range of Torque in Foot-Pounds	3/8	3	45 - 60	3/4	4 – 24	75 - 90	1	30 – 36	100 - 120	1-1/4	42 - 48	120 - 150
Working Pressure Rating (psi)																																
Size (inch)	MJ Fittings	Flanged Fittings																														
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3/4	4 – 24	75 - 90																														
1	30 – 36	100 - 120																														
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3/2018 – Pipeline	15105 - 6	3/2018 – Pipeline	15105 - 7	3/2018 – Pipeline	15105 - 8	3/2018 – Pipeline	15105 - 9	3/2018 – Pipeline	15120 - 1																							

<div>Return to Table of Contents</div> <p>G. Section 02558 Identification/Location Guide</p> <p>H. Section 15000 Piping - General Provisions</p> <p>I. Section 15020 Disinfecting Pipelines</p> <p>J. Section 15025 Flushing and Cleaning Pipelines</p> <p>K. Section 15030 Pressure and Leakage Tests</p> <p>L. Section 15105 Ductile Iron Pipe and Fittings</p> <p>M. Section 15130 Piping Specialties</p> <p>N. 15150 Gate Valves</p> <p>O. Section 15170 Tapping Sleeves, Saddles, and Valves</p> <p>P. Section 15180 Fire Hydrants</p> <p>Q. Section 15185 Abandonment of Mains and Hydrants</p> <p>R. Section 15190 Air Valves, Blow-off Assemblies and Sampling Taps</p> <p>S. Section 15200 Service Lines</p> <div>1.05 REFERENCE</div> <p>Unless otherwise indicated, all references herein to other standards (e.g. AWWA, ASTM, ASME, ANSI etc.) shall mean the most current available revision. The following referenced documents are a part of this section. Comply with all applicable provisions and recommendations of the following documents, except as otherwise specified herein. Where a referenced document contains references to other standards, those other standards are included as references under this section as if referenced directly. In the event of a conflict between the requirements of this section and those of the referenced documents, the requirements of this section shall prevail.</p> <p>A. ASTM D1784 - Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds</p> <p>B. ASTM D2122 - Determining Dimensions of Thermoplastic Pipe and Fittings</p> <p>C. ASTM D2152 Poly(Vinyl Chloride) (PVC) Pipe and Mated Fittings by Acetone Immersion</p> <p>D. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)</p> <p>E. ASTM D2412 - Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading</p>		<div>F. ASTM D2855 - Standard Practice for Making Solvent Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings</div> <div>G. ASTM F412 - Standard Terminology Relating to Plastic Piping Systems</div> <div>H. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe</div> <div>I. ASTM F1668 - Standard Guide for Construction Procedures for Buried Plastic Pipe</div> <div>J. AWWA C605 - Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PCVO) Pressure Pipe and Fittings</div> <div>K. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 in. Through 12 in., for Water Transmission and Distribution</div> <div>L. AWWA Manual M23 - PVC Pipe - Design and Installation</div> <div>M. NSF/ANSI 14 Plastic Piping System Components and Related Materials</div> <div>N. NSF/ANSI 61 Drinking Water System Components - Health Effects</div> <div>O. Plastic Pipe Institute TR-2, PVC Range Composition Listing of Qualified Ingredients</div> <div>PART 2: PRODUCTS</div> <div>2.01 GENERAL</div> <p>A. No foreign-manufactured pipe shall be allowed. All pipe and restraints shall be produced solely in the United States.</p> <p>B. PVC pipe shall be used where shown on the Drawings, specified in Section 01075, listed in the Bid "Schedule of Prices" and Bid Tab, or where otherwise approved by the Engineer and Owner.</p> <p>C. All materials that come in contact with potable water, including lubricants, shall be evaluated, tested, and certified for conformance with ANSI/NSF Standard 61.</p> <div>2.02 PIPE MATERIALS</div> <p>A. All PVC pipe shall be PVC 1120 pressure pipe made from clean, virgin class 12454 PVC compound conforming to resin specification ASTM D1784 and outside diameter dimensions of cast iron pipe and shall conform to all applicable requirements of ASTM D1784 and D2241. The PVC compounds shall be treated or certified suitable for potable water products by the National Sanitation Foundation (NSF) Testing Laboratory (NSF Standard No. 61). All PVC pipe shall be blue in color.</p>		<div>B. PVC pipe 4 inch through 12 inch nominal size shall meet the requirements of AWWA C900. When AWWA C900 conflicts with the listed ASTM standards, the requirements of AWWA C900 shall prevail.</div> <div>I. Fittings</div> <p>No PVC fittings (including "sweeps") shall be permitted. All fittings for PVC pipe 4" diameter and larger shall be mechanical joint ductile iron fittings connected to PVC pipe with mechanical joint restraint devices as specified in Section 15130, unless otherwise indicated on the Drawings. Concrete thrust blocks shall be installed where shown on the Drawings.</p> <div>2.03 MANUFACTURERS</div> <p>Acceptable PVC pipe manufacturers are:</p> <p>A. JM Eagle, Inc. 5200 West Century Boulevard Los Angeles, CA 90045 (800) 621-4404 (909) 621-4404 www.jmeagle.com</p> <p>B. North American Pipe Corporation 2801 Post Oak Blvd., Suite 600 Houston, TX 77058 (713) 840-7473 www.northamericanpipe.com</p> <p>C. Diamond Plastics Corporation 1212 Johnson Road Grand Island, NE 68603 (800) PVC-PIPE www.dpcps.com</p> <p>D. Northern Pipe Products 1302 39th Street NW Fargo, ND 58102 800-747-7656 www.northernpipe.com</p> <p>E. Sanderson Pipe 875 International Boulevard Clarksville, TN 37040 800-658-3553 www.sandersonpipes.com</p> <div>PART 3: EXECUTION</div> <div>3.01 PACKAGING, HANDLING AND STORAGE</div>		<p>A. The manufacturer shall ensure that the interior of all pipe is clean and install plastic cleanliness plugs in all pipes to keep the pipe interiors clean or cover adequately to prevent dust or truck exhaust from entering pipes.</p> <p>B. Sections of pipe having been discovered with cuts or gouges in excess of 10% of the pipe wall thickness shall not be used.</p> <p>C. Any section of pipe showing a crack or which has received a blow that may have caused an incident fracture, even though no such fracture is visible, shall be marked as rejected and removed at once from the work.</p> <div>3.02 INSTALLATION</div> <p>Except as modified herein, installation of PVC pipe shall be in full accordance with AWWA C605, AWWA Manual M23, and the Uni-Bell "Handbook of PVC Pipe Design and Construction". In the event of conflicting requirements or guidelines within these referenced publications, the requirements of AWWA C605 shall prevail. Contractor shall also follow the provisions of Sections 02210 and 15000, other sections as applicable, and all manufacturers' recommendations, in addition to the following requirements:</p> <p>A. Assemble pipe using the following types of joints:</p> <ol style="list-style-type: none">Gasketed ball joint - Integral with the pipe.Gasketed coupling - A double gasketed coupling as specified in Section 15130, orRestrained mechanical joint (for pipe to fitting and pipe to valve joints only) - As specified in Section 15105.Restrained joint Coupling - Joints for restrained joint PVC pipe (Certa-Lok™) shall be as specified in Article 2.02 above. <p>B. Assemble push-on joints in accordance with the pipe manufacturer's recommendations. Assemble mechanical joints in accordance with the fitting and restraint manufacturers' recommendations.</p> <p>C. Do not remove factory installed gaskets. Keep the joint free of dirt, sand, grit, grease or any foreign material. Apply NSF certified lubricant when assembling gasketed joints in accordance with the pipe manufacturer's requirements. The use of improper lubricants can damage gaskets.</p> <p>D. Good pipe alignment is essential for proper joint assembly. Align the spigot to the bell and insert the spigot into the bell until it contacts the gasket uniformly. Do not swing or "slap" the joint; that is, do not suspend the pipe and swing it into the bell. The spigot end of the pipe is marked by the manufacturer to indicate the proper depth of insertion, and Contractor shall use extreme caution to avoid over-inserting pipe into the bell.</p> <p>E. Protect pipe from damage when assembling ("pushing home") pipe joints. Wood or other suitable (non-metallic) material consistent with the pipe manufacturer's recommendations shall be used as a cushion while pushing home the pipe.</p>			
3/2018 – Pipeline	15120 - 2	3/2018 – Pipeline	15120 - 3	3/2018 – Pipeline	15120 - 4	3/2018 – Pipeline	15120 - 5	3/2018 – Pipeline	15120 - 6

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Refer to Sections 01000, 01011 and 01075 for materials to be furnished by the Owner.</p> <div>1.02 SUBMITTALS</div> <p>A. Contractor shall submit Shop Drawings, manufacturer's literature and product data, installation instructions, and certifications for all products furnished under this section in accordance with Section 01300.</p> <p>B. Required certifications include those specified under Quality Assurance below.</p> <div>1.03 QUALITY ASSURANCE</div> <p>A. PVC pipe shall meet the minimum quality requirements by conforming to the below-referenced AWWA/ANSI standards as modified herein. PVC pipe shall be accepted on the basis of the Manufacturer's certification that the materials conform to this section.</p> <p>B. The Owner reserves the right to sample and test these materials subsequent to delivery at the project site.</p> <div>1.04 RELATED WORK</div> <p>A. Section 01000 Summary of Work</p> <p>B. Section 01011 Special Provisions</p> <p>C. Section 01075 Basis of Payment</p> <p>D. Section 01300 Submittals</p> <p>E. Section 01600 Products</p> <p>F. Section 02210 Trenching, Backfilling and Compacting</p>		<div>Return to Table of Contents</div> <p>A. The manufacturer shall ensure that the interior of all pipe is clean and install plastic cleanliness plugs in all pipes to keep the pipe interiors clean or cover adequately to prevent dust or truck exhaust from entering pipes.</p> <p>B. Sections of pipe having been discovered with cuts or gouges in excess of 10% of the pipe wall thickness shall not be used.</p> <p>C. Any section of pipe showing a crack or which has received a blow that may have caused an incident fracture, even though no such fracture is visible, shall be marked as rejected and removed at once from the work.</p> <div>3.02 INSTALLATION</div> <p>Except as modified herein, installation of PVC pipe shall be in full accordance with AWWA C605, AWWA Manual M23, and the Uni-Bell "Handbook of PVC Pipe Design and Construction". In the event of conflicting requirements or guidelines within these referenced publications, the requirements of AWWA C605 shall prevail. Contractor shall also follow the provisions of Sections 02210 and 15000, other sections as applicable, and all manufacturers' recommendations, in addition to the following requirements:</p> <p>A. Assemble pipe using the following types of joints:</p> <ol style="list-style-type: none">Gasketed ball joint - Integral with the pipe.Gasketed coupling - A double gasketed coupling as specified in Section 15130, orRestrained mechanical joint (for pipe to fitting and pipe to valve joints only) - As specified in Section 15105.Restrained joint Coupling - Joints for restrained joint PVC pipe (Certa-Lok™) shall be as specified in Article 2.02 above. <p>B. Assemble push-on joints in accordance with the pipe manufacturer's recommendations. Assemble mechanical joints in accordance with the fitting and restraint manufacturers' recommendations.</p> <p>C. Do not remove factory installed gaskets. Keep the joint free of dirt, sand, grit, grease or any foreign material. Apply NSF certified lubricant when assembling gasketed joints in accordance with the pipe manufacturer's requirements. The use of improper lubricants can damage gaskets.</p> <p>D. Good pipe alignment is essential for proper joint assembly. Align the spigot to the bell and insert the spigot into the bell until it contacts the gasket uniformly. Do not swing or "slap" the joint; that is, do not suspend the pipe and swing it into the bell. The spigot end of the pipe is marked by the manufacturer to indicate the proper depth of insertion, and Contractor shall use extreme caution to avoid over-inserting pipe into the bell.</p> <p>E. Protect pipe from damage when assembling ("pushing home") pipe joints. 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Section 01300 Submittals</p> <p>E. Section 01600 Products</p> <p>F. Section 02210 Trenching, Backfilling and Compacting</p>		<div>Return to Table of Contents</div> <p>A. The manufacturer shall ensure that the interior of all pipe is clean and install plastic cleanliness plugs in all pipes to keep the pipe interiors clean or cover adequately to prevent dust or truck exhaust from entering pipes.</p> <p>B. Sections of pipe having been discovered with cuts or gouges in excess of 10% of the pipe wall thickness shall not be used.</p> <p>C. Any section of pipe showing a crack or which has received a blow that may have caused an incident fracture, even though no such fracture is visible, shall be marked as rejected and removed at once from the work.</p> <div>3.02 INSTALLATION</div> <p>Except as modified herein, installation of PVC pipe shall be in full accordance with AWWA C605, AWWA Manual M23, and the Uni-Bell "Handbook of PVC Pipe Design and Construction". 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3/2018 – Pipeline	15120 - 2	3/2018 – Pipeline	15120 - 3	3/2018 – Pipeline	15120 - 4	3/2018 – Pipeline	15120 - 5	3/2018 – Pipeline	15120 - 6

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THE BLUFFS AT YOUNGS CREEK
SECTION 1

CONSTRUCTION DETAILS

STOEPPELWERTH
ALWAYS ON

THE BLUFFS AT YOUNGS CREEK
SECTION 1

FRANKLIN, FRANKLIN TOWNSHIP
JOHNSON COUNTY, INDIANA

THIS DRAWING IS NOT INTENDED TO BE REPRESENTED AS A REFACEMENT OR ORIGINAL BOUNDARY SURVEY, A ROUTE SURVEY OR A SURVEYOR LOCATION REPORT.

REGISTERED PROFESSIONAL ENGINEER
No. 19358
STATE OF INDIANA
CERTIFIED: 05/09/19
Daniel J. Stoepelwerth

796 East 10th Street, Fishers, IN 46038-2505
phone: 317.849.5932 fax: 317.849.5942

DRAWN BY: PDR
CHECKED BY: BKR
SHEET NO.
C803A
S & A 839 NO
83540MMA-S1

File Name: S:\8345MMA-S01\DWG\C803 - Construction Details.dwg - C803B
Modified / By: May 9, 2019 7:36:14 AM / P:\chris
Plotted / By: May 9, 2019 11:35:02 AM / Paul Richards

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