DESIGN DATA – S. Washington St. & 40th Avenue S.				
Traffic	Average Daily			Max.Hr.
Current	Pass: 11,970	Trucks: 1,330	Total: 13,300	1,400
Forecast	Pass: 25,200	Trucks: 2,800	Total: 28,000	2,900
Clear Zone Distance:		Design Speed: 40 mph		
Minimum Sight Dist. for Stopping:		Bridges: N/A		
Minimum Sight Dist. for Safe Passing:		N/A		
Sight Dist. for No Passing Zone:		N/A		
Pavement Design Life				

CITY OF GRAND FORKS JOB #34

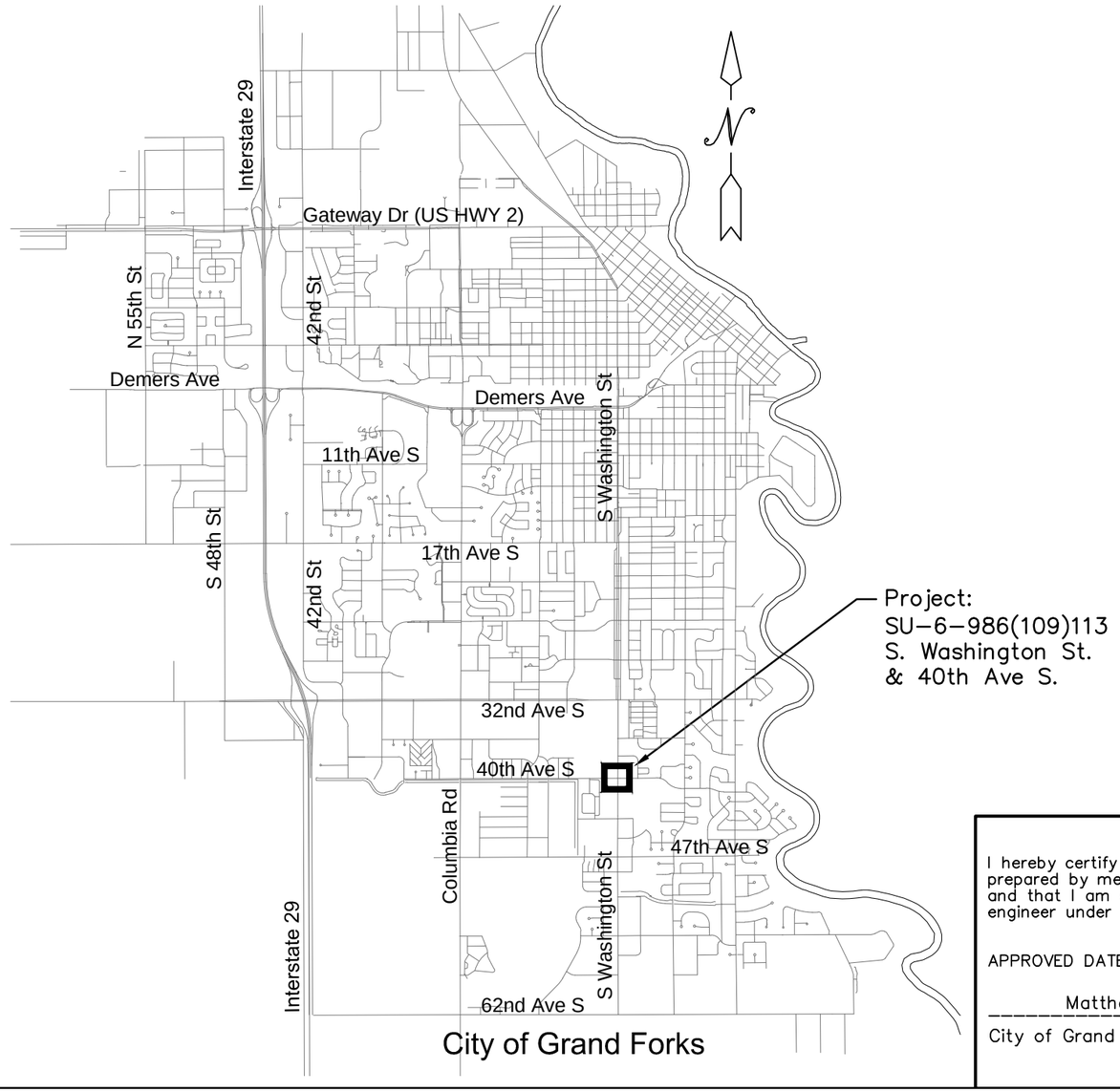
NORTH DAKOTA

SU–6–986(109)113
S Washington St & 40 Ave S
City Project 6757
Sec. 21, Twp. 151, Range 50
FHWA Limited Involvement
Grand Forks County
Removals, Grading, Storm Sewer, PCC Pavement,
Signing, Marking, Signals, ITS & Incidentals

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU–6–986(109)113	19723	1	1

GOVERNING SPECIFICATIONS:
Standard Specifications adopted by the North Dakota Department of Transportation October 2008; Standard Drawings currently in effect; and other Contract Provisions submitted herein.

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
SU–6–986(109)113 S Washington St 40th Ave S	0.17	0.17



DESIGNERS

Matthew Yavarow

Jane Williams

City of Grand Forks
Engineering Department

Approved for Construction

APPROVED DATE August 19, 2013

Allen R. Grasser /s/
City Engineer, City of Grand Forks, ND

I hereby certify that the attached plans were prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the state of ND.

APPROVED DATE August 19, 2013

Matthew P. Yavarow /s/
City of Grand Forks, Engineering Dept.

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LIST OF STANDARD DRAWINGS

Standard No.	Description
D-20-1,2,3	NDDOT APPROVED ABBREVIATIONS
D-20-10	NDDOT UTILITY CO APPROVED ABBREVIATIONS
D-20-20,21	LINESTYLES
D-20-30,31,32	SYMBOLS
D-704-7	BREAKAWAY SYSTEMS FOR CONSTRUCTION SIGNS – PERFORATED TUBE
D-704-8	BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS
D-704-9	CONSTRUCTION SIGN DETAILS – TERMINAL & GUIDE SIGNS
D-704-10	CONSTRUCTION SIGN DETAILS-REGULATORY SIGNS
D-704-11	CONSTRUCTION SIGN DETAILS-WARNING SIGNS
D-704-13	BARRICADE DETAILS
D-704-14	CONSTRUCTION SIGN AND BARRICADE ASSEMBLY DETAILS
D-704-23	CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS
D-704-25	CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS
D-704-32	SIGN LAYOUT FOR ONE LANE CLOSURE DIVIEDED HIGHWAY
D-704-50	PORTABLE SIGN SUPPORT ASSEMBLY
D-722-2	INLET SPECIAL
D-754-80	LIGHT STANDARD SIGNAL STANDARD SPAN WIRE MOUNTED SIGN ASSEMBLY DETAIL
D-762-1	PAVEMENT MARKING MESSAGE DETAILS
D-770-1	CONCRETE FOUNDATIONS (TRAFFIC SIGNALS AND HIGHWAY LIGHTING)
D-770-2A	COMBINATION FEED POINT DETAILS
D-770-3	PULL BOX DETAILS
D-770-4	LIGHTING AND SIGNAL DETAILS
D-770-5	LIGHT STANDARD DETAILS
D-772-1	FEED POINTS – TRAFFIC SIGNALS
D-772-2	TRAFFIC SIGNAL STANDARDS
D-772-3	TRAFFIC SIGNAL STANDARDS
D-772-4	TRAFFIC SIGNAL HEAD MOUNTING

LIST OF SPECIAL PROVISIONS (SP)

SP #	Description
SP 1264(08)	Concrete Mix Design
SP 1101(08)	Split Sampling & Testing Requirements for Aggregate Base

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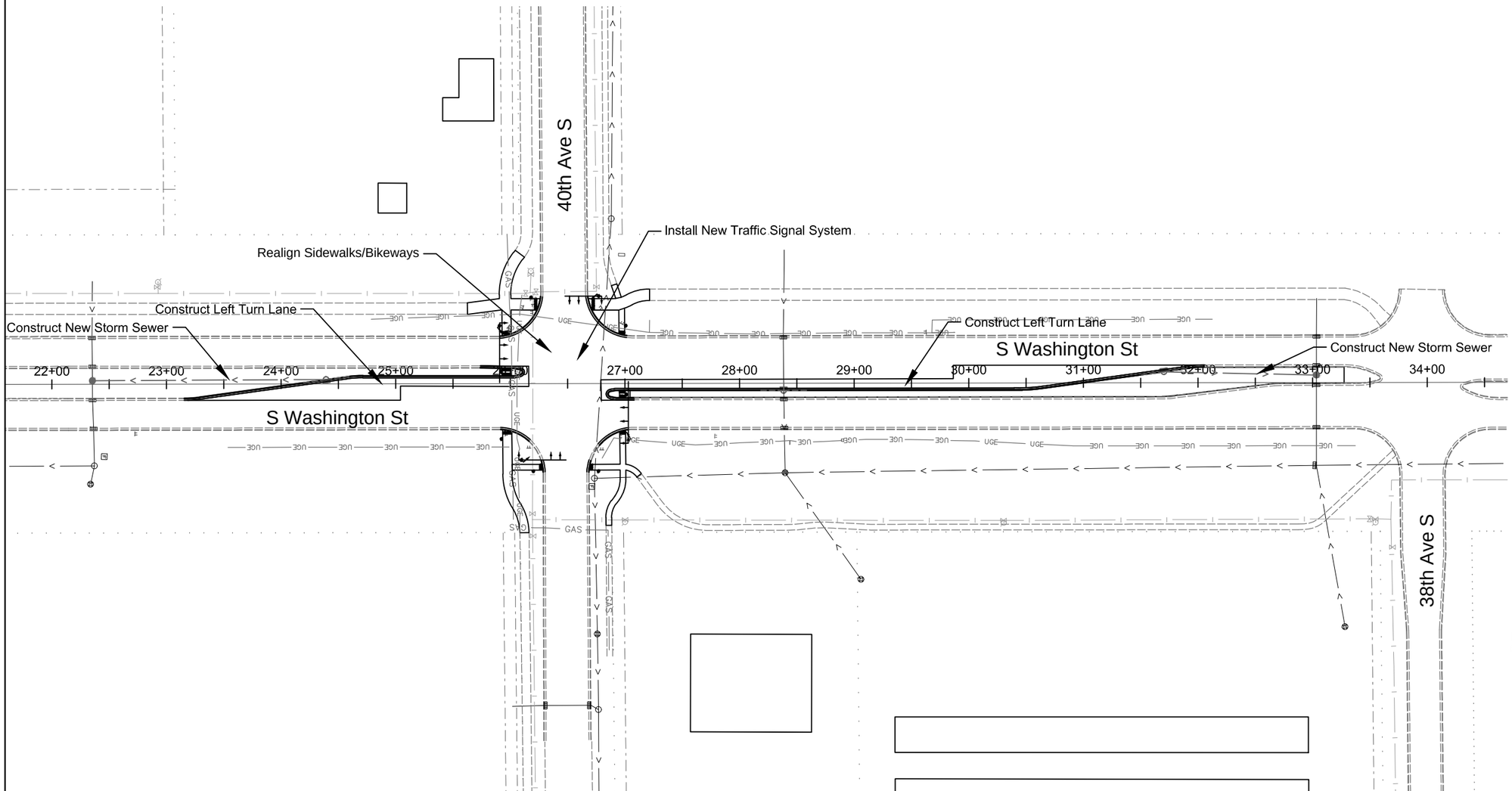

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Scope of Work

South Washington Street & 40th Avenue South

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GENERAL NOTES

100-P01 WEEKLY PROGRESS REPORTING:
The Contractor shall submit a progress weekly report of the project and specifically state any known delays. City will provide forms.

100-P02 NOISE RESTRICTIONS: The Contractor shall be required to comply with the City of Grand Forks noise ordinance. The Contractor shall schedule his operations between the hours of 6:30 AM and 10:00 PM. Should work need to be done outside this range, the Contractor shall make a written request to the Grand Forks Public Health Department at 151 South 4th Street, Suite N-301, Grand Forks, ND 58201-4735.

Contractor may not request one permit to cover all work for the entire project duration. All requests shall be made 72 hours in advance, stating the specific nature of the work, additional hours required and the number of days needed to complete the specified work. The contractor shall obtain approval from the Health Department 24 hours prior to beginning work. The Contractor shall also furnish a copy of the approved permit to the Grand Forks Police Department a minimum of 24 hours prior to beginning of work and notify them of the days and hours planned for work under this permit.

100-P03 PUBLIC NOTIFICATION: The Contractor shall provide written notices to the city's Info Center a minimum of 7 days in advance of scheduled lane and/or shared use path closings in order to allow media relations sufficient time to notify the public of closures. The Contractor shall notify the City Public Works Department a minimum of 5 business days in advance of lane closures.

202-P01 SAWING: The bid item "Saw Concrete" shall include all labor, materials and equipment necessary to saw existing concrete sidewalks, bikeways, curb and gutter, or any other existing concrete items. Contractor shall saw a clean, vertical full depth cut necessary to facilitate the removal of the concrete material. This item shall be measured by the linear foot. No payment will be made for re-sawing.

202-P02 REMOVAL OF PAVEMENT: The bid item "Removal of Pavement" shall consist of the removal of all concrete material: Sidewalks, Bikeways, Pavement and Medians. Measurement and payment will be on a square yard basis. All concrete materials paid for as removal have been deducted from the excavation quantity.

203-P01 EXCAVATION FOR PROPOSED PAVEMENT SECTION: Excavation of the roadway section shall be completed in accordance with Section 203.02 C of the Standard Specifications to the proposed elevations. Subgrade shall be sloped from the edge of existing pavement to the edges of the excavation.

Contractor shall install the subsequent pavement section with construction methods that maintain the integrity of the subgrade during aggregate base and concrete pavement placement. In order to maintain the integrity of the subgrade during subsequent operations, the Contractor shall determine the extent of his efforts that will be necessary to maintain the subgrade integrity. These efforts, if necessary, shall be performed at no additional compensation, and shall be included in the price bid for "Common Excavation-Subcut".

203-360 COMPACTION AND DENSITY CONTROL: Compaction and density controls shall be in accordance with Section 203.02 G of the Standard Specifications AASHTO T-99.

302-P01 SALVAGED BASE COURSE: Payment for Salvaged Base Course shall be the cubic yard in place (compacted volume) for material placed beneath curb and gutter, pavements, driveways and shared use paths based on the dimensions shown on the Plans. Additional measurement and payment shall be made for changes made in the field. No allowance for over excavation, subgrade settlement, compaction or waste shall be made.

550-P01 TIE BARS All tie bars shall be epoxy coated Grade 40 and placed according to the joint details as shown on the plans. All tie bars required for installation into new or existing concrete pavements shall be grouted into a pre-drilled hole with an approved epoxy grout. Prior to grouting bar in place, the pre-drilled hole shall be cleaned with compressed air and prepared as recommended by the epoxy grout manufacturer. Placement of tie bars into plastic concrete is not an acceptable installation method. Cost of tie bars for concrete pavement and curb & gutter shall be included into the respective concrete pavement or curb and gutter bid items.

704-P01 TRAFFIC CONTROL DEVICES LIST: Traffic control is based on NDDOT Std D-704-23, Layout Type P for Lane Closure.

708-P01 SEEDING – HYDRO MULCH: Seeding shall cover all disturbed areas. Seeding shall be Type B, Class V as follows:

Grass Species	Variety	Lbs PLS per Acre
Western Blue Grass	Park	100
Perennial Rye Grass	--	40
Six-Week Fescue or Dural-hard Fescue	--	60
Annual Rye Grass	--	50

The hydro mulch material shall be as specified in the NDDOT specification 708.02B.3.a. In urban areas, the hydro mulch shall be applied after the seed is drilled into the topsoil. Fertilizer shall be a mixture of 5-10-5 applied at a rate of 100 pounds per acre.

The seed shall be watered daily for three weeks minimum after placement in order to provide sufficient moisture for growth. Run-off and puddling shall be prevented; water trucks shall not be driven over turf areas.

Mowing shall be done as needed to maintain lawn areas at a normal height of 3 inches until final acceptance, except not more than 1/3 of the grass leaf shall be removed by the initial cutting. Clippings shall be removed when the amount of cut turf is heavy enough to damage the turfed areas. Seeded areas shall be mowed immediately prior to final inspection. Maintenance of the seeded areas shall include eradicating weeds, maintaining erosion control materials and mulch, protecting the installed areas from traffic, mowing, watering and fertilization. If any portion of the surface becomes rilled, gullied, damaged, or destroyed,

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that portion shall be repaired and re-established at the contractor's expense. The Contractor shall control erosion during the maintenance period by using ditch checks, sod swales, silt fences or other methods until a proper stand of turf is established.

Turf establishment after seeding shall extend for 3 cuttings after completion of the seeding on the entire project, unless desired growth is established, and the shortening the period of the Contractor's responsibility for acceptably established areas is authorized by the Engineer. Grass plants shall be evaluated for species and health when the grass plants are a minimum of 1 inch high. At acceptance, the turf will be free of weeds, have no bald spots greater than 2". All cost for labor, equipment and materials necessary to complete the work and provide maintenance will be included in the price bid for "Seeding – Hydro Mulch".

722-P01 CHIMNEY SEALS New external chimney seals shall be installed on all inlets. The sleeve and extension shall be extruded from a high-grade rubber compound conforming to the applicable requirements of ASTM C923. The bands used for compressing the sleeve and extension against the inlet shall be fabricated from 16-guague stainless steel conforming to ASTM A240, Type 304. Screws, bolts and nuts used on this band shall be stainless steel conforming to ASTM F593 and 594, Type 304. The chimney Seals shall not be paid for separately but shall be included in the price bid for each respective inlet.

754-P01 SIGNS: All signs and supports removed from the project shall become the property of the City of Grand Forks, delivered to the City of Grand Forks Public Works facility. (Address 724 N 47th St Phone # 701-740-0679). The cost for this work shall not be bid separately but shall be included in the price bid for "TRAFFIC SIGNAL SYSTEM".

754-P02 STREET NAME SIGNS: The street name signs shall be Type IX reflective sheeting meeting ASTM D 4956-04. The cost for furnishing the Type IX sheeting shall not be bid separately but shall be included in the price bid for "TRAFFIC SIGNAL SYSTEM".

770-P01 LIGHTING STANDARDS: The design of the Lighting standards shall meet the requirements of AASHTO publication, Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (5th Edition 2010 Interim). A wind velocity of 90 mph with the necessary coefficient of height correction factor shall be used in the calculations. Each structure component shall be designed using the requirements of Table 11-1, "Fatigue Importance Factor, IF" Fatigue Category I shall be used for High Mast Lighting and Fatigue Category III shall be used for Lighting Standards. All the necessary calculations and drawings used in the design of these poles shall be furnished with the shop drawing submittal. Calculations and work drawings used in the design of Lighting Standards shall be signed, sealed, and dated by a Professional Engineer duly registered in the State of North Dakota. This item shall be included in the price bid for "TRAFFIC SIGNAL SYSTEM"

770-P02 LIGHTING CIRCUITS TESTING: All underground street lighting circuits shall be tested with a megohmmeter in the presence of the city electrician or city electrical inspector. The test shall be done at a minimum of 5,000 volts with no reading below 50 meg. Any conductors failing this test shall be replaced. The cost of testing shall not be bid separately, but shall be considered incidental to the project.

770-P03 CONDUCTOR: All multiple underground cables and underground conductors required for connection to light standards and feed points shall be single conductor assemblies, without overall armor or jacket. Insulation shall be color coded with one red, one black, and one white NO 4 and one green NO 6 cable. Ungrounded and neutral cable types shall be RHW-USE suitable for direct buried applications. Equipment ground cables shall be RHW-USE or THW. The quantities shown in the Plans for the bid item "TRAFFIC SIGNAL SYSTEM" are based on the total length of each conductor size. Conductors in Lighting Standards shall be SEO 14/3 stranded copper with ground cable, Electrical Conductors, Inc. or approved equal. Receptacles and luminaires shall have separate cables. Cable shall be rated for use from -50 degrees C to +105 degrees C. Cable to be supported by Kellems grip attached to one of the luminaire pole stops as approved by the Engineer. Also see Plan details. All splicing shall be in pole bases. All leads shall be brought out at least 12" beyond the hand hole/ Splice assemblies shall be tied together with plastic tape or cord and a tag end left under the hand hole cover to facilitate retrieving splices for future service. Splices shall be Polaris IT-4 insulated splice or equal. All poles shall have in-line fuse holders on all ungrounded conductors. Fuse holders shall be Tron HEB-AA or equal. Fuses shall be TRM3. Festoon receptacle outlets shall be separately fused. Underground splices are prohibited, unless approved by the Engineer in writing. If preapproved splices shall be made up with 3M Scotchcast 90-B1 splicing kits.

770-P04 CONDUCTOR: The bid items "TRAFFIC SIGNAL SYSTEM" shall include all labor, materials and equipment required to install conductors.

770-P05 LUMINAIRES: The 250 watt high pressure sodium vapor luminaires shall be internal ballast constant wattage, 120x240 volt, operated on 240 volts. The finish shall be gray enamel. All costs associated with the installation of 2 new luminaires heads shall be included in price bid for "TRAFFIC SIGNAL SYSTEM".

770-P06 TRAFFIC SIGNAL AND LUMINAIRE SYSTEM POWER SOURCE: The Contractor shall be responsible for obtaining the electrical source necessary to operate the lighting system. The Contractor shall make the necessary arrangements with the utility to provide for the electric service, which may come from the existing pad mounted transformer or a new transformer in the same location. The electric utility is Xcel Energy. Costs for electric service, including three 3/0 copper service cables in 3" PVC conduit and grounding as required by the NEC, shall be included in the price bid for "TRAFFIC SIGNAL SYSTEM". The Contractor shall also be responsible for all costs required to operate and maintain the lighting system until final acceptance of the lighting system.

770-P07 FEED POINT: The Feed Point shall be Type IV-Pad Mounted and shall include all labor, materials, equipment and utility fees to provide one new feed point and foundation. The new feed point shall be fabricated from 14 gauge #304 stainless steel and be U.L. approved. Shop drawings shall be submitted for review prior to the pre-construction meeting. All street lighting luminaries shall be operated on 240 volt. Festoon receptacles will require 120 volt. Feed point components shall be furnished and installed in accordance with the Plans. Enclosures shall include a subpanel for complete deadfront access to all, main disconnect handles, circuit breaker handles and toggle test switches. Breakers

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shall be specified amperage, plug in type, 10,000 AIC. Relays shall be coil type, mercury contactor rated at 60 ampere, 480 volt, as manufactured by Mercury Displacement Industries, Model 60 ND-120A. Photoelectric (PE) cells shall be externally mounted on the feed point cabinet. PE sockets shall be EEI/NEMA type. PE control shall have a time delay of at least 15 seconds and shall be Area Lighting Research Model PT168 rated for 240 volt or equal. PE cells shall face east or north. The existing feed point shall be removed, salvaged and delivered to the City Electrician at 714 South 47th Street, Grand Forks, ND. The Contractor shall coordinate their delivery with Mr. Rick Hanson. Mr. Rick Hanson may be reached at 701-738-8796. All costs associated with installation of a new feed point and removal and salvaging existing feed point shall be included in price bid for "TRAFFIC SIGNAL SYSTEM".

772-P01 TRAFFIC SIGNAL SYSTEM: The price bid "TRAFFIC SIGNAL SYSTEM" shall include all labor and equipment necessary for each signal system to be fully operational as shown in the plans upon construction completion. This includes, but is not limited to, the installation of the following features where applicable; traffic signal standards, mast arms, pedestrian pushbuttons, pushbutton posts and signs, vehicular and pedestrian heads, video detection system, controller,controller battery back-up, cabinet, foundations, feed point installation, GTT emergency vehicle pre-emption system, Washington St coordination plans, along with all cable, conduit, junction boxes and appurtenances to install the traffic signal completely. This also includes the removal of the existing wiring and any other abandoned features that may conflict with the proposed traffic signal system improvements. This also included lighting as noted in 770-P01 through 770-P07.

772-P02 TRAFFIC SIGNAL STANDARDS: The design of the Traffic Signal Standards shall meet the requirements of AASHTO publication, Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (5th Edition 2010 Interim). A wind velocity of 90 mph with the necessary coefficient of height correction factor shall be used in the calculations. Each structure component shall be designed using the requirements of Table 11-1, "Fatigue Importance Factor, IF" Fatigue Category III shall be used for Traffic Signal Standards with mast arm lengths less than 40 feet, Fatigue Category II shall be used for Traffic Signal Standards with mast arm lengths greater than or equal to 40 feet. All the necessary calculations and drawings used in the design of the Traffic Signal Standards shall be furnished with the shop drawing submittal. Calculations and work drawings used in the design of the Traffic Signal Standards shall be signed, sealed, and dated by a Professional Engineer duly registered in the State of North Dakota.

772-P03 FIELD VERIFICATION: All features labeled "Existing" are approximately located, Contractor shall verify in field. The Contractor shall field verify the location of all proposed signal and lighting features including all proposed conduit to avoid conflict with any utilities or any other features potentially encountered in the field.

772-P04 PADLOCKS: The City of Grand Forks shall provide padlocks for the Traffic Signal System.

772-P05 SIGNAL TESTING AND INITIAL OPERATION: When not in operation, the signal head shall be hooded with a material that will allow the signal heads, when lit, to be seen dimly by personnel testing the signals. The hood shall remain in place until the signal is authorized to be operated. The cost of testing shall not be bid separately, but shall be included in the price for "TRAFFIC SIGNAL SYSTEM."

772-P06 TRAFFIC SIGNAL CONTROLLER: The volume density controller shall be RM ASC/3 Series NEMA TS2/NTCIP Actuated Controller produced by Econolite. The controller shall be equipped with a transit signal priority data key with Y cable. The controller cabinets and auxiliary control equipment furnished shall be from a manufacturer whose Type Econolite ASC Rack mounted System operates on Aries Software which has been approved by the City of Grand Forks. The price bid for "TRAFFIC SIGNAL SYSTEM" shall include all labor, materials and equipment required to install the new controller and interface with a existing and new fiber optic lines connecting to 32nd Ave and 47th Ave S controller. This shall include but is not limited to the GTT emergency vehicle pre-emption/transit priority unit, cabinet, new detector amplifiers (furnished and installed), other ancillary signal components (such as load switches, conflict monitors, etc.) and controller cabinet components connected as required to make the new controller equipment operational with the existing and proposed signal equipment.

772-P07 GRAND FORKS TRAFFIC SIGNAL CABINET: The traffic signal cabinet shall be Econolite 332D as specified in the plans. Cabinet shall adhere to the City of Grand Forks Cabinet Specifications at Traffic Control Corporation. All costs, labor, materials and equipment necessary for furnishing and installing this item shall be included in the price bid for "TRAFFIC SIGNAL SYSTEM."

772-P08 CONCRETE CONTROLLER CABINET PAD: The existing concrete pad for the traffic signal cabinet shall be removed and become the property of the contractor, existing cabinet to be salvaged and delivered to the city Electrical Division at 724 N 47th St, Grand Forks. All costs, labor, materials and equipment necessary for furnishing and installing a new concrete foundation and 332D signal cabinet, and removing and salvaging existing shall be included in the price bid for "TRAFFIC SIGNAL SYSTEM."

772-P09 BATTERY BACKUP SYSTEM: The Contractor shall provide a battery backup system for the traffic signal system. All costs, labor, materials and equipment necessary for furnishing and installing this item shall be included in the price bid for "TRAFFIC SIGNAL SYSTEM." The battery backup system shall have the following minimum requirements:

- Provides full battery backup for the traffic controller in normal or flash operation
- Flash activation contacts to ensure the longest possible battery life
- Rack mountable for installation in a 332D Cabinet or NEMA rated outdoor pad mounted enclosure, as required
- Power conditioning and transient filtering
- True Sine wave output with ±2% voltage regulation
- Power management and diagnostic functions
- RS-232 port with software to monitor or download data logs of the battery backup system through an Ethernet connection
- Suitable for operation from -40°F to 120°F
- Battery backup for a minimum of 3 hours of flash operation
- The battery backup system shall be capable of running the intersection for 30 minutes at 1000 watts and then switch to flash operation to conserve power
- The UPS shall include an external bypass switch rated at 30 amp 250 VAC and shall use 30 amp relays.

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772-P10 EMERGENCY VEHICLE PRE-EMPTION AND TRANSIT PRIORITY: The emergency vehicle preemption/transit priority system shall be GTT Global GPS Vehicle Preemption model 764. The location of the EVP detector as denoted in the plans may vary based upon GPS signal availability. All indicator lamps shall be LED. The EVP equipment shall be fully compatible with the other EVP equipment used within the City of Grand Forks. The Contractor shall provide all labor and equipment necessary for the EVP detection system to be fully operational. The Contractor shall notify City of Grand Forks fire chief Peter O'Neill (701-746-2566) and city electrician Rick Hanson (701-738-8796) when the proposed signalized intersection EVP systems are tested and operable. All costs, labor, materials, equipment and providing a manufacturer's representative to assist in the set-up needed for furnishing, installing and calibrating this item shall be included in the price bid for "TRAFFIC SIGNAL SYSTEM."

772-P11 CONFLICT MONITOR: The traffic signal controller conflict monitor shall be a RENO A&E model, Ethernet connection. A complete controller conflict monitor test shall be performed by the Contractor prior to unveiling the traffic heads. All materials, labor and equipment necessary to conduct the conflict monitor testing shall be included in the price bid "TRAFFIC SIGNAL SYSTEM."

772-P12 CONTROLLER MONITORING UNIT AND/OR COMMUNICATION MODULE: The volume density controller shall be provided with a communication hookup which provides a duplex data link with a central control computer. The communications hookup shall be IBM PC compatible. A controller monitoring unit and/or communication module shall be installed in the controller. The monitor unit shall be installed and connected to the controller and conflict monitor so as to monitor conflict monitor flash, pre-emption status, cabinet door open, phase on and status bits required for central control intersection display, and detector diagnostics. The unit shall be capable of providing a traffic map and of uploading and downloading information into the controller from a PC, central control computer or a laptop in the field, or a telephone line. All costs, labor, materials and equipment necessary for furnishing and installing this item shall be included in the price bid for "TRAFFIC SIGNAL SYSTEM."

772-P13 VIDEO DETECTION SYSTEM: The signalized intersection shall use Econolite ENCORE Video Detection Equipment type (refer to Video Detection Special Provision for details). Video detection units shall be mounted on risers. Risers shall extend 5 feet above the mast arm. Riser height may vary if approved by the City of Grand Forks. All cable connections, camera aiming and system set-up, including programming detection zones, vehicle counting, turn-on and verification of reliable operation shall be provided by the manufacturer's representative. Cable and camera installation shall be performed by the contractor. Video detection camera locations in the plans are for guidance only. The Contractor shall provide all labor and equipment necessary for the Video detection system to be fully operational. Video monitors for each signalized intersection shall be meet LCDI-104-CCTV-LCD specifications. One additional camera and one additional TIP/TAP and 16 hours of factory representative training shall be provided. All costs, labor, materials and equipment necessary for furnishing and installing this item shall be included in the price bid for "TRAFFIC SIGNAL SYSTEM."

772-P14 SHOP DRAWINGS: The Contractor shall furnish shop drawings and a complete listing of materials proposed for installation. Two copies shall be utilized by the City of Grand Forks Traffic Engineer, plus any additional sets that need approval and that are to be returned for the Contractor's use. The Contractor shall provide the Engineer with proof of purchase, and delivery and manufacturing schedules for traffic signal materials indicating that acquisition of these materials is consistent with progress and completion requirements of this contract.

772-P15 TRAFFIC SIGNAL HEAD MOUNTINGS: Piping shall be furnished to mount the vehicle and signal heads to the side of the poles. Heads shall not be mounted directly to the pole or on the face of the pole directly adjacent to the street. All costs, labor, materials and equipment necessary for installing traffic signal heads shall be included in the price bid for "TRAFFIC CONTROL SYSTEM."

772-P16 TRAFFIC SIGNAL STANDARDS BASE: All proposed traffic signal standards shall be "T" transformer base type standards. All costs, labor, materials and equipment necessary for furnishing and installing this item shall be included in the price bid for "TRAFFIC SIGNAL SYSTEM."

772-P17 SIGNAL STANDARD PAINT COLOR: All new traffic signal system components shall be painted in accordance with the following:

Transformer base - black
Mast arm - black
Signal head mounting hardware – black
Backplate – black with yellow reflective edge
Shaft - black
Signal housing - black
Pedestrian pushbutton post - black
Pedestrian pushbutton housing - black

The color black shall be # 27038 of Federal Standard No.595B .

772-P18 VEHICULAR TRAFFIC SIGNAL HEADS: The vehicular signal heads shall be 12 inch heads with aluminum housings for each section. All sections shall be equipped with GEGTx LED illuminating elements. All LED traffic signal sections shall conform to the Institute of Transportation Engineers Equipment and Materials Standards and Specifications. All costs, labor, materials and equipment necessary for furnishing and installing this item shall be included in the price bid for "TRAFFIC SIGNAL SYSTEM."

772-P19 PEDESTRIAN SIGNAL HEADS: The countdown pedestrian signal heads shall be equipped with LED illuminating elements displaying the pedestrian signals as shown. This item shall consist of one LED 12" PED, FULL HAND MAN GT1 and one LED 12" PED, COUNTDOWN GT1 with the part numbers :

- General Electric Gtx LED GEL-PS6-CFL1-26A 12"
- General Electric GEL-PSG-PFD1-26A 12"

All costs, labor, materials (brackets, shields, etc) and equipment necessary for furnishing and installing this item shall be included in the price bid for "TRAFFIC SIGNAL SYSTEM."

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772-P20 PEDESTRIAN PUSH BUTTONS, HOUSINGS AND SIGNS: Pedestrian push buttons, housings and signs shall be furnished with the ability to be bolted directly to the traffic signal standards. Bandit shall not be permitted. The pushbuttons should be 3" round and vandal resistant, solid state pressure sensitive non move Piezo yellow pedestrian push button station with visual and audible press and release feedback with a 5" X 7" frame up. TS 2 compliant switch rated for 100 X 106 operations with a 75 ms closure with a mounting for 4 bolts. The housings are for a 3 inch round push button with a 4 bolt (2.60 +/- .05") circle and displays a 5" X 7" sign. The top of the push-button signs shall not extend above the top of the pedestrian push-button post Complete with mounting hardware and signs compatible with the provided housings shall be provided. The pedestrian push buttons shall meet ADA and MUTCD minimum requirements, specified for pedestrian countdown pushbuttons. All costs of material and delivery shall be included in the price bid for "TRAFFIC SIGNAL SYSTEM".

772-P21 SALVAGED SIGNAL EQUIPMENT: All removed items including but not limited to vehicular and pedestrian signal heads, cabinet with controller, Opticom device, wiring, existing video detection system and signal poles shall be salvaged and delivered to the City of Grand Forks Public Works facility 724 N 47th St, Grand Forks. All costs, labor, materials and equipment necessary for salvaging signal equipment shall be included in the price bid for "TRAFFIC SIGNAL SYSTEM."

772-P22 PULL BOXES: Pull boxes shall meet the specification outlined in the NDDOT standard drawing D770-3. All proposed pull boxes located within the footprint of a sidewalk shall be the precast concrete pull box variation. All pull boxes located within a boulevard or adjacent to a driving lane shall be shall be made of PVC and shall include a traffic resistant cast iron cover. All costs, labor, materials and equipment necessary for furnishing and installing this item shall be included in the price bid for "TRAFFIC SIGNAL SYSTEM."

772-P23 CONDUIT: Conduit shall be installed at the location shown on the plans. Conduit shall be bored under existing pavement. At specific locations, the contractor may need to dig potholes to verify that the conduit avoids the existing utility. Pushing conduit, digging potholes and restoring the potholes with new material that ties into the existing surround material shall be included in the bid price for "TRAFFIC SIGNAL SYSTEM." All conduits shall be sealed with duct seal at the controller cabinet and at the traffic signal standard foundations. Conduit types may be either schedule 40 PVC or HDPE conduit with a wall thickness equivalent to schedule 40 (Refer to NDDOT specification). HDPE conduit shall be UL listed.

772-P24 ADDITIONAL CONDUIT: The Contractor shall install one additional 4-inch diameter conduits in the new controller and feedpoint foundation. Conduit will need to be aligned with existing conduit. The direction of these conduits will be determined in the field by the engineer. Each foundation for proposed traffic signal standards shall have one spare 2-inch conduit; the direction will be determined by the engineer in the field. The conduits shall be capped. All costs to supply and install this additional conduit shall be included in the price bid for "TRAFFIC SIGNAL SYSTEM."

772-P25 CONDUCTOR COLOR CONTINUINITY: Conductor color continuity shall be maintained where any 12 AWG 12 or 12 AWG 10 conductor cables are connected to 12 AWG 5 and/or 12 AWG 3 conductor cables within the terminal block of a traffic signal standard.

772-P26 LABEL ALL FIELD CABLES: All labeling materials shall be approved by the City. Labels shall be readable without moving the cables. When installing cable bundles in conduit, bundles will not be taped. All field cables installed by the Contractor shall be labeled with the cable designations:

TYPE	LABEL	LABLE LOCATION
Communication Cable	Comm./address of other end	Within 12" of conduit
Pedestrian Push Button	Phase/location (i.e. NW, SW, etc.)	Within 6" of terminals
Coaxial Cable Cameras	Detection zone (i.e. D2-1, D2-2, etc.)	Within 6" of terminals
Control Cable	Cable number & location (i.e. NW, SW, etc.)	Within 12" of conduit
Opticom Cable	Pre-empt number/location (i.e. NW, SW, etc.)	Within 6" of terminal

Labeling field cables is not a separate pay item, cost to be included in "TRAFFIC SIGNAL SYSTEM" lump sum bid item.

772-P27 IT SYSTEM: The price bid "TRAFFIC SIGNAL SYSTEM" shall include all labor and equipment necessary to interconnect this intersection with the traffic signals on 32nd and 47th Ave S. This shall include but not be limited to all fiber optic cable, pull boxes, conduit, conduit sweeps into existing pull boxes and connections required for the interconnected system to be fully operational. This also includes any spare conduit denoted in the plans for future fiber optic cable installation and furnishing and installation of Ethernet switch (RuggedComm) and fiber optic data links at each signalized intersection.

772-P28 ETHERNET SWITCH: The Ethernet Switch shall be produced by RuggedComm and shall be model type RuggedSwitch RS900G. Fiber distribution unit shall have dual fiber optic Gigabit Ethernet ports. Connections at these switches shall include two (2) single-mode fibers with LC connectors in and out. All costs, labor, materials and equipment necessary for furnishing and installing this item shall be included in the price bid for "TRAFFIC SIGNAL SYSTEM."

772-P29 IP ADDRESS: The Contractor shall coordinate with the City of Grand Forks to obtain any required IP addresses during IT system installation.

772-P30 INTERCONNECT CABLE: The fiber optics interconnect cable shall include one (1) 24 multimode (12 pairs) and 24 single-mode hybrid fiber optic hardwire for aerial and duct application, compatible with Daisy-chain operation, for the purpose of controlling traffic in a coordinated closed-loop system. The Contractor shall use one (1) pair of single-mode fiber for traffic signal controller interconnection and one (1) pair of single-mode fiber for the entire video detection system. Fibers shall terminate in the appropriate switch within the traffic signal controller and all fiber both single and multi-mode shall be terminated in the panel. The optical cable shall be dielectric, loose-tube, dry block, filled with a single polyethylene jacket and reinforced with aramid yarn. The optical specifications shall meet RUS 7 CFR 1755.900 (PE-90) and Telcordia GR-20 Standards for single-mode cable. Single mode fiber shall be 8.3/125 micrometer in diameter, zero water peak. The attenuation shall be less than or equal to 0.4 dB/km at 1310nm; less than or equal to 0.32 dB/km at 1383 nm and less than or equal to 0.3 dB/km at 1550nm. Multimode fiber shall be 62.5/125

Notes

NOTES

micrometer in diameter, zero water peak. The attenuation shall be less than or equal to 3 dB/km at 850 nm and less than or equal to 1 dB/km at 1550 nm. The temperature range shall be -40°C to +70°C.The contractor shall provide 25 feet of additional interconnect for each incoming and outgoing conduit run at every pull box, traffic signal controller. The cable manufacturer shall provide the Engineer with documentation indicating the attenuation and bandwidth for individual fibers on each reel within five business days after delivery of the cable. The cable shall again be tested after connectors are installed. All labor, materials and equipment necessary for fiber optic interconnection shall be included in the price bid for "TRAFFIC SIGNAL SYSTEM."

772-P31 TRACER CONDUCTOR: The interconnect cable conduit shall have a tracer conductor installed and labeled in each controller cabinet. The tracer conductor shall consist of a No. 14 AWG - Type THW single conductor as specified in Standard Specification section 895.03A1. The conductor shall be continuously unspliced from control cabinet to control cabinet. The cost of furnishing and installing this conductor shall not be bid separately but shall be included in the price bid for "TRAFFIC SIGNAL SYSTEM."

772-P32 MAXIMUM TENSILE PULL STRENGTH: The contractor shall not exceed a maximum tensile strength of 600 pounds when pulling the fiber optic interconnect cable.

772-P33 SIGNAL TIMING AND COORDINATION: The contractor is responsible for inputting all necessary data into the traffic signal controller to achieve a fully operational coordinated signal system. This shall include but not be limited to installing all necessary time of day plans, video detection functions, emergency vehicle preemption, transit signal priority, railroad preemption and video detection and signal interconnection and communication. All labor, materials and equipment necessary achieve this fully operational coordinated signal system shall be included in the price bid "TRAFFIC SIGNAL SYSTEM."

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Notes

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SU-9-986(109)113	6	7

ENVIRONMENTAL COMMITMENTS

ENVIRONMENTAL COMMITMENTS: The City of Grand Forks, North Dakota Department of Transportation and the Federal Highway Administration have made several environmental commitments to various agencies and the public to secure approval of this project. The environmental commitments are as follows:

Based on the NEPA documentation, no additional permits or environmental commitments have been identified beyond what is covered by the NDDOT's Standard Specification of Road and Bridge Construction.

Wetland Number	Cowardin Classification	Wetland Type	Wetland Size (acres)	Wetland Feature	USACE Jurisdictional Wetlands	Impacts to Wetlands	
						Temp.	Perm.
NO WETLANDS PRESENT							
TOTALS:			0.00			0.00	0.00

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Environmental Commitments

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	8	1

SPEC NO.	CODE NO.	ITEM DESCRIPTION	QTY	UNIT
103	100	CONTRACT BOND	0.5	L SUM
202	119	SAW CONCRETE	1087	LF
202	130	REMOVAL OF CURB & GUTTER	979	LF
202	137	REMOVAL OF PAVEMENT	538	SY
202	230	REMOVAL OF INLETS	1	EA
202	174	REMOVAL OF PIPE ALL TYPES AND SIZES	8	LF
203	138	COMMON EXCAVATION-SUBCUT	699	CY
302	101	SALVAGE BASE COURSE	401	CY
550	112	8IN NON-REINF CONCRETE PVMT CL AE	930	SY
702	100	MOBILIZATION	0.5	L SUM
704	100	FLAGGING	120	MHR
704	1000	TRAFFIC CONTROL SIGNS	745	UNIT
704	1060	DELINEATOR DRUMS	54	EA
704	1086	SEQUENCING ARROW PANEL-TYPE B	2	EA
708	2900	SEEDING-HYDRO MULCH	3000	SY
709	701	GEOTEXTILE FABRIC - TYPE R1	1221	SY
714	615	PIPE CONC REINF 24IN CLIII	8	LF
714	4090	PIPE CONDUIT 12IN-STORM DRAIN	204	LF
714	9720	UNDERDRAIN PIPE PVC PERFORATED 4IN	120	LF
722	100	MANHOLE 48IN	1	EA
722	120	MANHOLE 72IN	1	EA
722	3500	INLET TYPE-1	2	EA
722	3700	INLET SPECIAL-TYPE 1 48IN	1	EA
722	6140	ADJUST GATE VALVE BOX	1	EA
748	140	CURB & GUTTER-TYPE I	1068	LF
750	105	SIDEWALK CONCRETE BIKEWAY	291	SY
750	115	SIDEWALK CONCRETE -4IN	106	SY
750	210	MEDIAN NOSE PAVING	10	SY
750	2115	DETECTABLE WARNING PANELS	164	SF
762	103	PVMT MK PAINTED MESSAGE	172	SF
762	122	PREFORMED PATTERNED PVMT MK-MESSAGE (GROOVED)	64	SF
762	1305	PROFORMED PATTERNED PVMT MK 4IN LINE-GROOVED	550	LF
762	1307	PREFORMED PATTERNED PVMT MK 6IN LINE-GROOVED	478	LF
762	1309	PREFORMED PATTERNED PVMT MK 8IN LINE-GROOVED	1659	LF
762	1325	PREFORMED PATTERNED PVMT MK 24IN LINE-GROOVED	147	LF
770	4540	RELOCATE LIGHT STANDARD	1	EA
772	1	TRAFFIC SIGNAL SYSTEM	1	EA
772	3135	REMOVE INTERIM TRAFFIC SIGNALS	1	EA

Quantities

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	10	1

Basis of Estimate

Common Excavation-Subcut

"Common Excavation-Subcut" bid item shall include the excavation of all embankment within the neat lines as shown on the plans less existing concrete pavement that is to be removed. Additional excavation has been provided for the for the construction of the sideways and bikeways. The bid item "Common Excavation-Subcut" shall be paid at plan quantity and no separate measurement or payment will be made, unless changes are made to the plan grade.

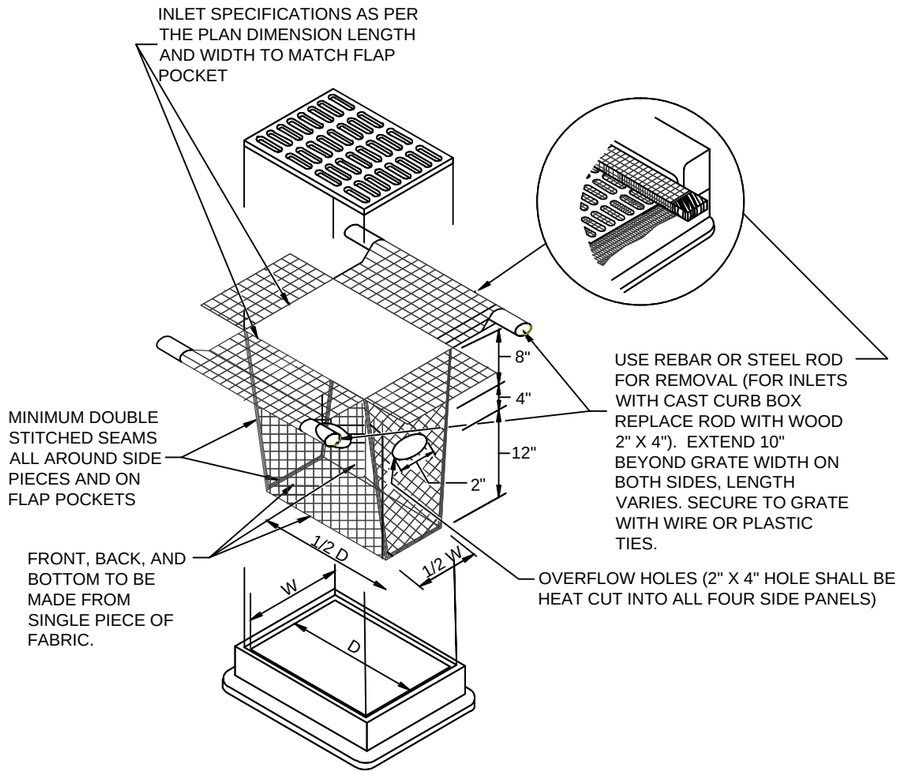
Salvaged Base Course

"Salvaged Base Course" bid item shall include the placement of salvaged base course on the excavated road bed and shared use path as shown on the plans. Salvaged Base Course will be measured as in-place compacted volume (CY). The bid item "Salvaged Base Course" shall be paid at plan quantity and no separate measurement or payment will be made, unless changes are made to the plan grade.

Pavment Marking

4" Centerline Skip: 1320LF/Mile

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	20	1



FILTER BAG INSERT

(CAN BE INSTALLED IN ANY INLET TYPE WITH OR WITHOUT A CURB BOX)

NOTES:

1. ALL GEOTEXTILE MATERIAL USED FOR INLET PROTECTION SHALL BE MONOFILAMENT IN BOTH DIRECTIONS.

2. FINISHED SIZE, INCLUDING POCKETS WHERE REQUIRED SHALL EXTEND A MINIMUM OF 10 INCHES AROUND THE PERIMETER TO FACILITATE MAINTENANCE OR REMOVAL.

3. INSTALLATION NOTES:
   DO NOT INSTALL FILTER BAG INSERT IN INLETS SHALLOWER THAN 30 INCHES, MEASURED FROM THE BOTTOM OF THE INLET TO THE TOP OF THE GRATE. THE INSTALLED BAG SHALL HAVE A MINIMUM SIDE CLEARANCE OF 3 INCHES BETWEEN THE INLET WALLS AND THE BAG, MEASURED AT THE BOTTOM OF THE OVERFLOW HOLES. WHERE NECESSARY THE CONTRACTOR SHALL CLINCH THE BAG, USING PLASTIC ZIP TIES, TO ACHIEVE THE 3 INCH SIDE CLEARANCE.

4. FLAP POCKETS SHALL BE LARGE ENOUGH TO ACCEPT WOOD 2 INCH X 4 INCH OR USE A ROCK SOCK OR STRAW WATTLE IN PLACE OF THE FLAP POCKETS.

Inlet Protection

Inlet Protection Details (BMP's)

South Washington Street
& 40th Avenue South

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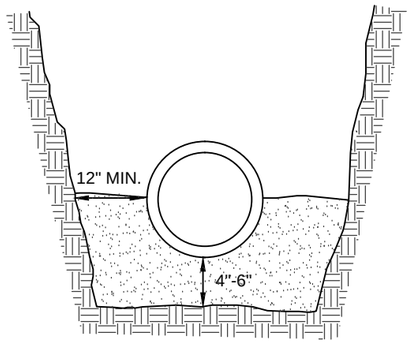
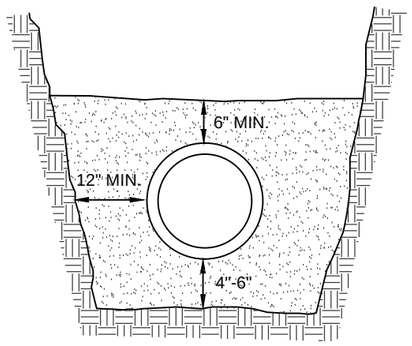
ND	SU-6-986(109)113	19723	20	2



12" & 15" PIPE CONDUIT BEDDING

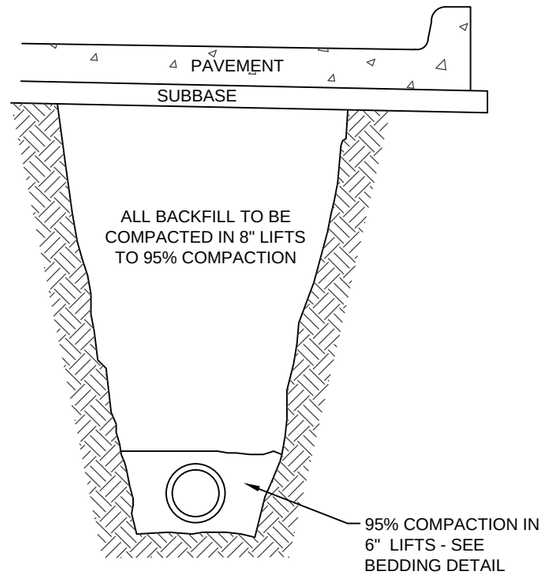
CLASS 6 BEDDING AT 95% DENSITY
TO SPRINGLINE OF PIPE

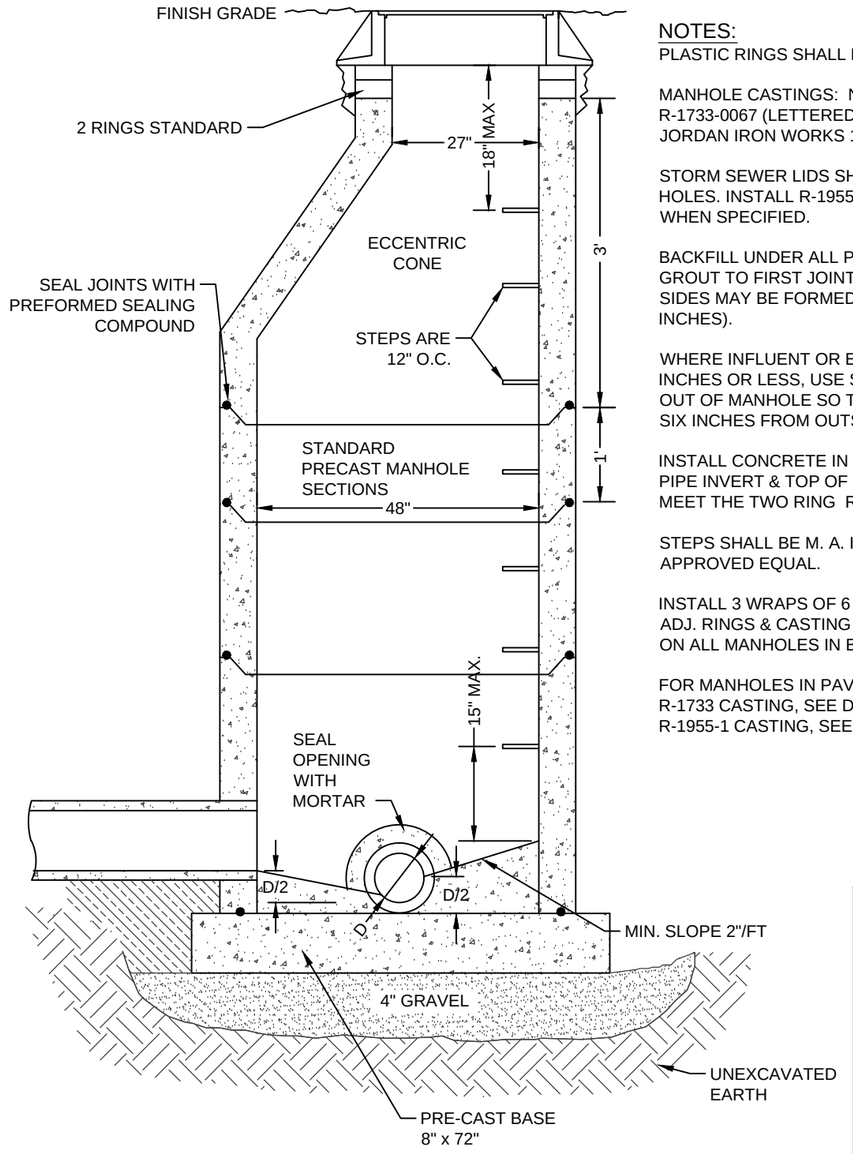


18" & GREATER PIPE CONDUIT BEDDING

CLASS 6 BEDDING AT 95% DENSITY
TO 6" OVER TOP OF PIPE @95%.

Backfill





Manhole

NOTES:

PLASTIC RINGS SHALL BE REQUIRED.

MANHOLE CASTINGS: NEENAH FOUNDRY NO. R-1733-0067 (LETTERED STORM SEWER) OR EAST JORDAN IRON WORKS 1205.

STORM SEWER LIDS SHALL HAVE OPEN PICK HOLES. INSTALL R-1955-1 CASTING IN LIEU OF 1733 WHEN SPECIFIED.

BACKFILL UNDER ALL PIPES WITH CONCRETE OR GROUT TO FIRST JOINT ON EXCAVATED GROUND: SIDES MAY BE FORMED (MINIMUM WIDTH - 12 INCHES).

WHERE INFLUENT OR EFFLUENT LINES ARE 12 INCHES OR LESS, USE SHORT LENGTHS IN AND OUT OF MANHOLE SO THAT JOINTS FALL WITHIN SIX INCHES FROM OUTSIDE MANHOLE WALL.

INSTALL CONCRETE IN THE AREA BETWEEN THE PIPE INVERT & TOP OF BASE AS NECESSARY TO MEET THE TWO RING REQUIREMENT.

STEPS SHALL BE M. A. INDUSTRIES PS1-DI OR APPROVED EQUAL.

INSTALL 3 WRAPS OF 6 MIL POLY ON MH CONE, ADJ. RINGS & CASTING FLANGE (TAPE IN PLACE) ON ALL MANHOLES IN BERM AREAS.

FOR MANHOLES IN PAVED AREAS USING NEENAH R-1733 CASTING, SEE DETAIL 65.08. IF USING A R-1955-1 CASTING, SEE DETAIL 65.08A.

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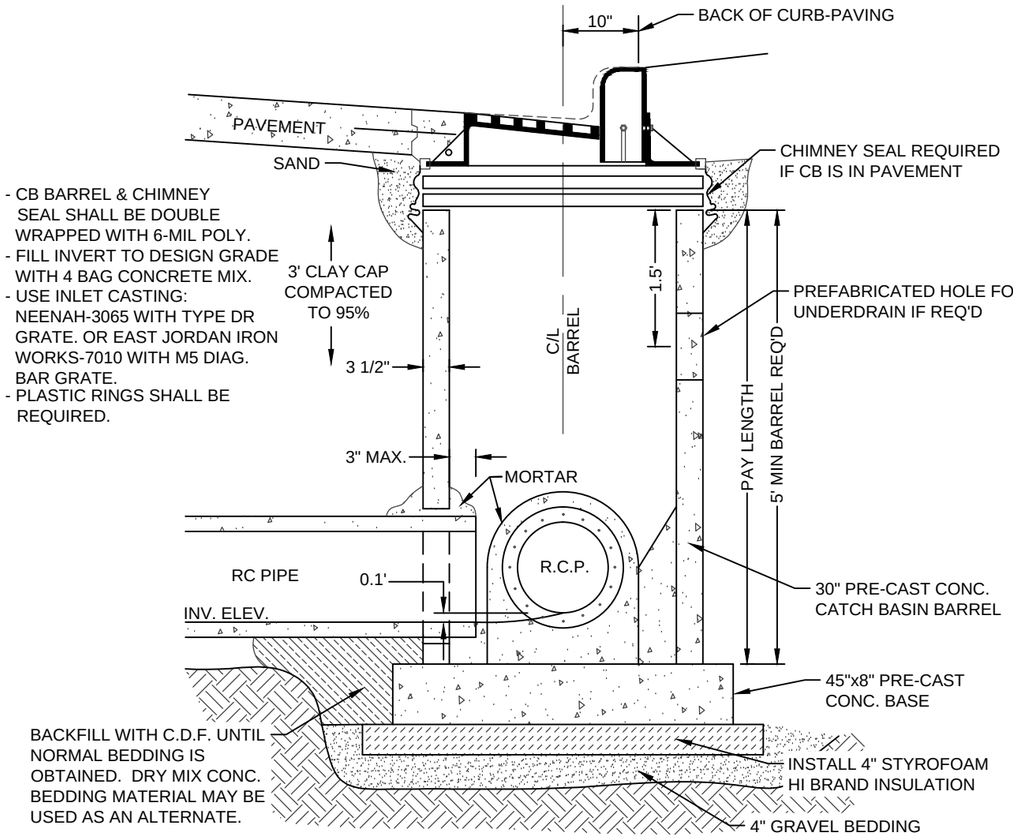
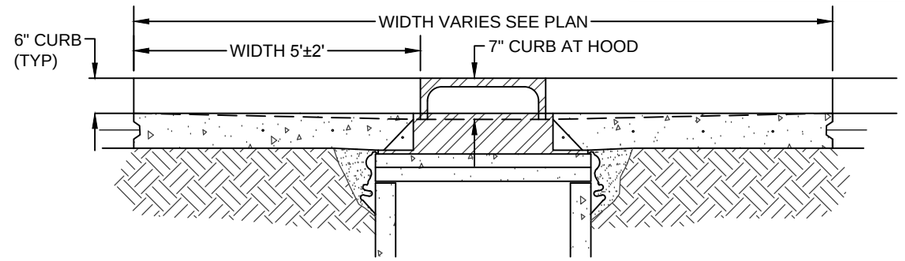
Storm Sewer Details

South Washington Street
& 40th Avenue South

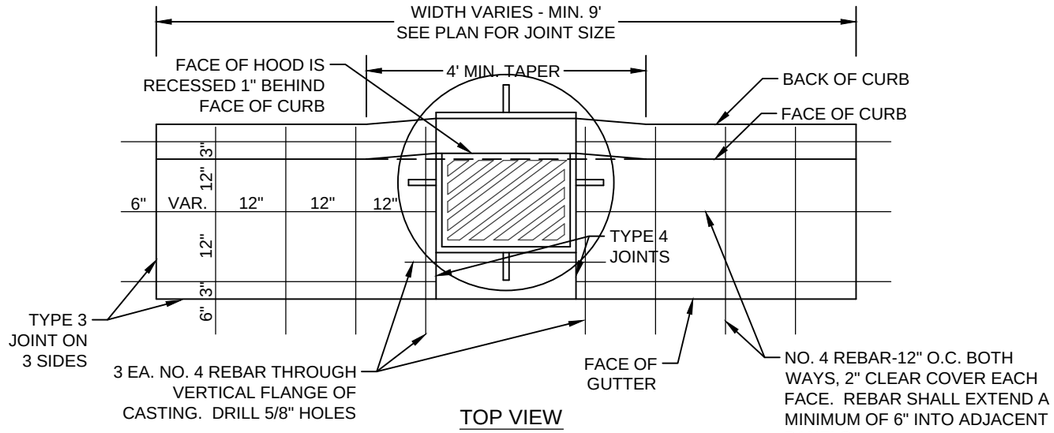
STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	20	3



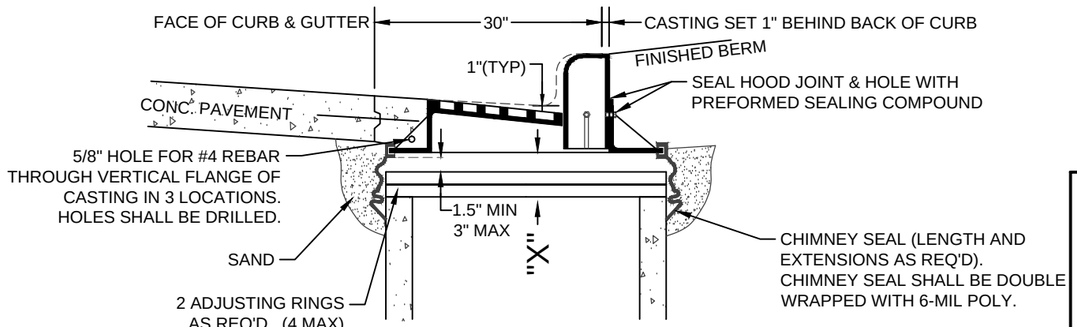
SIDE VIEW



FRONT VIEW



TOP VIEW



SIDE VIEW

"X"	SEAL LENGTH
1.5" TO 3"	6"
3" TO 5-1/2"	9"
5-3/4" TO 11"	9" AND 8" EXTENSION

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inlet Type I

Chimney Seal

Storm Sewer Details

South Washington Street & 40th Avenue South

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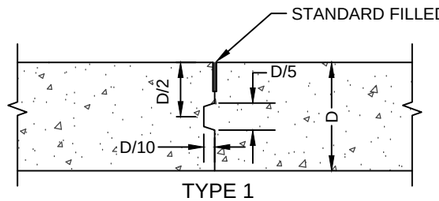
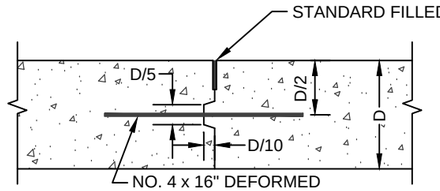
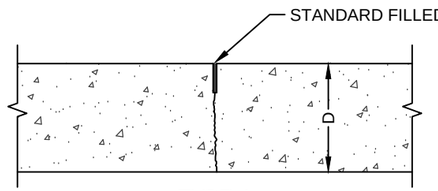
ND	SU-6-986(109)113	19723	20	4



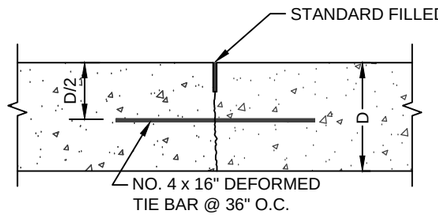
TYPE 1



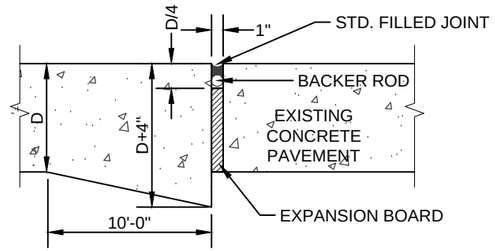
TYPE 3



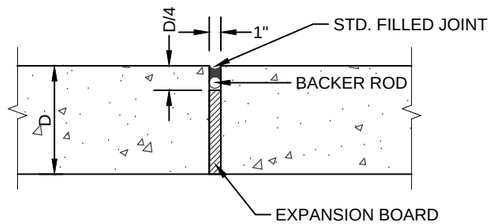
TYPE 4



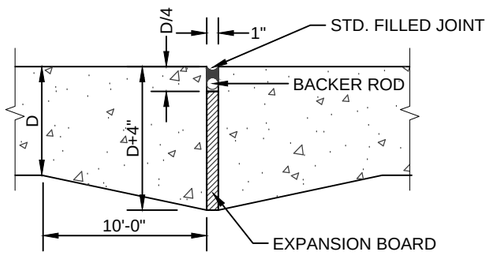
TYPE 5



TYPE 6



TYPE 7



MODIFIED TYPE 7

NOTE:
ALL BARS TO BE EMBEDDED
A MINIMUM OF 6"

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Pavement Joint Details

South Washington Street
& 40th Avenue South

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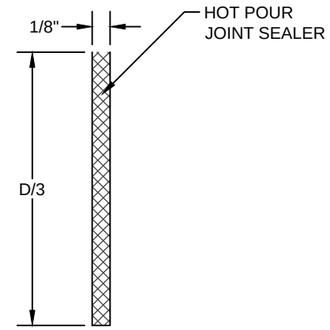
ND	SU-6-986(109)113	19723	20	5



STANDARD FILLED JOINT

NOTES:

1/8" WIDE STANDARD FILLED JOINT TO BE USED ON ALL CONCRETE CONSTRUCTION AND CONTRACTION JOINTS UNLESS OTHERWISE NOTED

ISOLATION JOINT SEALER TO BE HOT POUR

DURING CONCRETE PAVEMENT REPAIRS OR REHABILITATIONS, JOINT WIDTH AND SEALANT TYPE TO MATCH EXISTING JOINTS UNLESS OTHERWISE NOTED.

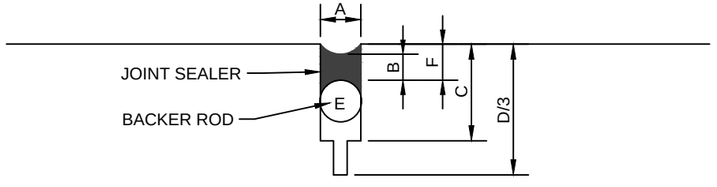
"D" IS DEPTH OF PAVEMENT

JOINT WIDTH TOLERANCE IS + 1/16" TO - 1/32"

THE JOINT FACES SHALL BE CLEANED BY SANDBLASTING AND DRIED BY AIR BLASTING

BACKER ROD SHALL BE CAPABLE OF WITHSTANDING SEALANT TEMPERATURES OF 400 DEGREES F.

A	B	C	E	F
JOINT WIDTH, INCHES	SEALANT BEAD THICKNESS, INCHES	MINIMUM JOINT DEPTH, INCHES	BACKER ROD DIAMETER, INCHES	BACKER ROD PLACEMENT, INCHES
3/8	1/4	1 3/8	1/2	5/8
1/2	1/4	1 3/8	5/8	5/8
5/8	5/16	1 5/8	3/4	11/16
3/4	3/8	1 7/8	1	3/4
7/8	7/16	2	1	13/16
1	1/2	2 1/8	1 1/4	7/8



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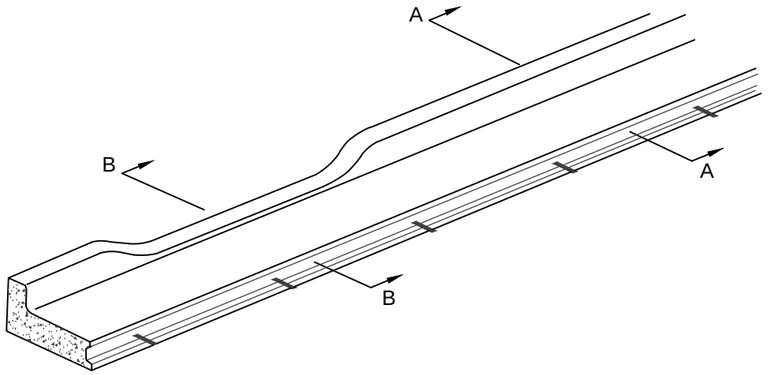
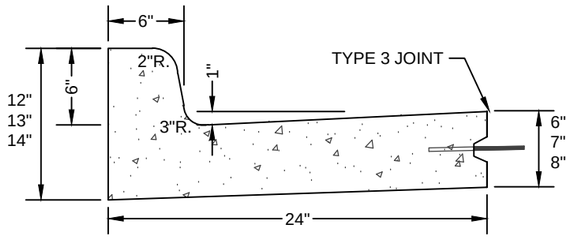
Standard Filled Joint & Curb and Gutter

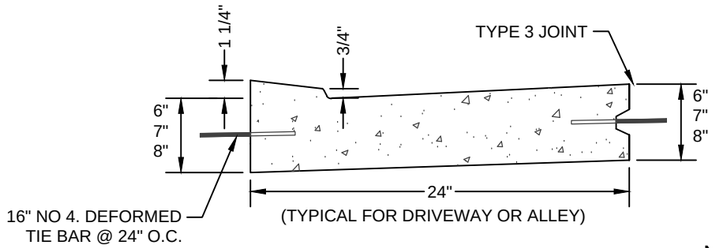
South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	20	6



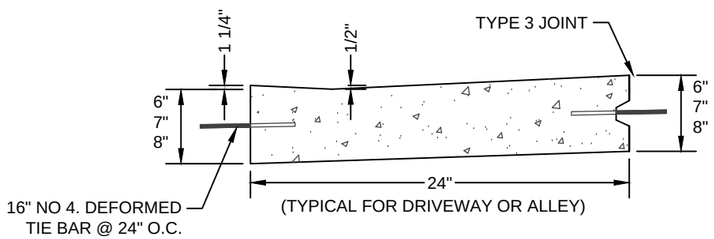


FULL CURB
SECTION A-A

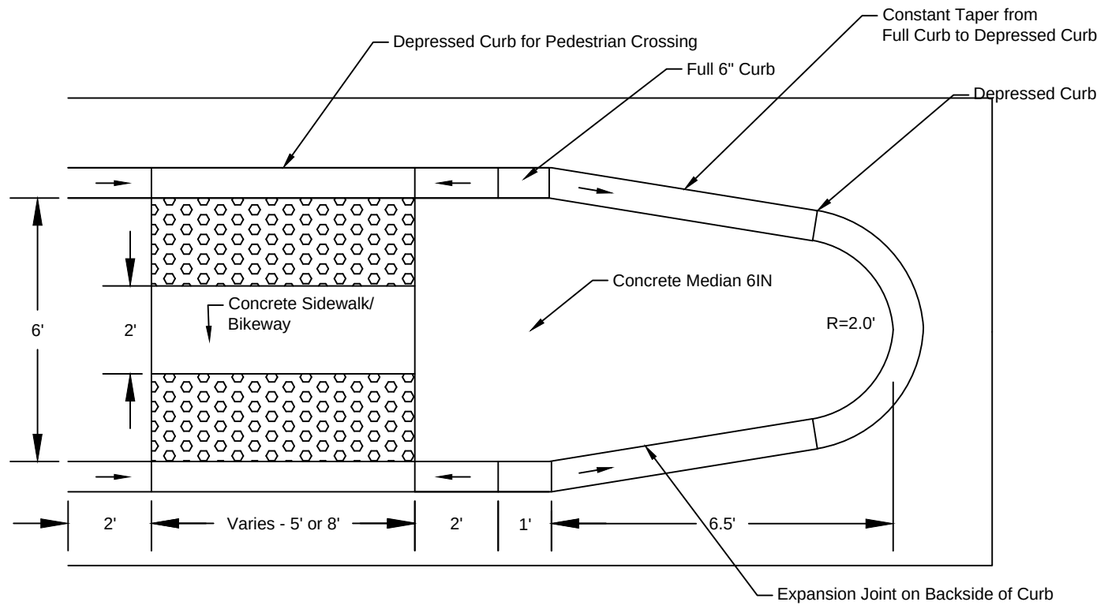


DEPRESSED CURB
SECTION B-B

NOTE:
DEPTH OF CURB TO MATCH
DEPTH OF ADJACENT
PAVEMENT (6" MIN.)



DEPRESSED CURB AT
PEDESTRIAN CROSSINGS
SECTION B-B



Median Nose Detail

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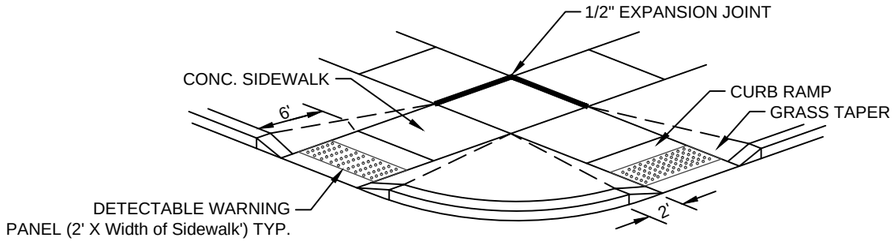
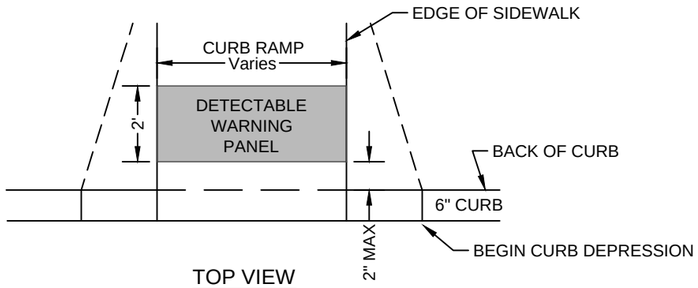
Curb & Gutter

South Washington Street
& 40th Avenue South

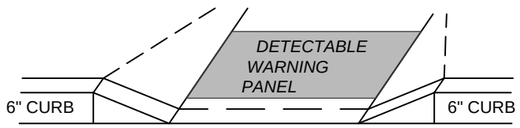
Curb & Gutter

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	20	7

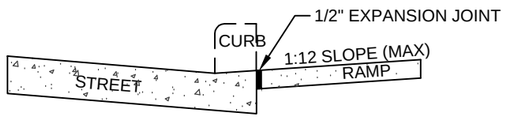




TOP VIEW

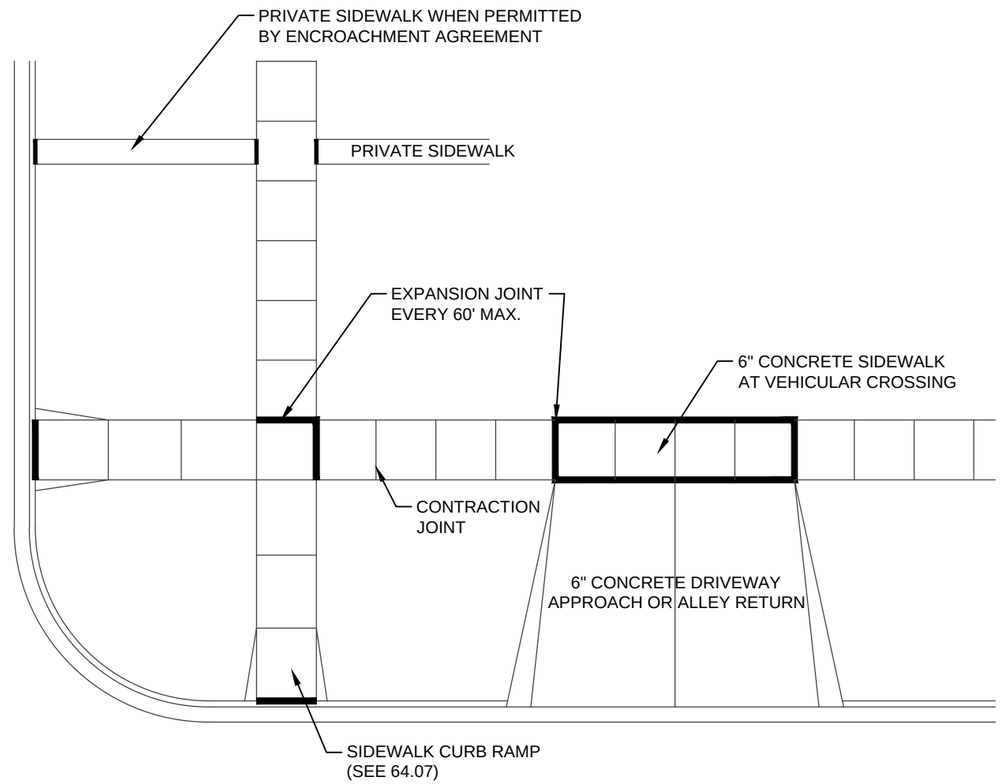


FRONT VIEW



SIDE VIEW

Curb Ramp



NOTE:
DARK LINES SHOW 1/2" EXPANSION JOINT TO BE PLACED AS SHOWN.

Sidewalk Joint Plan

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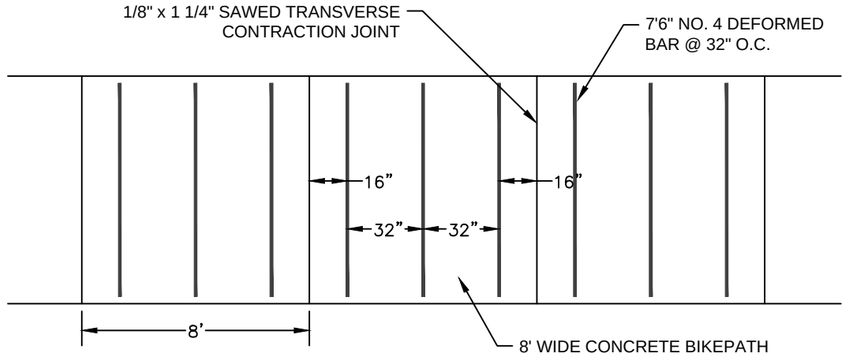
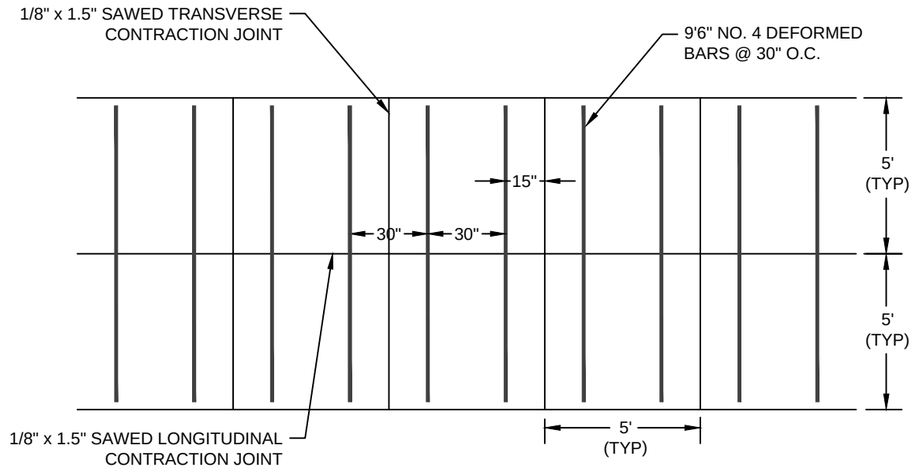
Curb Ramp and Sidewalk

South Washington Street
& 40th Avenue South

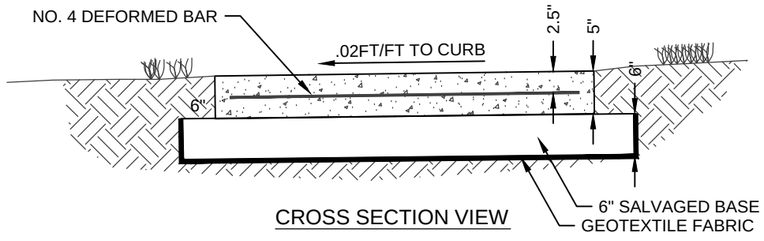
STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	20	8



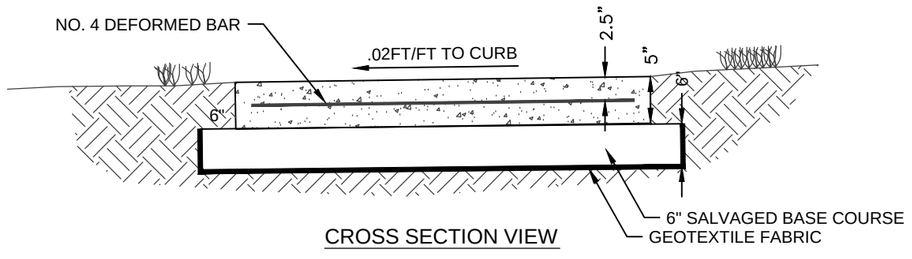
PLAN VIEW



PLAN VIEW



CROSS SECTION VIEW



CROSS SECTION VIEW

8' Wide Bikeway

10' Wide Bikeway

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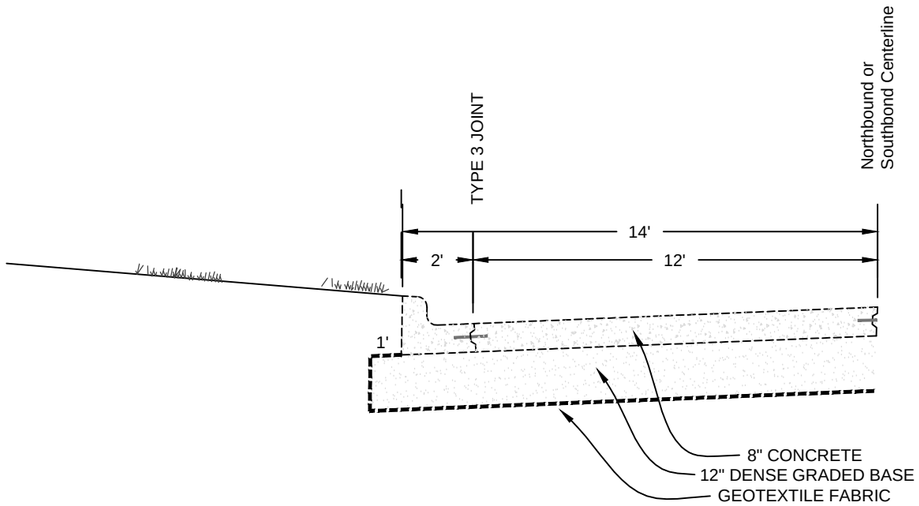
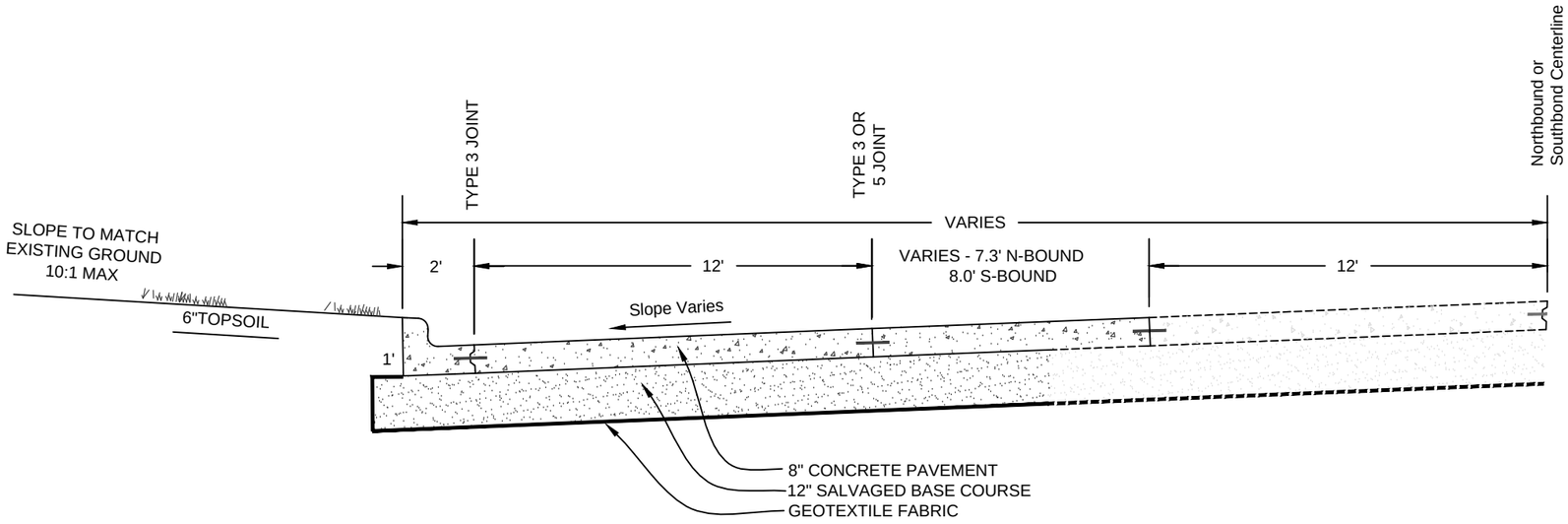
Bikeway Details

South Washington Street & 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	30	1



EXISTING SECTION



PROPOSED TURN LANE SECTION

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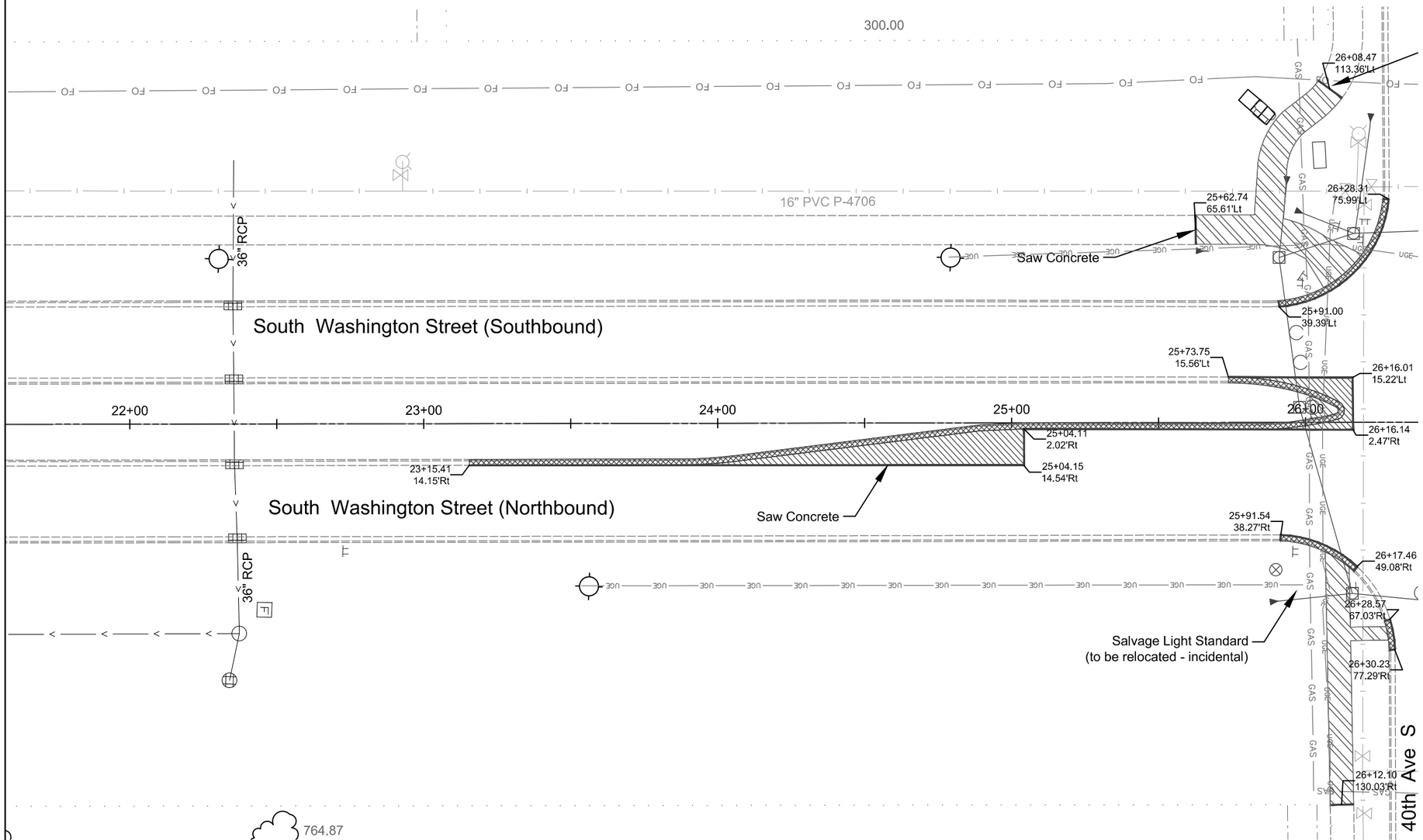
Turn Lane Typical Sections

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	40	1



Saw Concrete	332 LF
23+15, 14'Rt to 26+00, 3'Rt	296 LF
25+74, 15'Lt to 26+00, 15'Lt	26 LF
25+63, 65.6'Lt	10 LF
Removal of Curb & Gutter	312 LF
23+15 to 25+73	312 LF
Removal of Pavement	169 SY
24+06 to 26+00	169 SY

N

HORIZONTAL SCALE:
0 40 80
Feet

Legend:
- Saw Concrete
- Removal of Curb & Gutter
- Removal of Pavement
- Removal of Concrete Sidewalk/Shared Use Path

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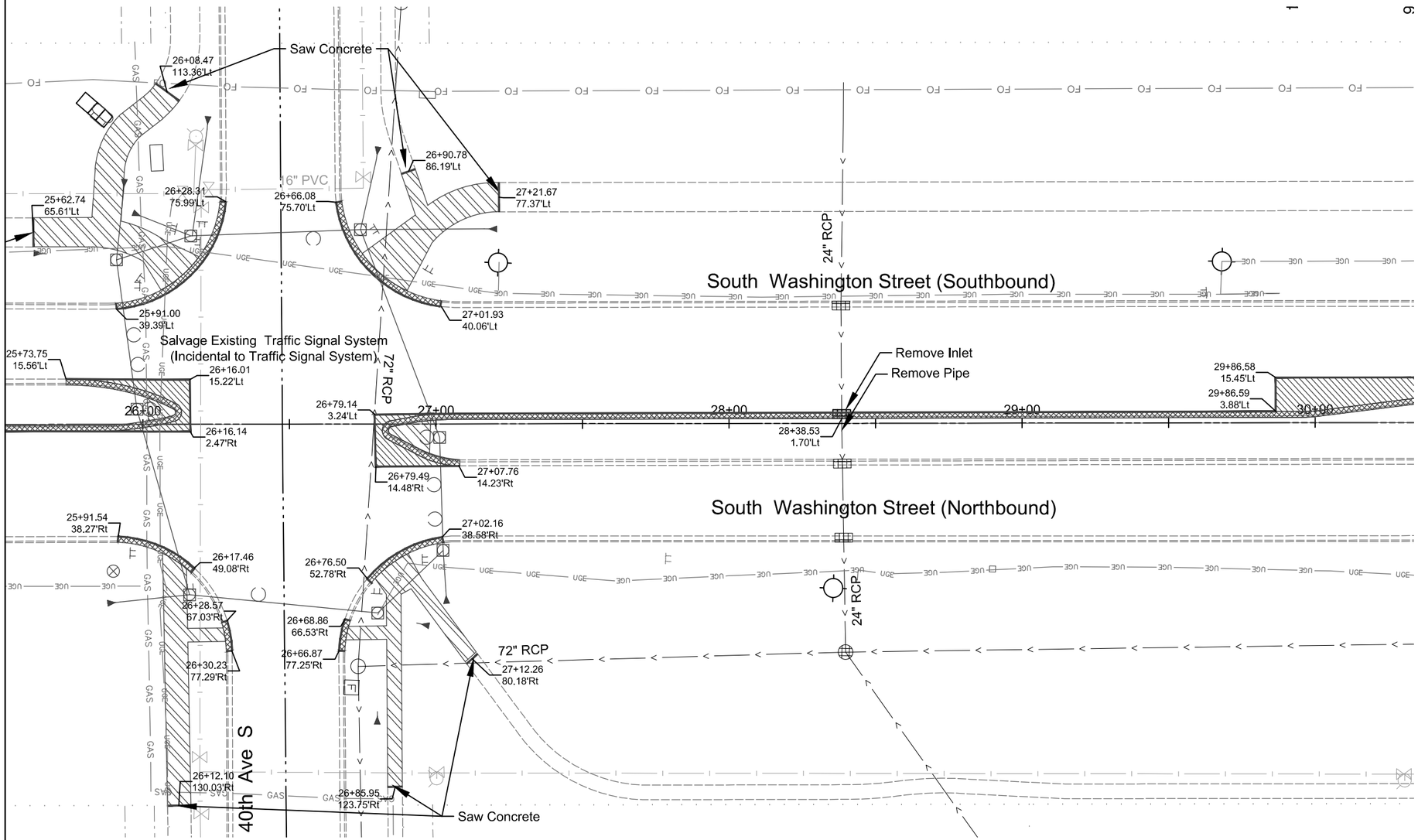
Removals
Sta. 22+00 to 26+00

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	40	2



Saw Concrete	549 LF
26+00, 15'Lt to 26+00, 2.5'Rt	5 LF
26+08, 113'Lt	10 LF
26+12, 44'Rt	18 LF
26+12, 130'Rt	8 LF
26+15, 49'Lt	26 LF
26+29, 71'Rt	13 LF
26+68, 71'Rt	13 LF
26+80, 49'Lt	29 LF
26+83, 48'Rt	23 LF
26+86, 124'Rt	5 LF
26+91, 65'Lt	5 LF
27+08, 14.2'Rt to 30+00, 15'Lt	379 LF
27+12, 80'Rt	5 LF
27+22, 77'Lt	10 LF
Removal of Curb & Gutter	461 LF
26+00 to 30+00	461 LF
Removal of Pavement	311 SY
26+00 to 30+00	311 SY
Removal of Inlets	1 EA
28+39, 2.5'Lt	1 EA
Removal of Pipe All Types and Sizes	8 LF
26+00 to 30+00	8 LF

HORIZONTAL SCALE:
0 40 80
Feet

Legend:
- Saw Concrete
- Removal of Curb & Gutter
- Removal of Pavement
- Removal of Concrete Sidewalk/Shared Use Path

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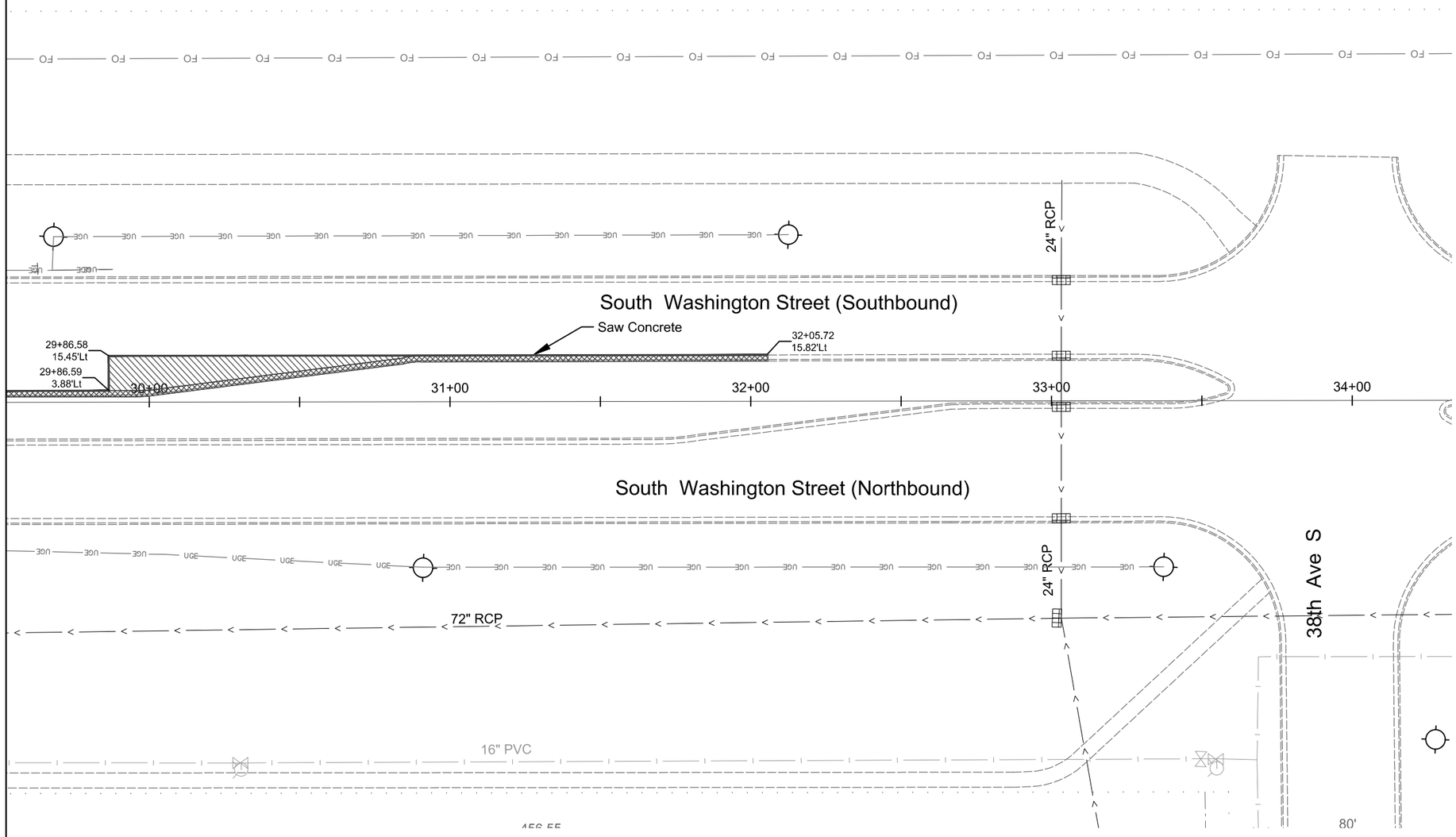
Removals
Sta. 26+00 to 30+00

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	40	3

Saw Concrete	206 LF
30+00, 15'Lt to 32+06, 15'Lt	206 LF
Removal of Curb & Gutter	206 LF
30+00 to 32+06	206 LF
Removal of Pavement	58 SY
30+00 to 32+06	58 SY



Legend:

- Saw Concrete
- Removal of Curb & Gutter
- Removal of Pavement
- Removal of Concrete Sidewalk/Shared Use Path

N

HORIZONTAL SCALE:
0 40 80
Feet

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Removals
Sta. 30+00 to 34+00

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	50	1

MH No.	1 - 72"
Northing	340384.50
Easting	2815926.44
Station	22+35.49, 3.04'Lt
Top Elev	834.77
Top of Riser Elev	833.85
Max Base	825.29
Invert E/W	825.63 36" Conduit
Invert N	828.48 12" Conduit

MH No.	3 - 48"
Northing	341451.41
Easting	2815882.46
Station	33+03.30, 6.51'Lt
Top Elev	835.70
Top of Riser Elev	834.78
Max Base	829.40
Invert E/W	829.70 24" Conduit
Invert S	829.80 12" Conduit

Inlet No.	1A - 30"
Type	Inlet - Type 1
Grate Style	Diagonal
Northing	340588.20
Easting	2815917.87
Station	24+39.36, 3.85'Lt
Top of Curb Elev	834.92
Barrel Elev	833.42
Max Base	829.10
Invert	829.30 12" Conduit

Inlet No.	2 - 48"
Type	Inlet - Special Type 1
Grate Style	Diagonal
Northing	340987.58
Easting	2815913.84
Station	28+38.61, 6.27'Rt
Top of Curb Elev	835.08
Barrel Elev	833.58
Max Base	828.80
Invert	829.10 24" Conduit

Inlet No.	3A - 30"
Type	Inlet - Type 1
Grate Style	Diagonal
Northing	341318.51
Easting	2815884.50
Station	31+70.41, 9.51'Lt
Top of Curb Elev	835.80
Barrel Elev	834.30
Max Base	830.10
Invert	830.33 12" Conduit

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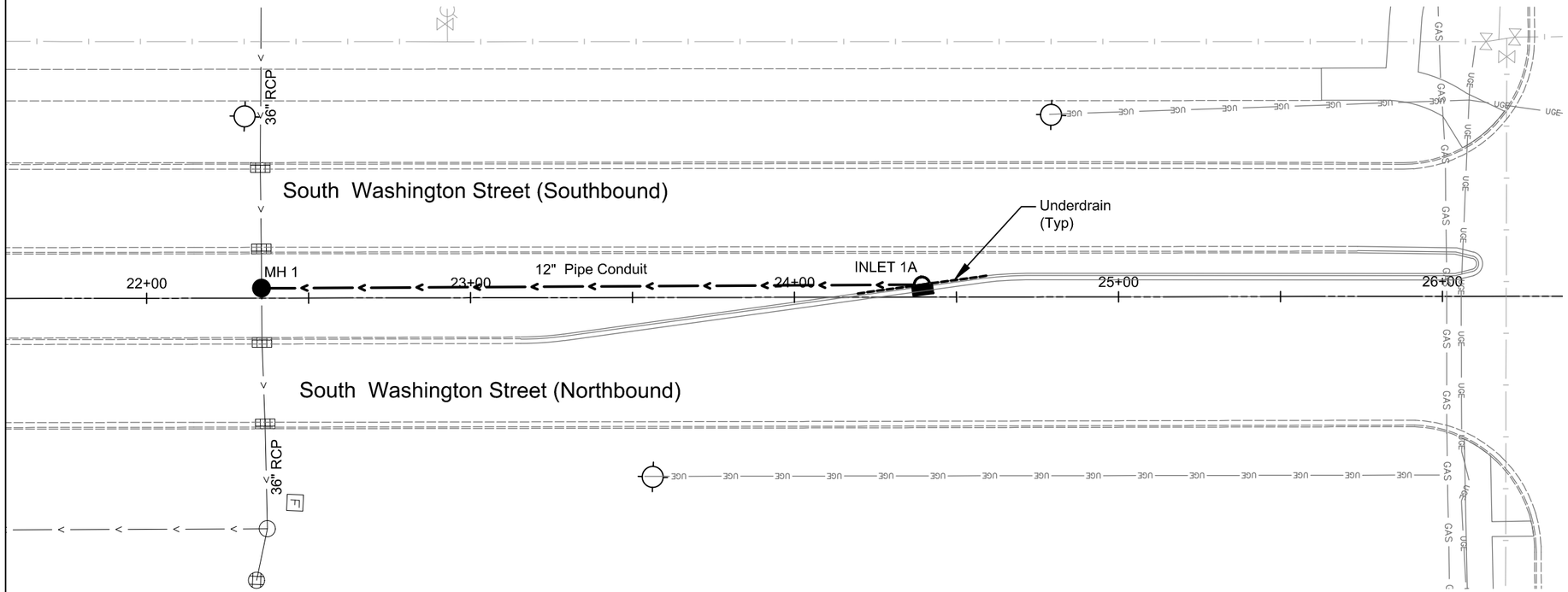
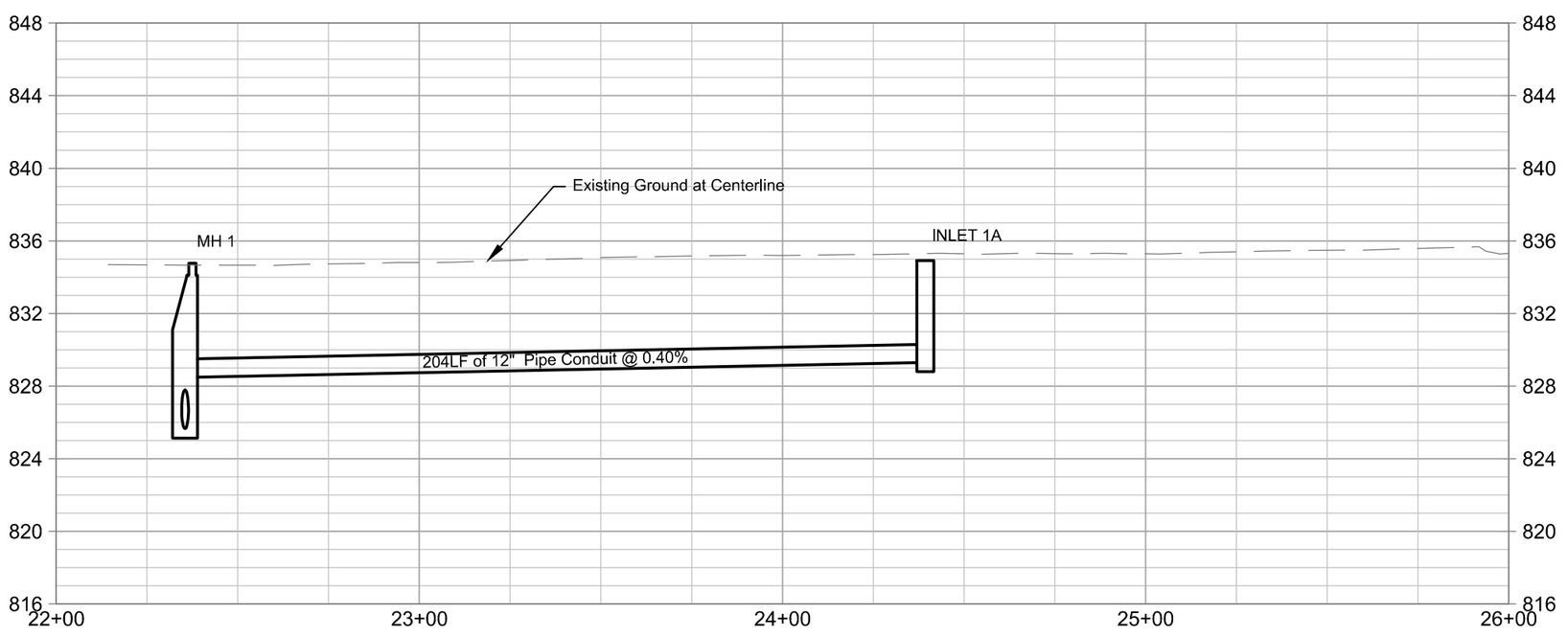
Inlet & Manhole Summary

South Washington Street & 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	50	2





Pipe Conduit 12IN-Storm Drain	204 LF
22+00 to 26+00	204 LF
Manhole 72IN	1 EA
22+00 to 26+00	1 EA
Inlet-Type 1	1 EA
22+00 to 26+00	1 EA
Underdrain Pipe PVC Perforated 4IN	40 LF
20+00 to 26+00	40 LF

HORIZONTAL SCALE:
0 40 80 Feet

VERTICAL SCALE:
0 8 16 Feet

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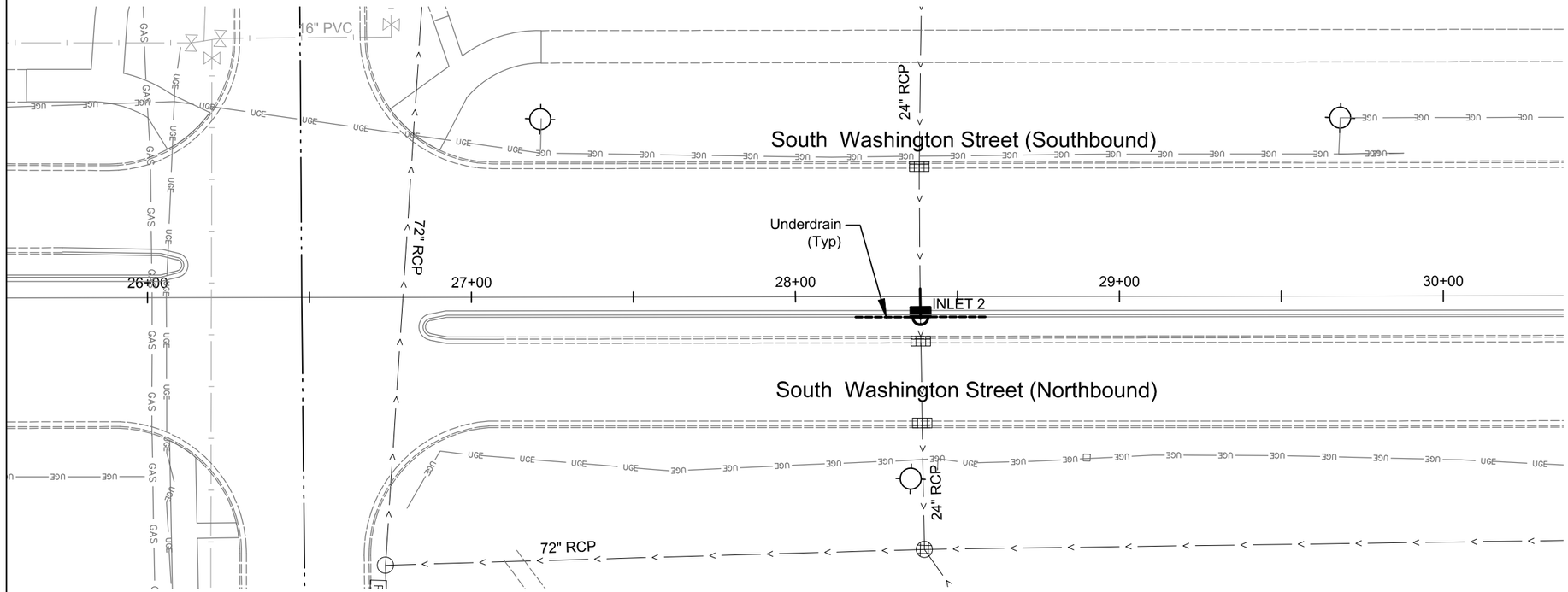
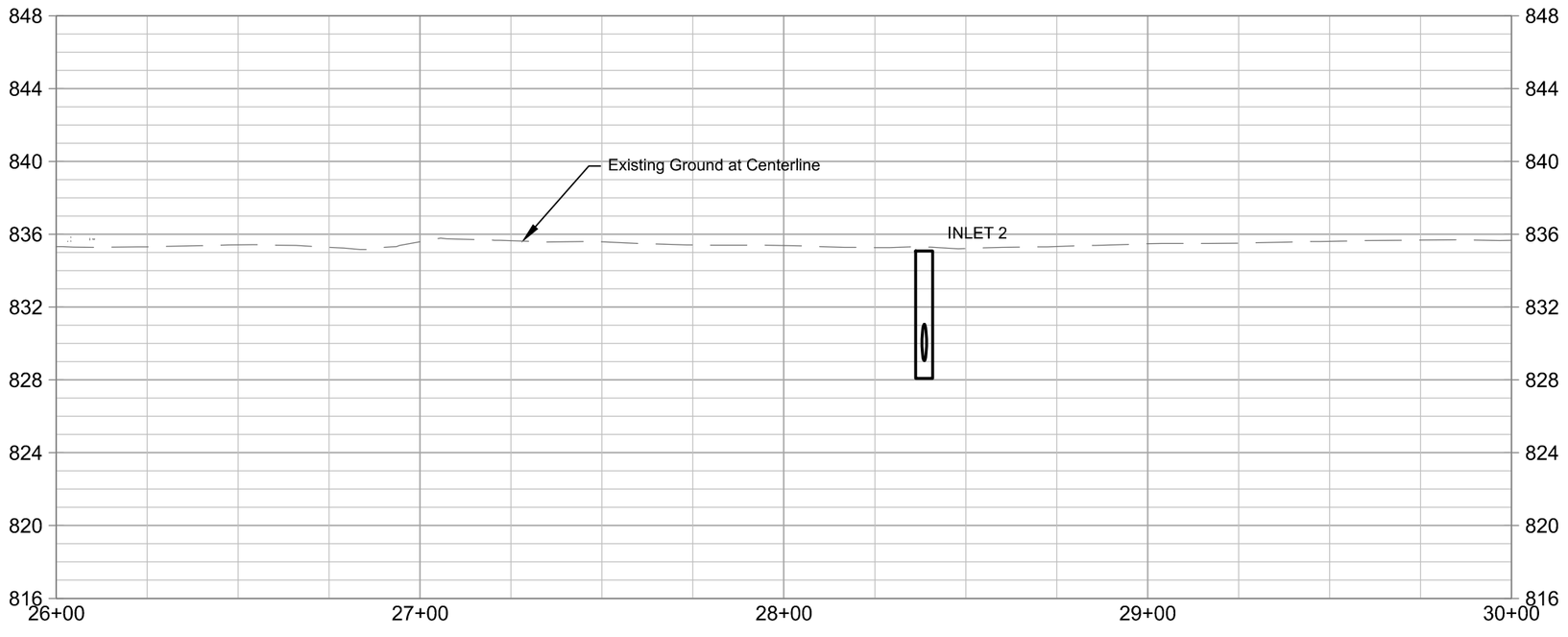
Storm Sewer
Sta. 22+00 to 26+00

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	50	3





Inlet Special -Type 1 48IN	1 EA
26+00 to 30+00	1 EA
Pipe Conduit 24IN-Storm Drain	8 LF
26+00 to 30+00	8 LF
Underdrain Pipe PVC Perforated 4IN	40 LF
26+00 to 30+00	40 LF

N

HORIZONTAL SCALE:
0 40 80
Feet

VERTICAL SCALE:
0 8 16
Feet

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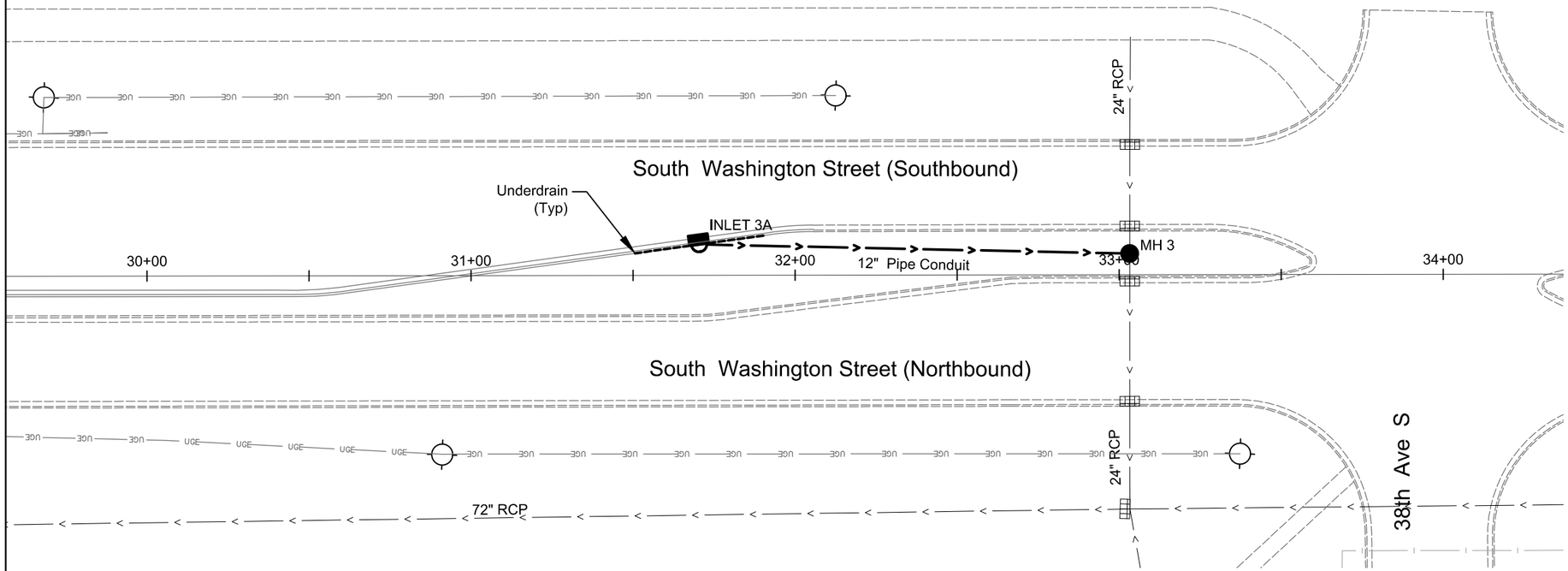
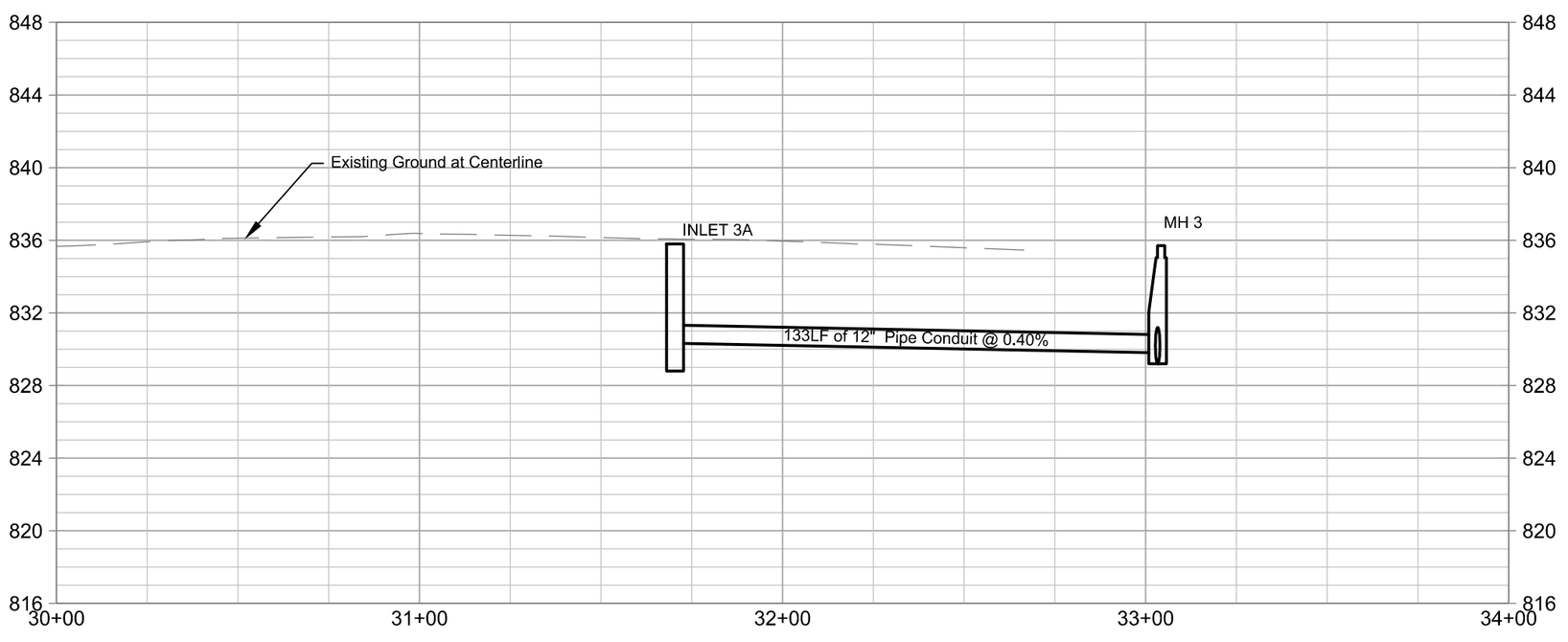
Storm Sewer
Sta. 26+00 to 30+00

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	50	4





Pipe Conduit 12IN-Storm Drain	133 LF
30+00 to 34+00	133 LF
Manhole 48IN	1 EA
30+00 to 34+00	1 EA
Inlet-Type 1	1 EA
30+00 to 34+00	1 EA
Underdrain Pipe PVC Perforated 4IN	40 LF
30+00 to 34+00	40 LF

N

HORIZONTAL SCALE:
0 40 80
Feet

VERTICAL SCALE:
0 8 16
Feet

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Storm Sewer
Sta. 30+00 to 34+00

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	51	1

Begin Staion / Location	End Station / Location	Lenth	Pipe Conduit Storm Drain Pay Size	Allowable Material	Required Diameter	Minimum Thickness	Apllicable Backfill Detail	Under Roadway
		LF	In		In	In		
22+35.5, MH 1	24+39.4, Inlet 1A	204	12	Reinforced Concrete Pipe - Class III	12		Section 20	No
				Aluminum Coated Spiral Rib Corrugated Steel (Type 2)	12	0.168		
				Polymeric Coated Spiral Rib Corregated Steel (over zinc or aluminum coated steel)	12	0.064		
28+38.6, Inlet 2		8	24	Reinforced Concrete Pipe - Class III	24	0.168	Section 20	Yes
31+70.4, Inlet 3A	33+03.3, MH 3	133	12	Reinforced Concrete Pipe - Class III	12		Section 20	No
				Aluminum Coated Spiral Rib Corrugated Steel (Type 2)	12	0.168		
				Polymeric Coated Spiral Rib Corregated Steel (over zinc or aluminum coated steel)	12	0.064		

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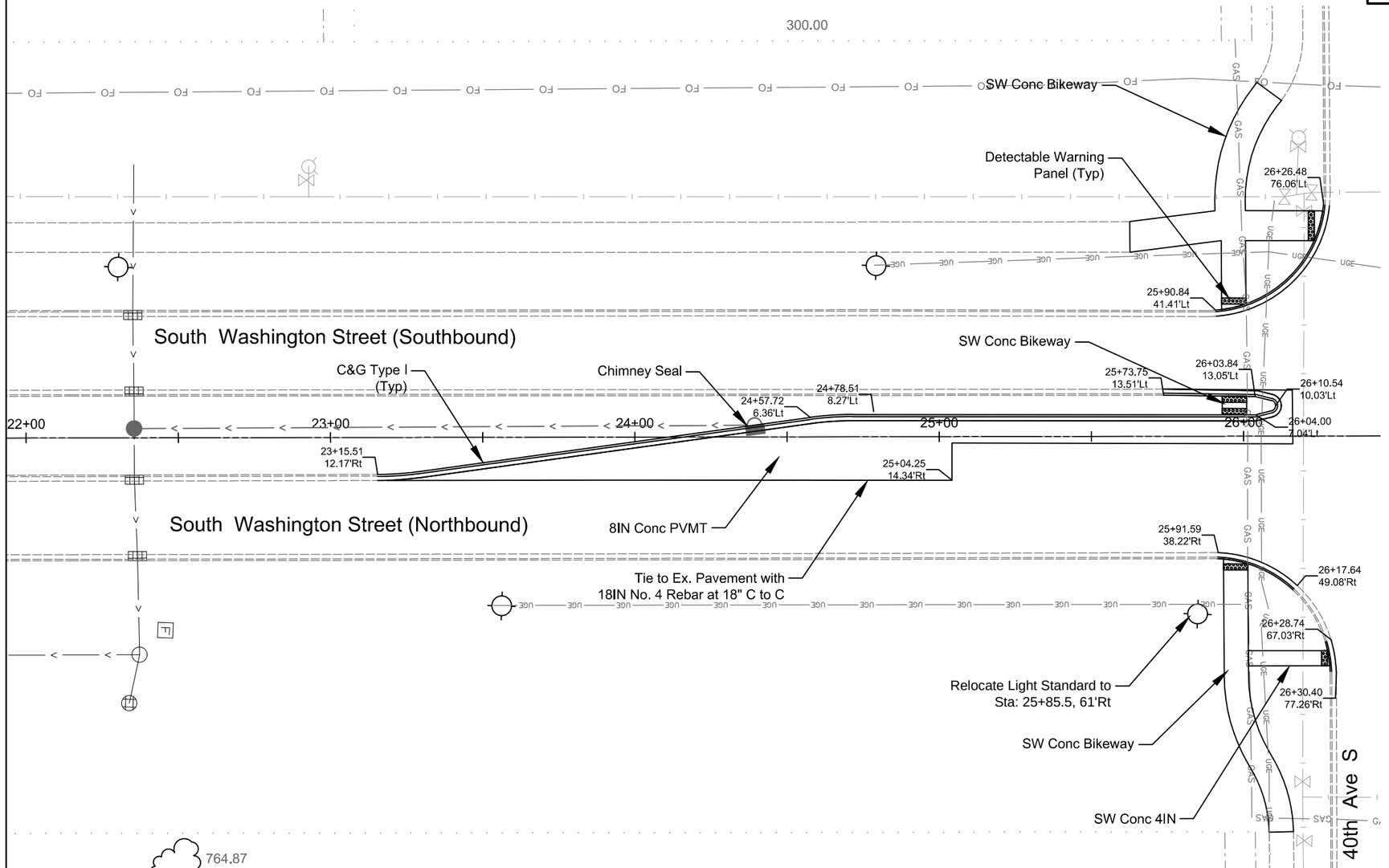
Pipe List

South Washington Street & 40th Avenue South

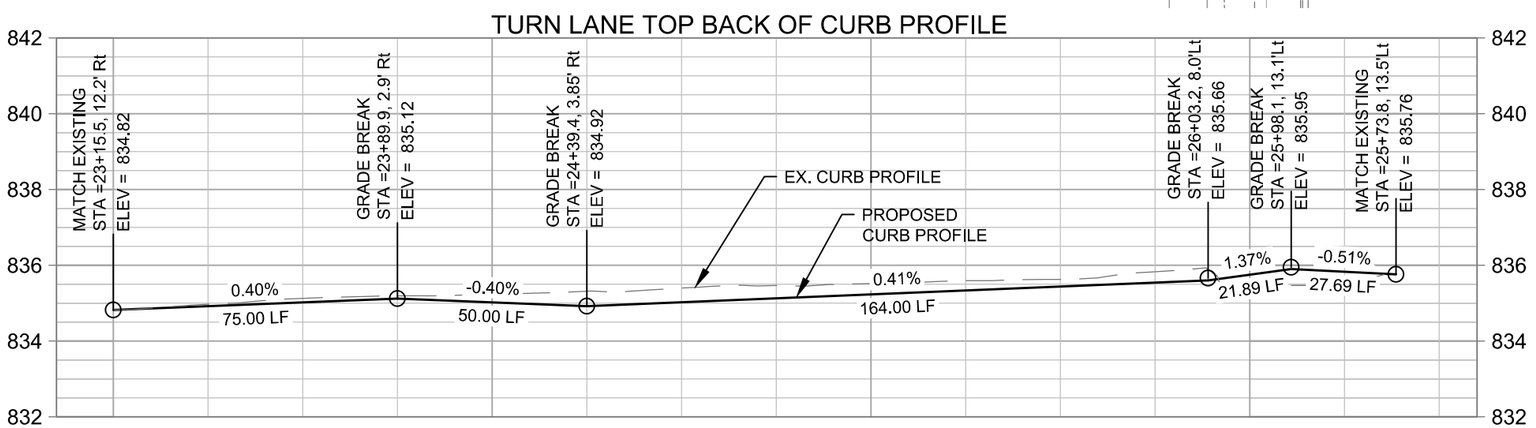
STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	60	1



Common Excavation–Subcut	234 CY
22+00 to 26+00	234 CY
Salvaged Base Course	138 CY
22+00 to 26+00	138 CY
8IN Non–Reinf Concrete PVMT Cl AE	324 SY
22+00 to 26+00	324 SY
Geotextile Fabric–Type R1	416 SY
22+00 to 26+00	416 SY
Curb & Gutter–Type I	330 LF
22+00 to 26+00	330 LF
Sidewalk Concrete Bikeway	130 SY
22+00 to 26+00	130 SY
Detectable Warning Panels	64 SF
25+96.9, 43.4'Lt	16 SF
25+97.0, 11.1' Lt	16 SF
25+97.1, 8.0' Lt	16 SF
25+97.3, 42.0, Lt	16 SF
Relocate Light Standard	1 EA
25+85.5, 61'Rt	1 EA

HORIZONTAL SCALE:
0 40 80 Feet

VERTICAL SCALE:
0 4 8 Feet



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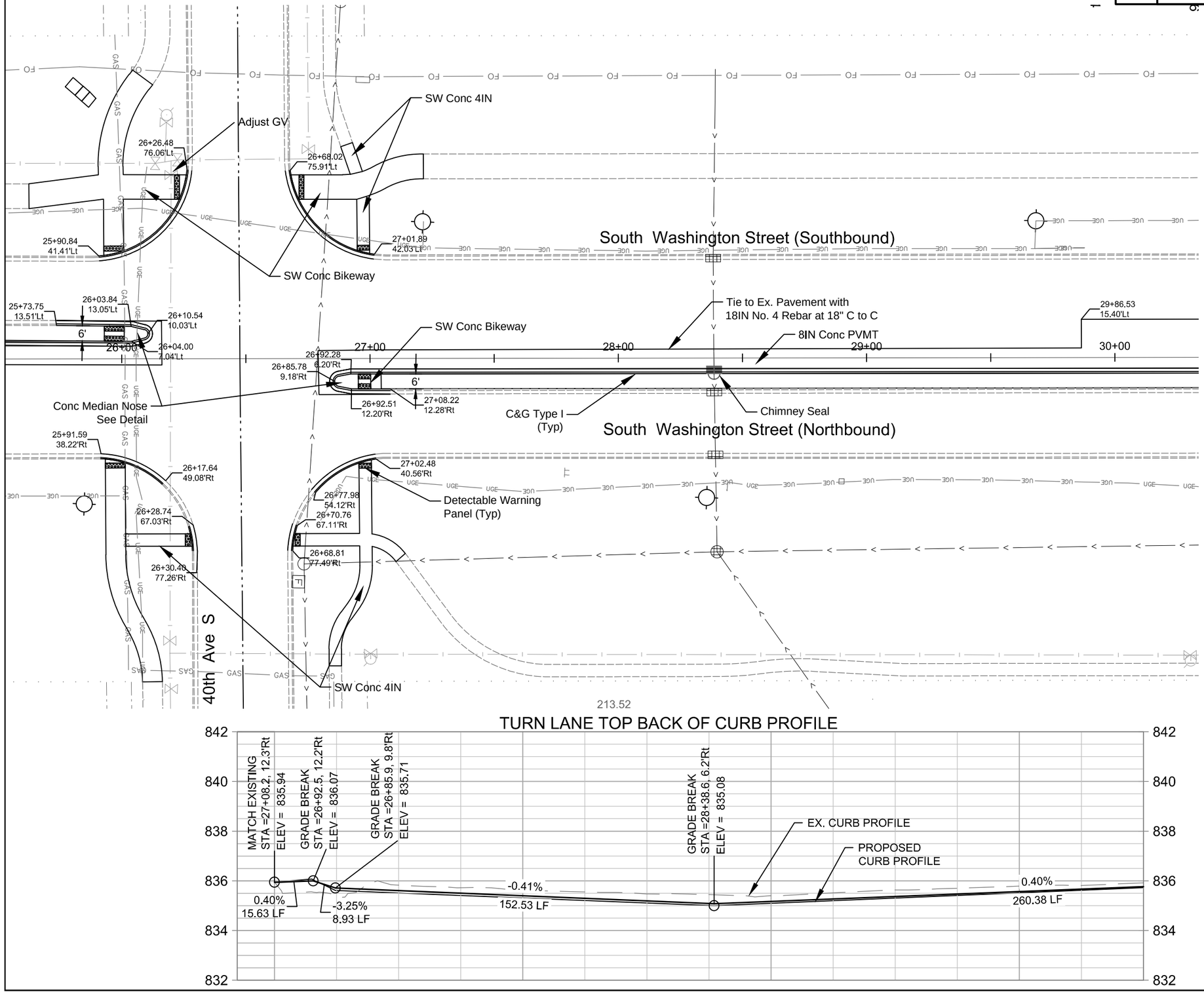
Paving
22+00 to 26+00

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	60	2



213.52

Common Excavation-Subcut	290 CY
26+00 to 30+00	290 CY
Salvaged Base Course	180 CY
26+00 to 30+00	180 CY
8IN Non-Reinf Concrete PVMT Cl AE	332 SY
26+00 to 30+00	332 SY
Geotextile Fabric-Type R1	510 SY
26+00 to 30+00	510 SY
Curb & Gutter-Type I	531 LF
26+00 to 30+00	531 LF
Sidewalk Concrete Bikeway	151 SY
26+00 to 30+00	151 SY
Sidewalk Concrete 4IN	106 SY
26+00 to 30+00	106 SY
Concrete Median Nose Paving	10 SY
26+00 to 30+00	10 SY
Detectable Warning Panels	100 SF
26+23.4, 69.1'Lt	20 SF
26+26.5, 70.5'Rt	10 SF
26+70.8, 70.5'Rt	10 SF
26+71.5, 69.1'Lt	20 SF
26+97.4, 43.6'Lt	10 SF
26+97.8, 7.2'Rt	10 SF
26+97.8, 12.2'Rt	10 SF
26+98.0, 42.2'Rt	10 SF

HORIZONTAL SCALE:
0 40 80 Feet

VERTICAL SCALE:
0 4 8 Feet

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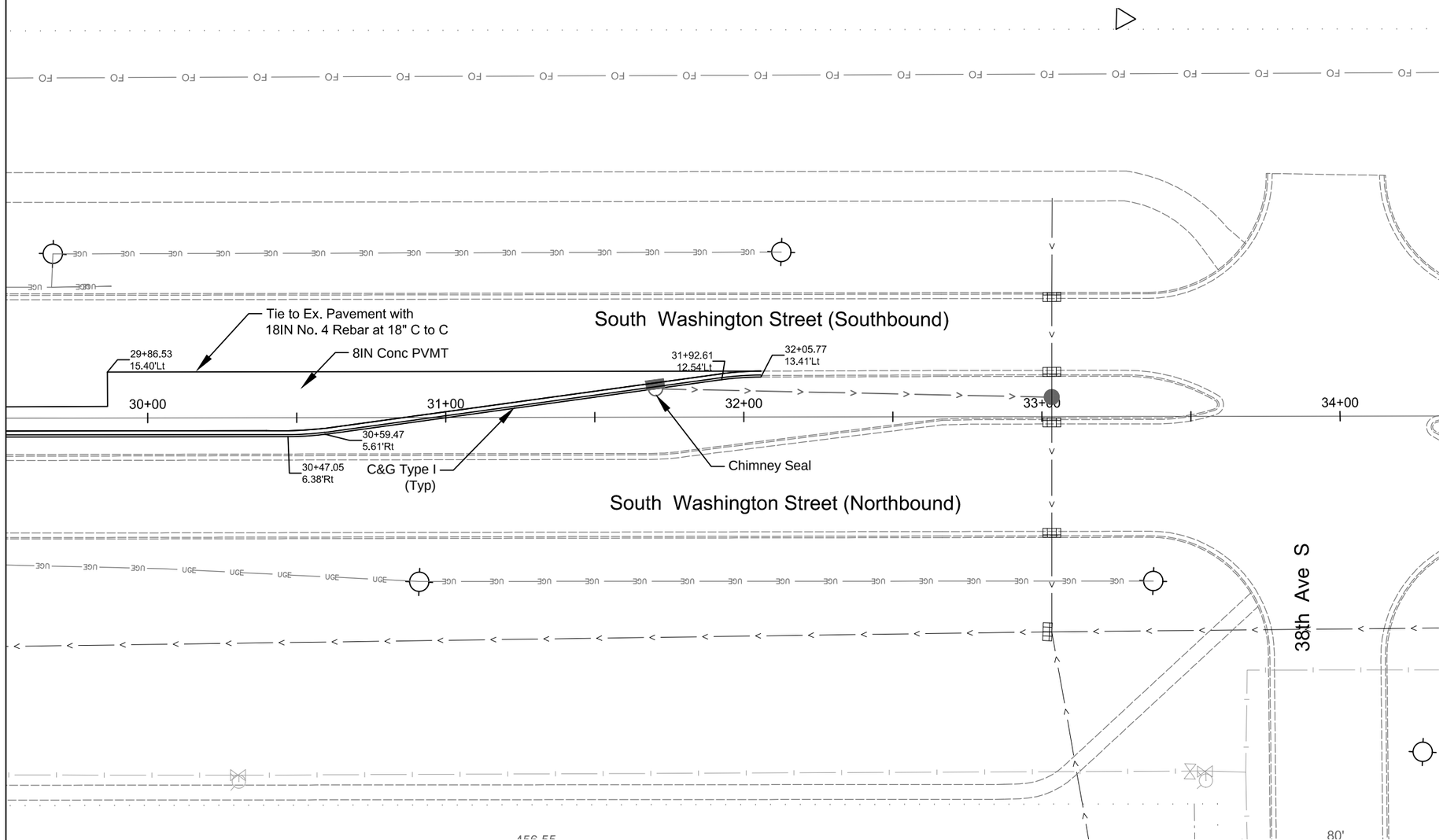
Paving
Sta. 26+00 to 30+00

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	60	3

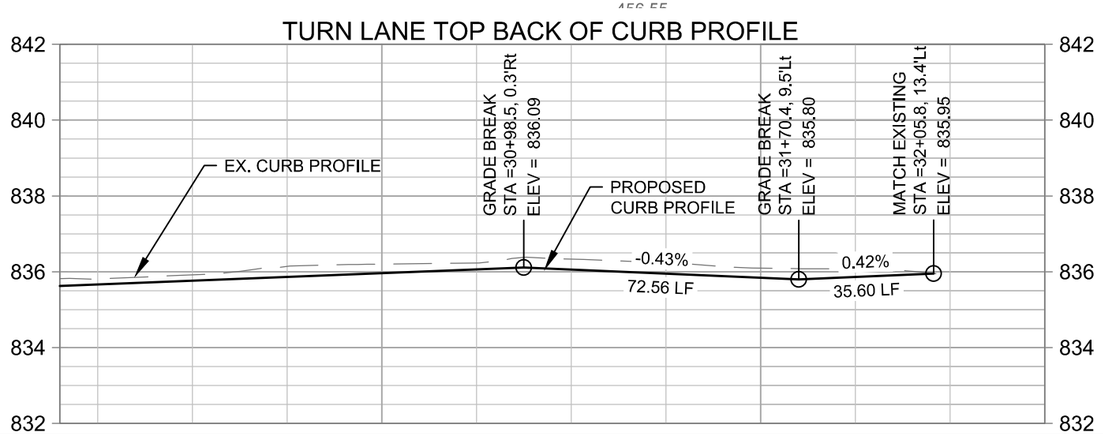


Common Excavation-Subcut	175 CY
30+00 to 34+00	175 CY
Salvaged Base Course	83 CY
30+00 to 34+00	83 CY
8IN Non-Reinf Concrete PVMT Cl AE	273 SY
30+00 to 34+00	273 SY
Geotextile Fabric-Type R1	295 SY
30+00 to 34+00	295 SY
Curb & Gutter-Type I	207 LF
30+00 to 34+00	207 LF

HORIZONTAL SCALE:
0 40 80
Feet

VERTICAL SCALE:

Feet



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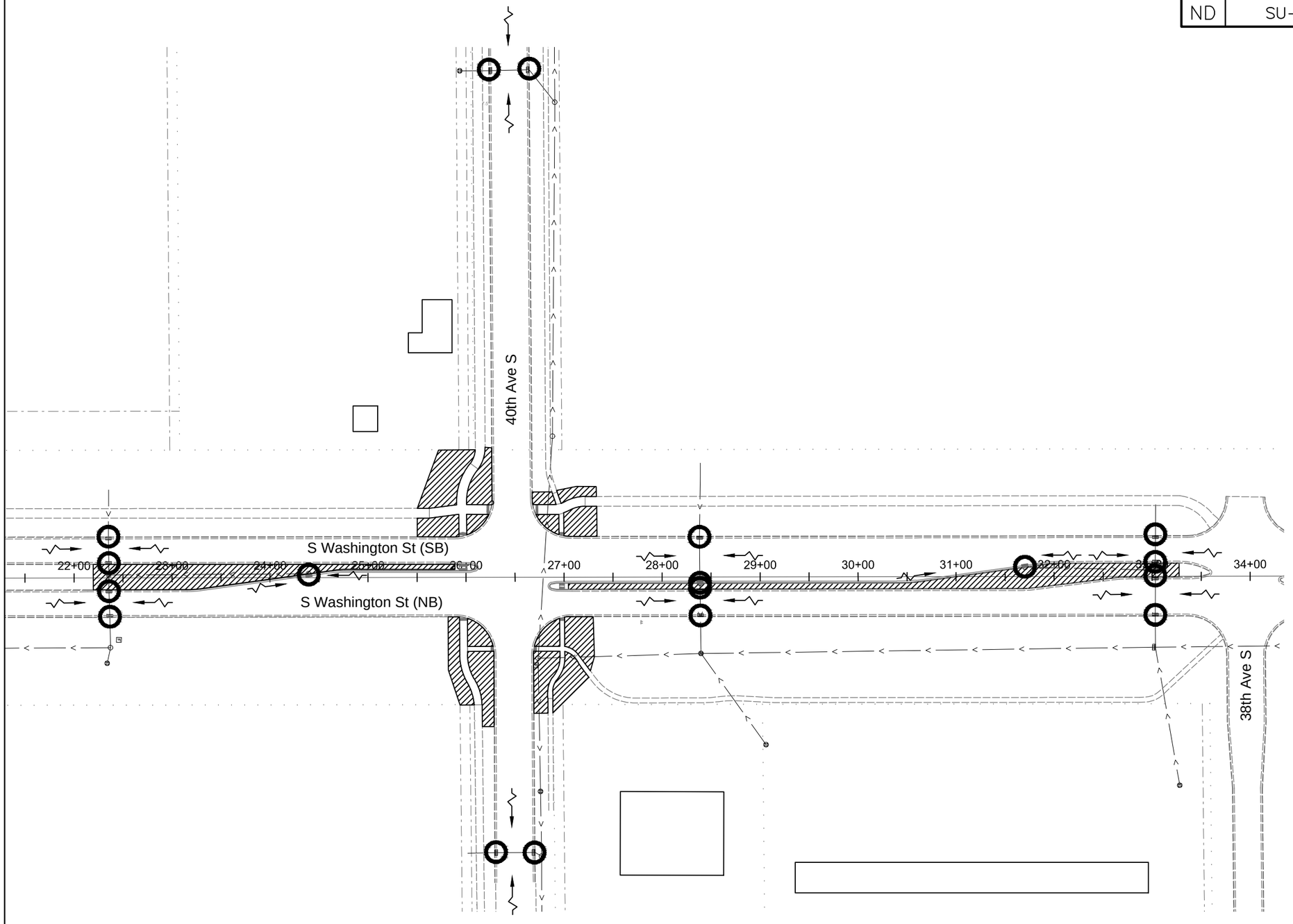
Paving
Sta. 30+00 to 34+00

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	75	1



Inlet Protection–Special 18 EA

Seeding–Hydromulch 3000 SY

HORIZONTAL SCALE:
0 100 200 Feet

Legend:

- Seeding-Hydromulch
- Inlet Protection - Special
- Flowline

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Erosion Control & Seeding

South Washington Street & 40th Avenue South

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
D3-36	36"x6"	STREET NAME SIGN (Sign and installation only)		6	
G20-1a-60	60"x24"	ROAD WORK NEXT __ MILES		34	
G20-1b-60	60"x24"	WORK IN PROGRESS/ NO WORK IN PROGRESS (Sign and installation only)		26	
G20-2a-48	**48"x24"**	**END ROAD WORK**	**2**	**19**	**38**
G20-4-36	36"x18"	PILOT CAR FOLLOW ME		18	
G20-10-108	108"x48"	CONTRACTOR SIGN		64	
G20-50a-72	72"x36"	ROAD WORK NEXT __ MILES RT & LT ARROWS		37	
G20-52a-72	72"x24"	ROAD WORK NEXT __ MILES RT or LT ARROW		30	
G20-55-96	96"x48"	SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT		59	
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)		10	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)		10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)		10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)		7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)		7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)		7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)		7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)		7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	48"x18"	DETOUR ARROW RIGHT or LEFT		23	
M5-1-21	21"x15"	ARROW AHD AND RT or LT(Mounted on route marker post)		7	
M5-2-21	21"x15"	ARROW AHD UP & RT or LT (Mounted on route marker post)		7	
M6-1-21	21"x15"	ARROW RT or LT (Mounted on route marker post)		7	
M6-2-21	21"x15"	ARROW UP & RT or LT (Mounted on route marker post)		7	
M6-3-21	21"x15"	ARROW AHD (Mounted on route marker post)		7	
R1-1-48	48"x48"	STOP		32	
R1-1a-18	**18"x18"**	**STOP and SLOW PADDLE Back to Back**	**2**	**5**	**10**
R1-2-60	60"x60"	YIELD		29	
R2-1-48	**48"x60"**	**SPEED LIMIT __**	**4**	**39**	**156**
R2-1a-24	24"x18"	MINIMUM FEE $80 (Mounted on Speed Limit post)		10	
R3-7-48	48"x48"	LEFT or RIGHT LANE MUST TURN LEFT or RIGHT		35	
R4-1-48	48"x60"	DO NOT PASS		39	
R4-7-48	48"x60"	KEEP RIGHT SYMBOL		39	
R5-1-48	48"x48"	DO NOT ENTER		35	
R6-1-36	36"x12"	ONE WAY RIGHT or LEFT		13	
R7-1-12	12"x18"	NO PARKING		11	
R10-6-24	24"x36"	STOP HERE ON RED		16	
R11-2-48	48"x30"	ROAD CLOSED		28	
R11-2a-48	48"x30"	STREET CLOSED		28	
R11-3a-60	60"x30"	ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-3c-60	60"x30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC		31	
W1-3-48	48"x48"	RIGHT or LEFT SHARP REVERSE CURVE ARROW		35	
W1-4-48	48"x48"	RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-4b-48	48"x48"	DOUBLE RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-6-48	48"x24"	LARGE ARROW		26	
W3-1-48	48"x48"	STOP AHEAD SYMBOL		35	
W3-3-48	48"x48"	SIGNAL AHEAD SYMBOL		35	
W3-4-48	48"x48"	BE PREPARED TO STOP		35	
W3-5-48	**48"x48"**	**SPEED REDUCTION AHEAD**	**2**	**35**	**70**
W4-2-48	**48"x48"**	**RIGHT or LEFT LANE TRANSITION SYMBOL**	**2**	**35**	**70**
W5-1-48	48"x48"	ROAD NARROWS		35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE		35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW		35	
W6-3-48	48"x48"	TWO WAY TRAFFIC SYMBOL		35	
W8-1-48	48"x48"	BUMP		35	
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	48"x48"	LOOSE GRAVEL		35	
W8-9a-48	48"x48"	SHOULDER DROP-OFF		35	
W8-11-48	48"x48"	UNEVEN LANES		35	
W8-12-48	48"x48"	NO CENTER STRIPE		35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY		35	
W8-54-48	48"x48"	TRUCKS ENTERING AHEAD or __ FT.		35	
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or __ FT.		35	
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY		35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W12-2-48	48"x48"	LOW CLEARANCE SYMBOL		35	
W13-1-24	24"x24"	__ MPH ADVISORY SPEED PLATE (Mounted on warning sign post)		11	
W13-4-48	48"x60"	RAMP ARROW		39	
W14-3-48	48"x36"	NO PASSING ZONE		23	
W20-1-48	**48"x48"**	**ROAD WORK AHEAD or _FT or _ MILE**	**2**	**35**	**70**
W20-2-48	48"x48"	DETOUR AHEAD or __ FT		35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or __ FT.		35	
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or __ FT.		35	
W20-5-48	**48"x48"**	**RIGHT or LEFT LANE CLOSED AHEAD or __ FT.**	**2**	**35**	**70**
W20-7a-48	**48"x48"**	**FLAGGING SYMBOL**	**2**	**35**	**70**
W20-7k-24	24"x18"	__ FEET (Mounted on warning sign post)		10	
W20-8-48	48"x48"	STREET CLOSED		35	
W20-51-48	**48"x48"**	**EQUIPMENT WORKING**	**5**	**35**	**175**
W20-52-54	54"x12"	NEXT __ MILES (Mounted on warning sign post)		12	
W21-1a-48	48"x48"	WORKERS SYMBOL		35	
W21-2-48	48"x48"	FRESH OIL		35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT		35	
W21-5-48	48"x48"	SHOULDER WORK		35	
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED		35	
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT.		35	
W21-6a-48	48"x48"	SURVEY CREW AHEAD		35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT.		35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY		35	
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK		35	
	24"x24"	TAKE TURNS (6" D letters) (Mounted on stop sign post)		11	
R3-5-48	**24"x36"**	**Left Turn Only**	**1**	**16**	**16**

SPECIAL SIGNS

SPEC & CODE

704-1000	TRAFFIC CONTROL SIGNS	TOTAL UNITS	745

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	**FLAGGING**	**MHR**	**120**
704-1041	ATTENUATION DEVICE-TYPE B-55	EACH	
704-1043	ATTENUATION DEVICE-TYPE B-65	EACH	
704-1044	ATTENUATION DEVICE-TYPE B-70	EACH	
704-1050	TYPE I BARRICADES	EACH	
704-1051	TYPE II BARRICADES	EACH	
704-1052	TYPE III BARRICADES	EACH	
704-1060	**DELINEATOR DRUMS**	**EACH**	**54**
704-1065	TRAFFIC CONES	EACH	
704-1067	TUBULAR MARKERS	EACH	
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1081	VERTICAL PANELS - BACK TO BACK	EACH	
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH	
704-1086	**SEQUENCING ARROW PANEL - TYPE B**	**EACH**	**2**
704-1087	SEQUENCING ARROW PANEL - TYPE C	EACH	
704-1088	SEQUENCING ARROW PANEL - TYPE C - CROSSOVER	EACH	
704-1095	TYPE B FLASHERS	EACH	
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF	
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH	
762-0200	RAISED PAVEMENT MARKERS	EACH	
762-0420	SHORT TERM 4IN LINE - TYPE R	LF	
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF	
762-1500	OBLITERATION OF PVMT MK	SF	
772-2110	FLASHING BEACON - POST MOUNTED	EACH	

NOTE:
If additional signs are required, units will be calculated using the formula from Section III-19.06 of the Design Manual.
http://www.dot.nd.gov/

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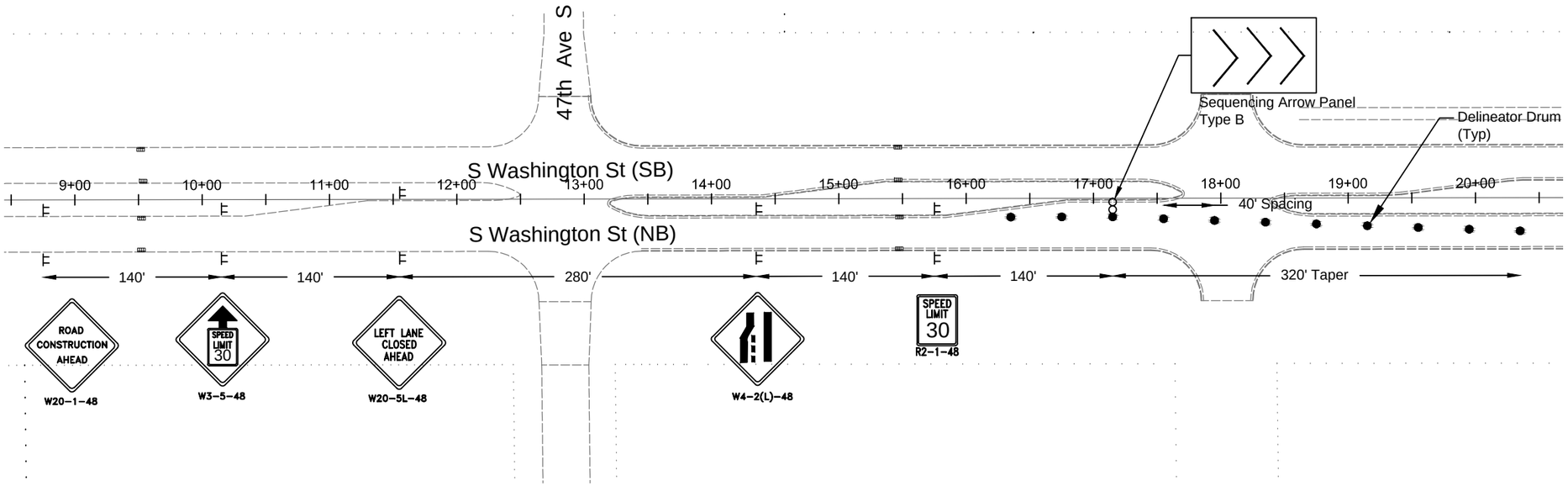
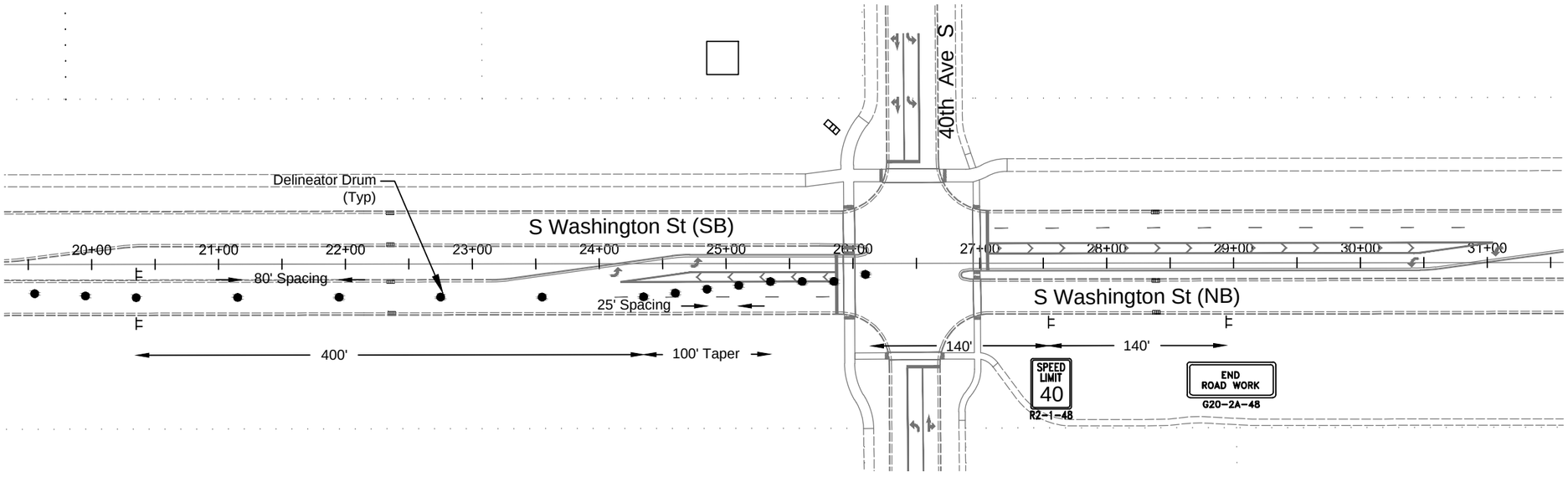
Traffic Control Devices List

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	100	2





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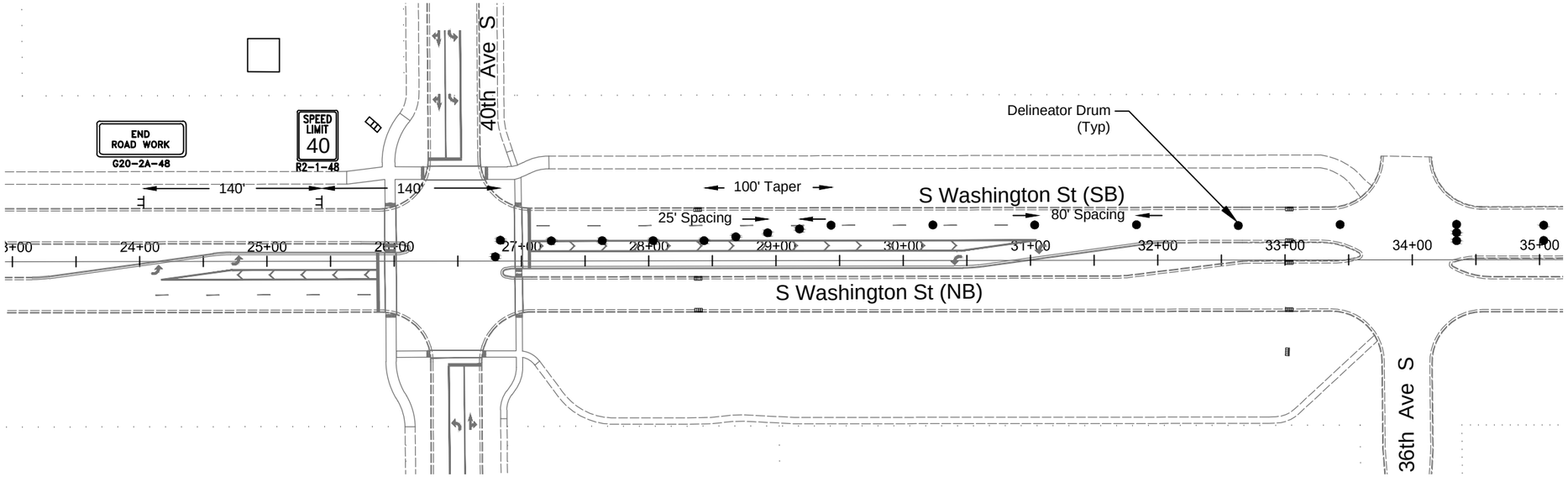
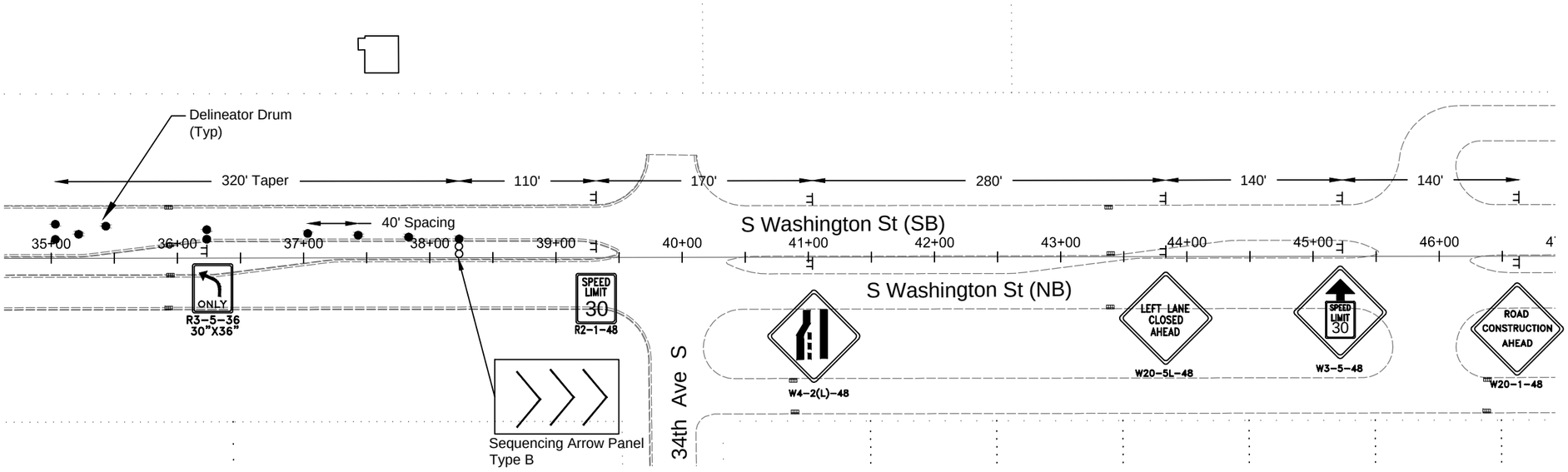
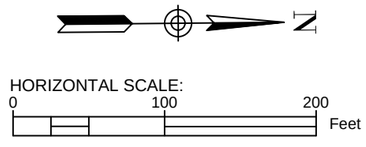
Temporary Traffic Control
Northbound Left Turn Lane

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	100	3







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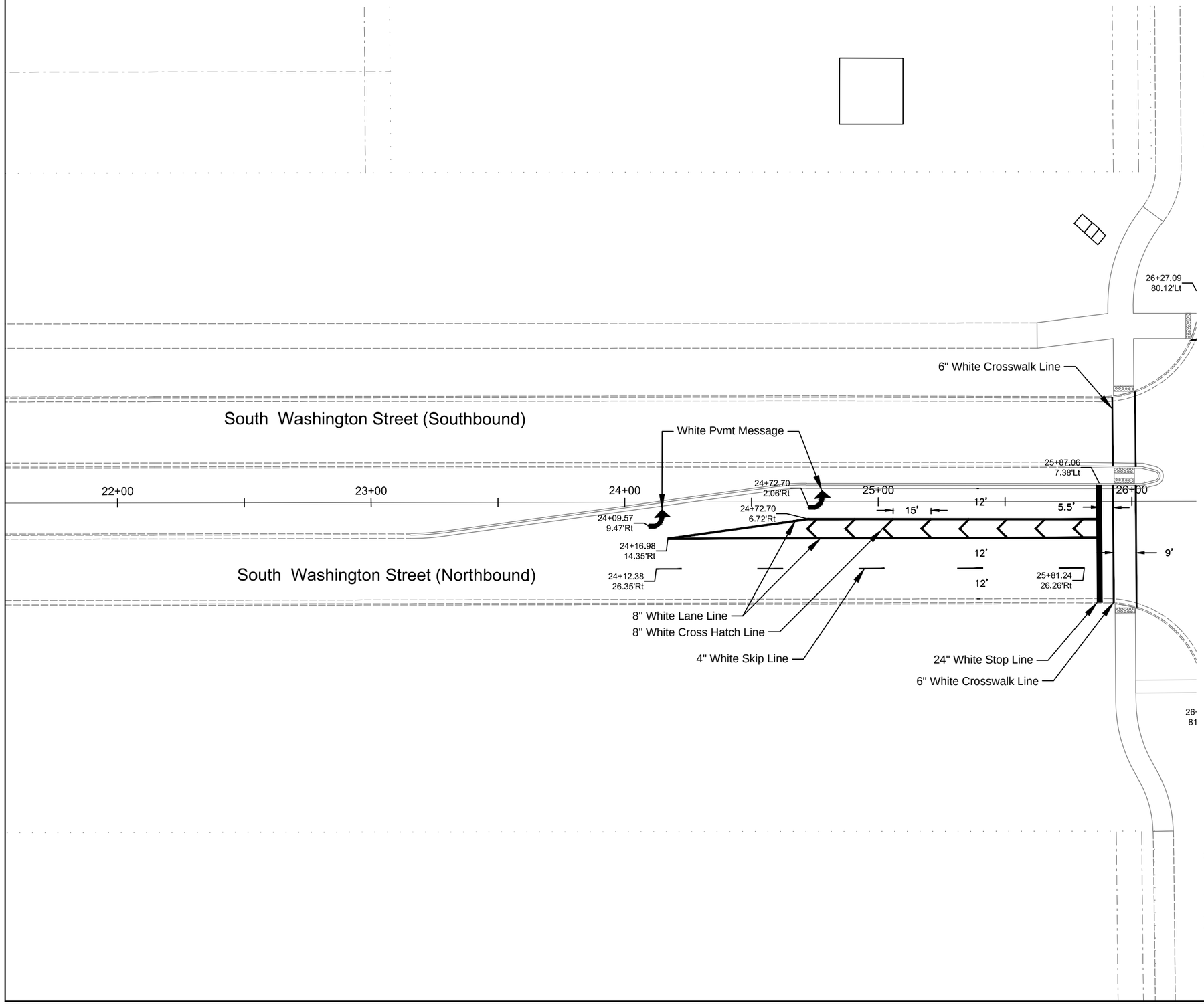
Temporary Traffic Control
Southbound Left Turn Lane

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	120	1



Preformed Patterned–Pvmt

MK–Message (Grooved)	32 SF
Left Arrow (2)	32 SF

Preformed Patterned Pvmt

Mk 4In Line–Grooved	50 LF
4" White Skip Line	50 LF

Preformed Patterned Pvmt

Mk 6In Line–Grooved	74 LF
6" White Crosswalk Line	74 LF

Preformed Patterned Pvmt

Mk 8In Line–Grooved	423 LF
8" White Cross Hatch Line	83 LF
8" White Lane Line	340 LF

Preformed Patterned Pvmt

Mk 24In Line–Grooved	47 LF
24" White Crosswalk Line	47 LF

HORIZONTAL SCALE:
0 40 80 Feet

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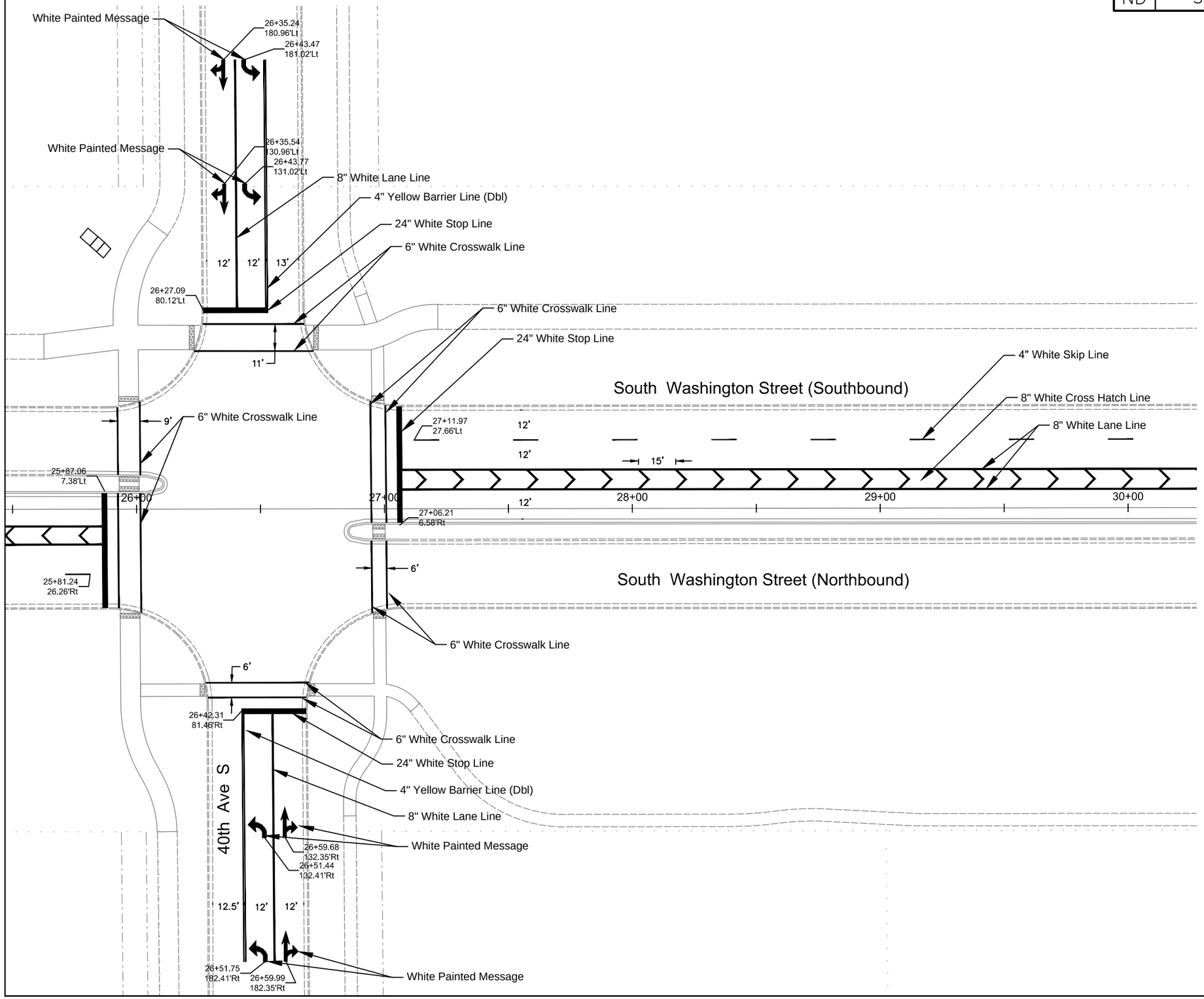
Pavement Marking Layout
Sta. 22+00 to 26+00

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	120	2



Pvmt MK Painted Message	172 SF
Left Arrow (4)	64 SF
Through & Right Arrow (4)	108 SF
Preformed Patterned Pvmt Mk 4In Line-Grooved	480 LF
4" White Skip Line	80 LF
4" Yellow Barrier Line	400 LF
Preformed Patterned Pvmt Mk 6In Line-Grooved	404 LF
6" White Crosswalk Line	404 LF
Preformed Patterned Pvmt Mk 8In Line-Grooved	1004 LF
8" White Cross Hatch Line	224 LF
8" White Lane Line	780 LF
Preformed Patterned Pvmt Mk 24In Line-Grooved	100 LF
24" White Crosswalk Line	100 LF

HORIZONTAL SCALE:
0 40 80
Feet

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Pavement Marking Layout
Sta. 26+00 to 30+00

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	120	3

Preformed Patterned-Pvmt

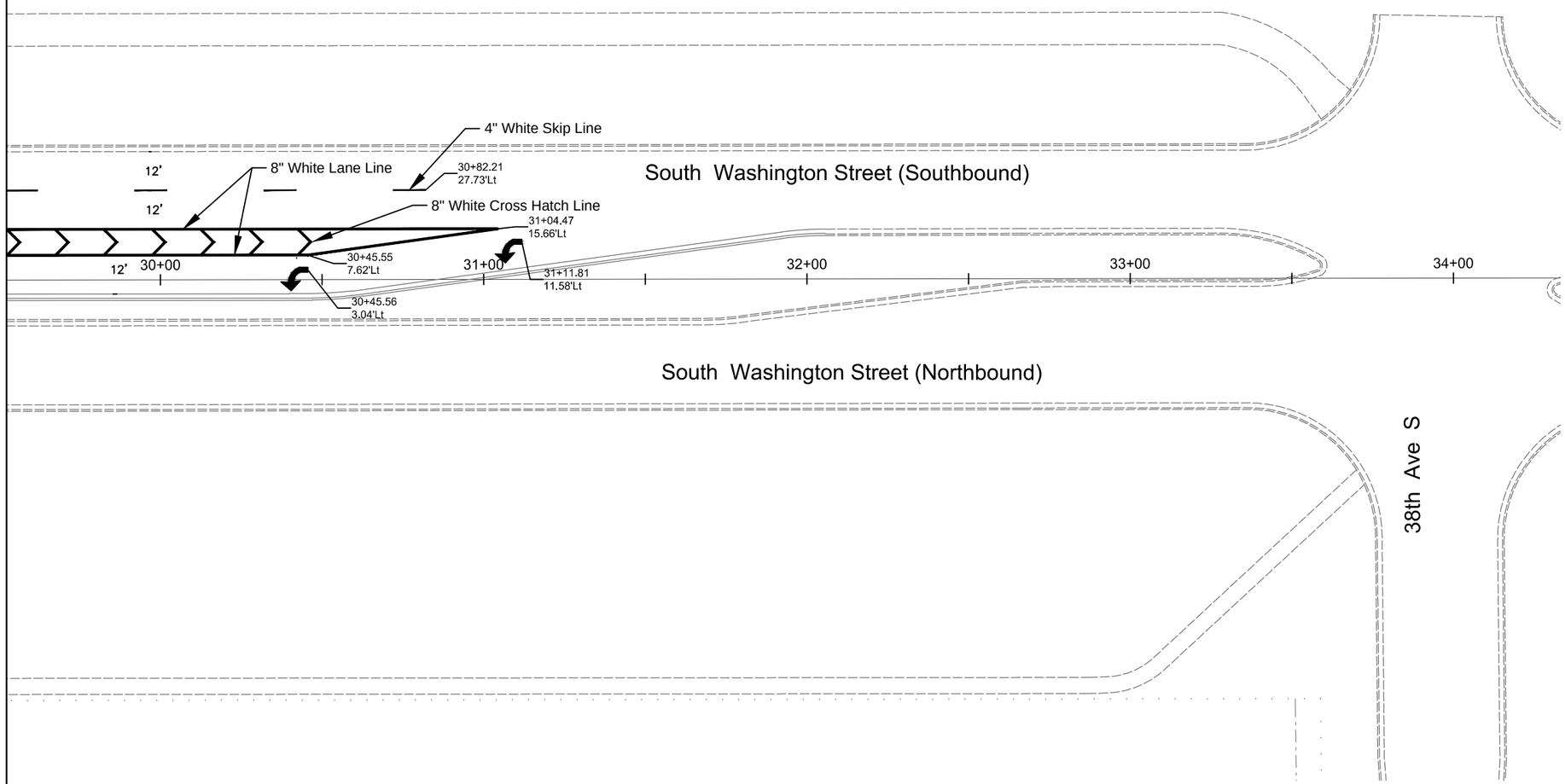
MK-Message (Grooved)	32 SF
Left Arrow (2)	32 SF

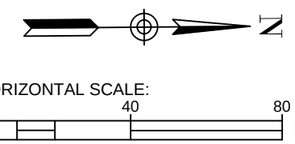
Preformed Patterned Pvmt

Mk 4In Line-Grooved	20 LF
4" White Skip Line	20 LF

Preformed Patterned Pvmt

Mk 8In Line-Grooved	232 LF
8" White Cross Hatch Line	22 LF
8" White Lane Line	210 LF





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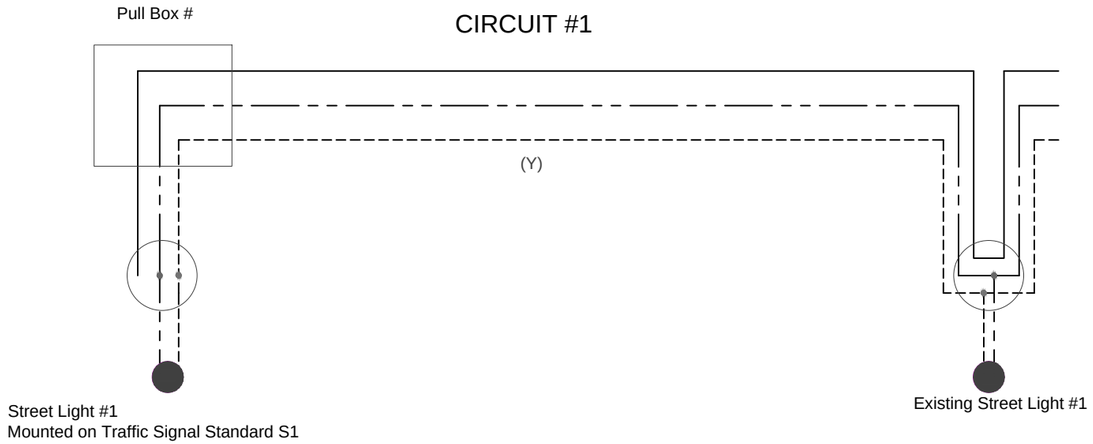
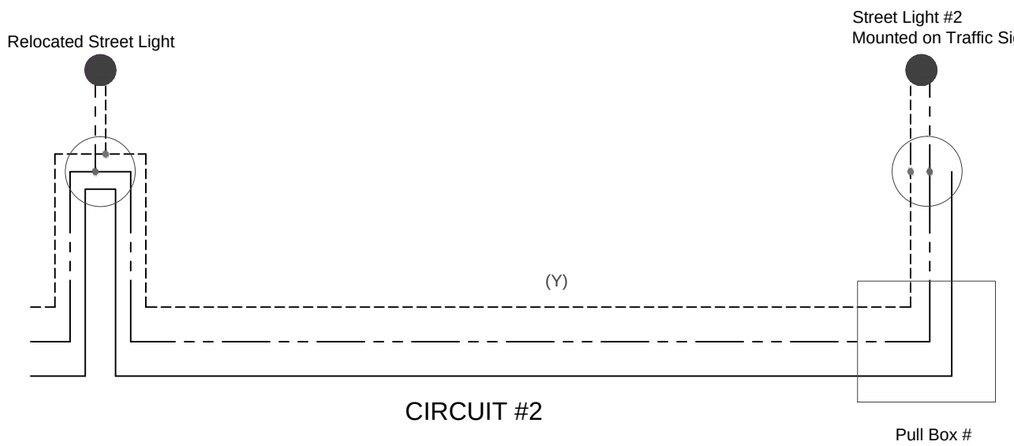
Pavement Marking Layout
Sta. 30+00 to 34+00

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	140	1





LEGEND

Ground conductor

Phase conductor

Phase conductor

(Y) (2) NO. 4 RHW. (1) NO. 6 THW

Light standard

Pull box

250 Watt high pressure Sodium Vapor Luminaire 120x240 Voltage, Operated on 240 Volts

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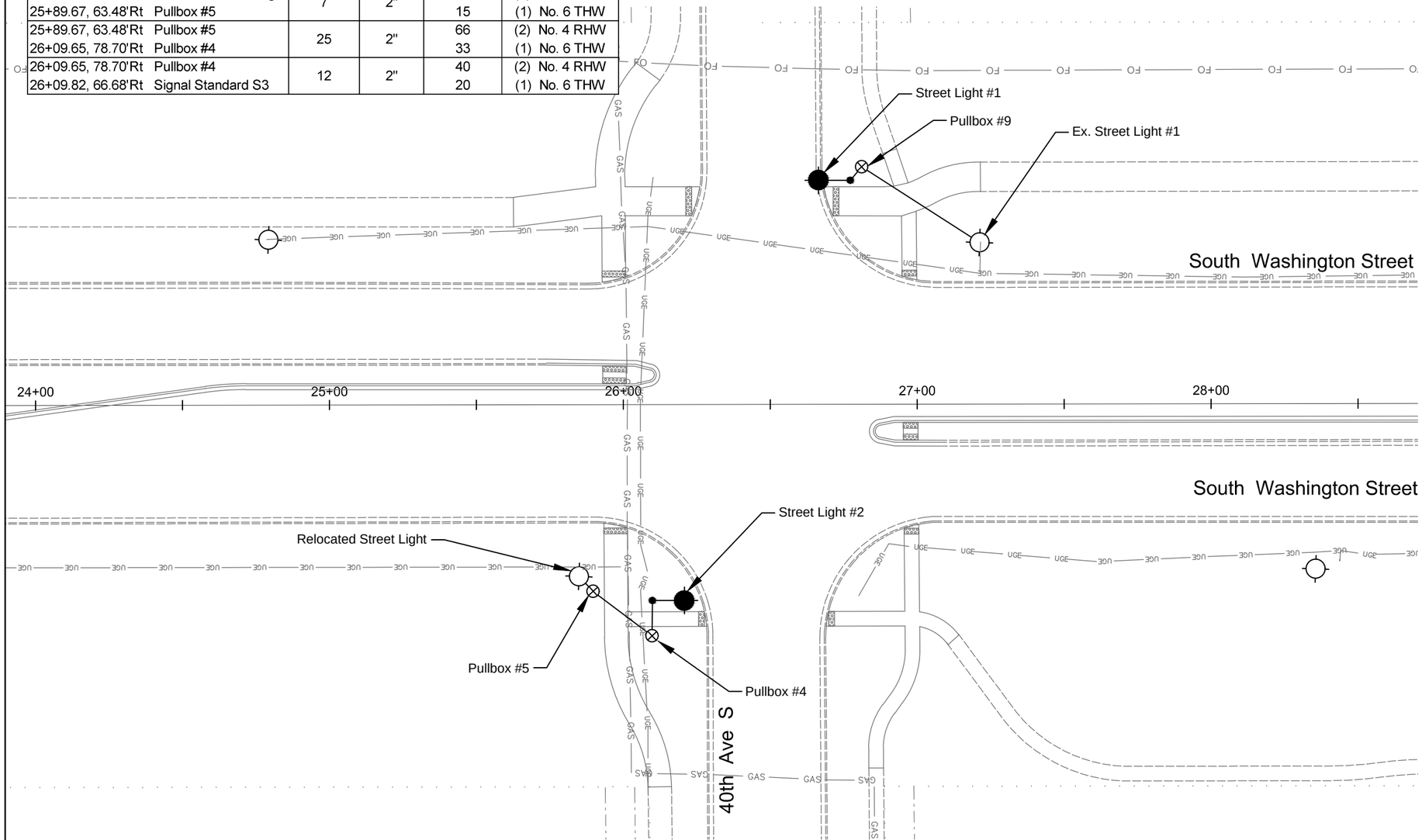
Lighting Schematic

South Washington Street & 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	140	2

STATION	CONDUIT RUNS		CABLE RUNS	
	LENGTH	SIZE	LENGTH	SIZE
27+21.32, 54.9'Lt Ex. Street Light #1	48	2"	112	(2) No. 4 RHW
26+81.23, 80.8'Lt Pullbox #9			56	(1) No. 6 THW
26+81.23, 80.8'Lt Pullbox #9	6	2"	28	(2) No. 4 RHW
26+77.37, 76.2'Lt Signal Std. S1			14	(1) No. 6 THW
25+84.86, 58.48'Rt Relocated Street Light	7	2"	30	(2) No. 4 RHW
25+89.67, 63.48'Rt Pullbox #5			15	(1) No. 6 THW
25+89.67, 63.48'Rt Pullbox #5	25	2"	66	(2) No. 4 RHW
26+09.65, 78.70'Rt Pullbox #4			33	(1) No. 6 THW
26+09.65, 78.70'Rt Pullbox #4	12	2"	40	(2) No. 4 RHW
26+09.82, 66.68'Rt Signal Standard S3			20	(1) No. 6 THW



NO.	STATION	OFFSET	WATTAGE	CIRCUIT	IES-TYPE	POLE HT.	MAST ARM
1	26+77.37	76.2'Lt	250	1	II	Signal Std.	6'
2	26+09.82	66.7'Rt	250	2	II	Signal Std.	6'

N

HORIZONTAL SCALE:
0 40 80
Feet

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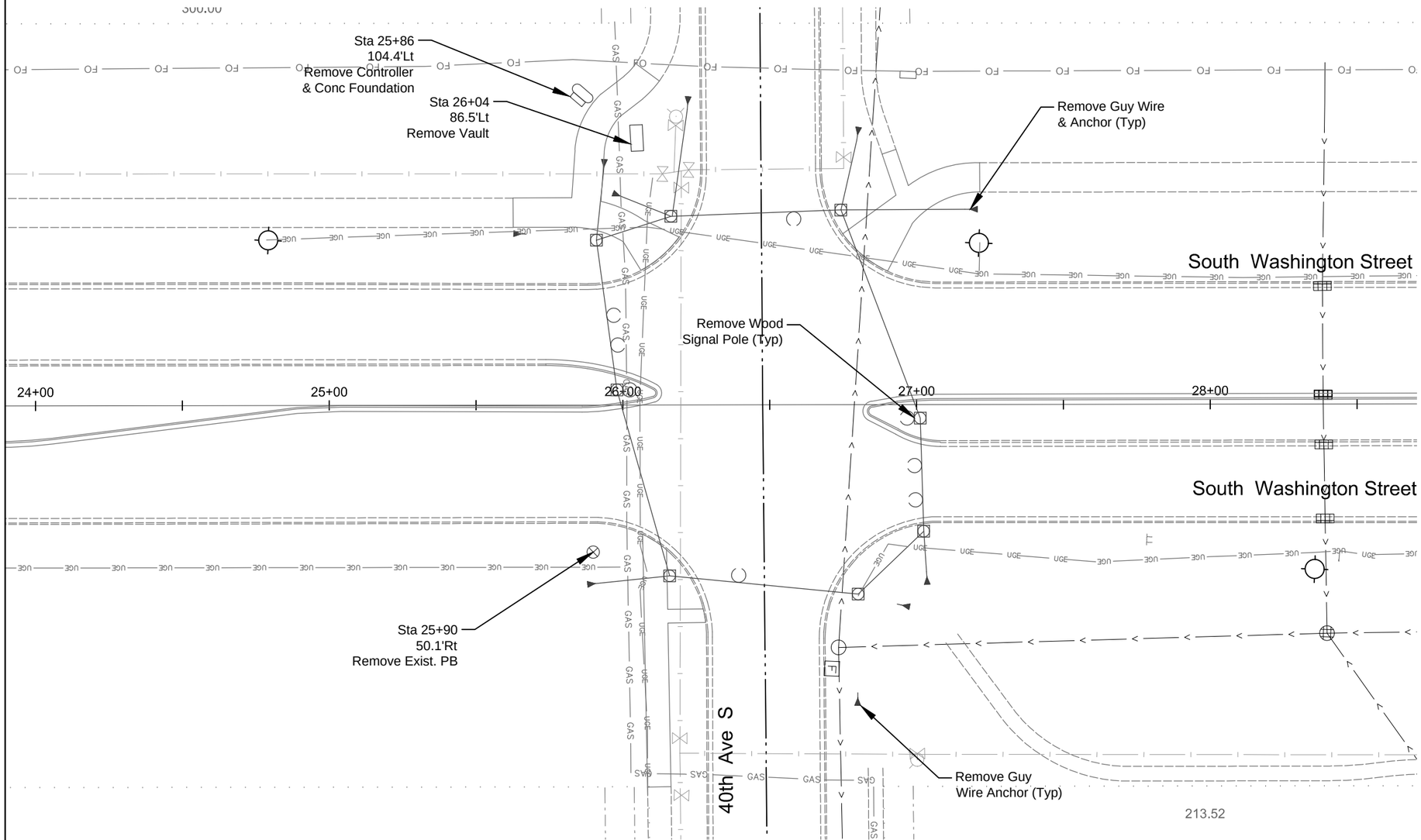
Lighting Layout

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	150	1



Remove Interim Traffic Signal 1 EA

N

HORIZONTAL SCALE:
0 40 80
Feet

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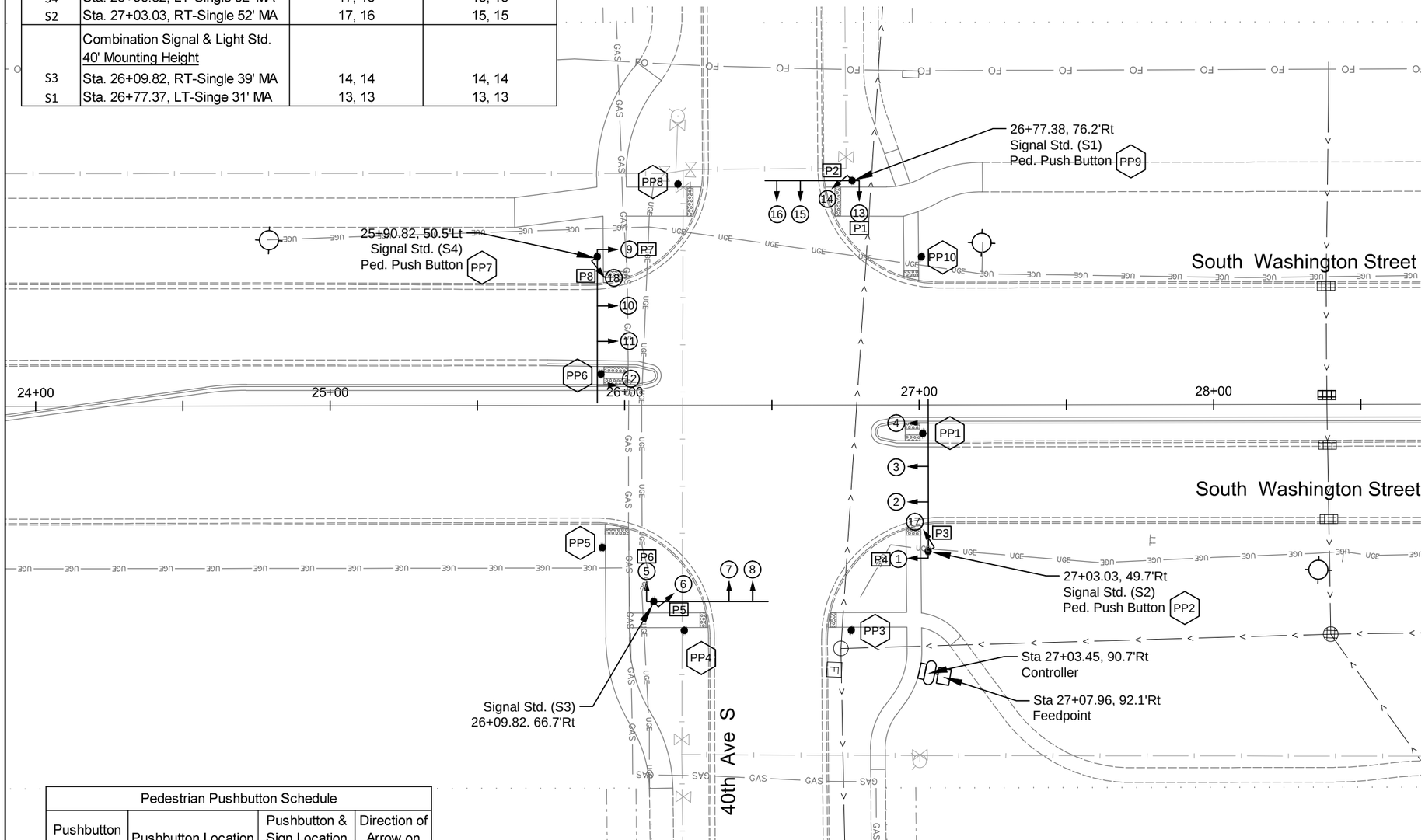
Traffic Signal System
Traffic Signal Removal

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	150	2

Signal Standard & Foundation Table

Name	Description	Footing Depth "D" 24" & 30" Diameters	Footing Depth "D" 36" & 42" Diameters
	Type IV Signal Std.		
S4	Sta. 25+90.82, LT-Single 52' MA	17, 16	15, 15
S2	Sta. 27+03.03, RT-Single 52' MA	17, 16	15, 15
	Combination Signal & Light Std. 40' Mounting Height		
S3	Sta. 26+09.82, RT-Single 39' MA	14, 14	14, 14
S1	Sta. 26+77.37, LT-Singe 31' MA	13, 13	13, 13



HORIZONTAL SCALE:
0 40 80
Feet

Pedestrian Pushbutton Schedule			
Pushbutton Number	Pushbutton Location	Pushbutton & Sign Location on Pole	Direction of Arrow on Sign
1	Pushbutton Post	S	Both
2	Signal Std. (S2)	S	Left
3	Pushbutton Post	W	Right
4	Pushbutton Post	W	Left
5	Pushbutton Post	N	Right
6	Pushbutton Post	N	Both
7	Signal Std. (S4)	N	Left
8	Pushbutton Post	E	Right
9	Signal Std. (S1)	E	Left
10	Pushbutton Post	S	Right

Sign on Pushbutton post to be R10-3e-9

Legend:

PP1 Pedestrian Push Button

P1 Pedestrian Head Number

1 Signal Head Number

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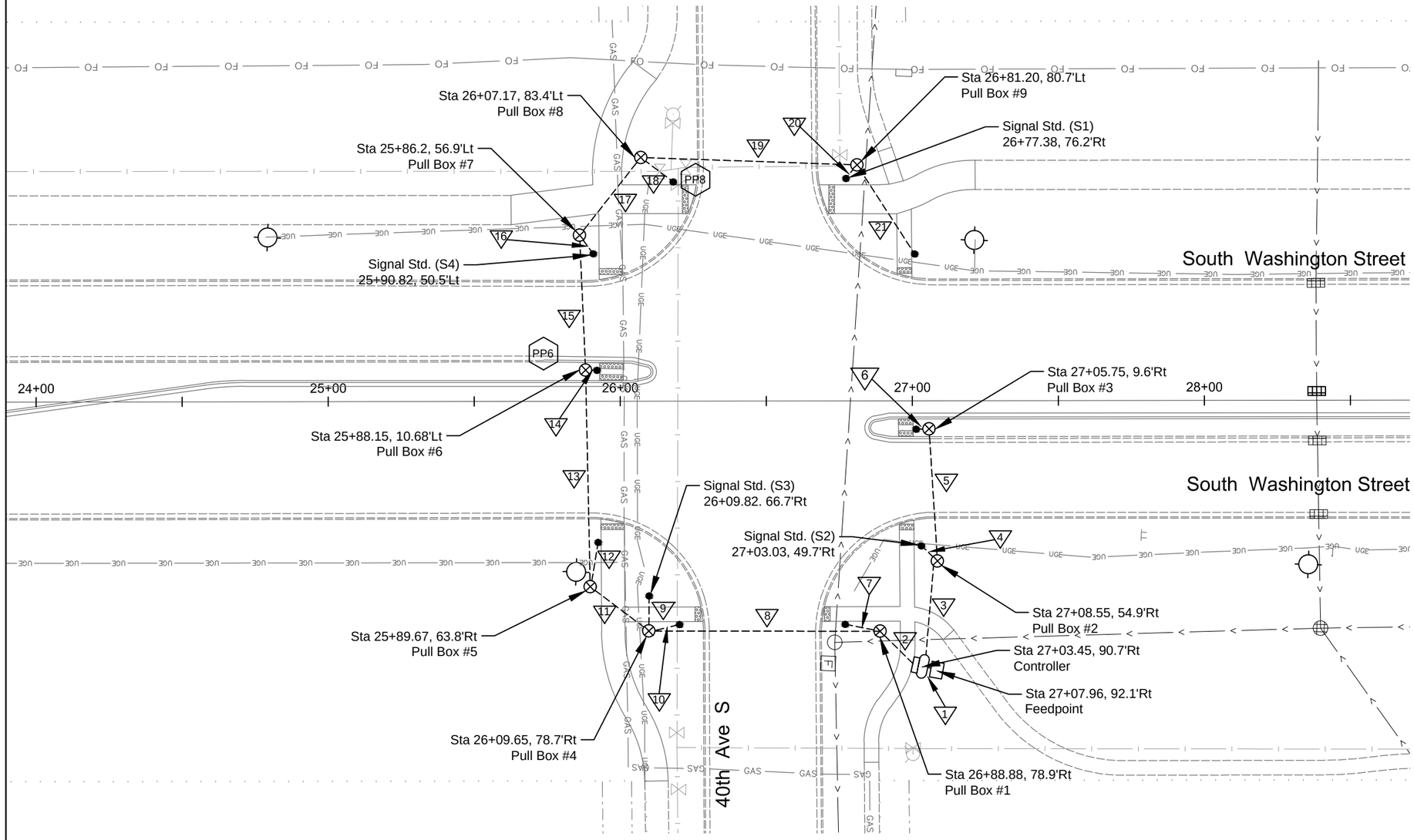
Traffic Signal System
Traffic Signal Layout

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	150	3



HORIZONTAL SCALE:
0 40 80
Feet

Legend:

1 Cable & Conduit Run Number

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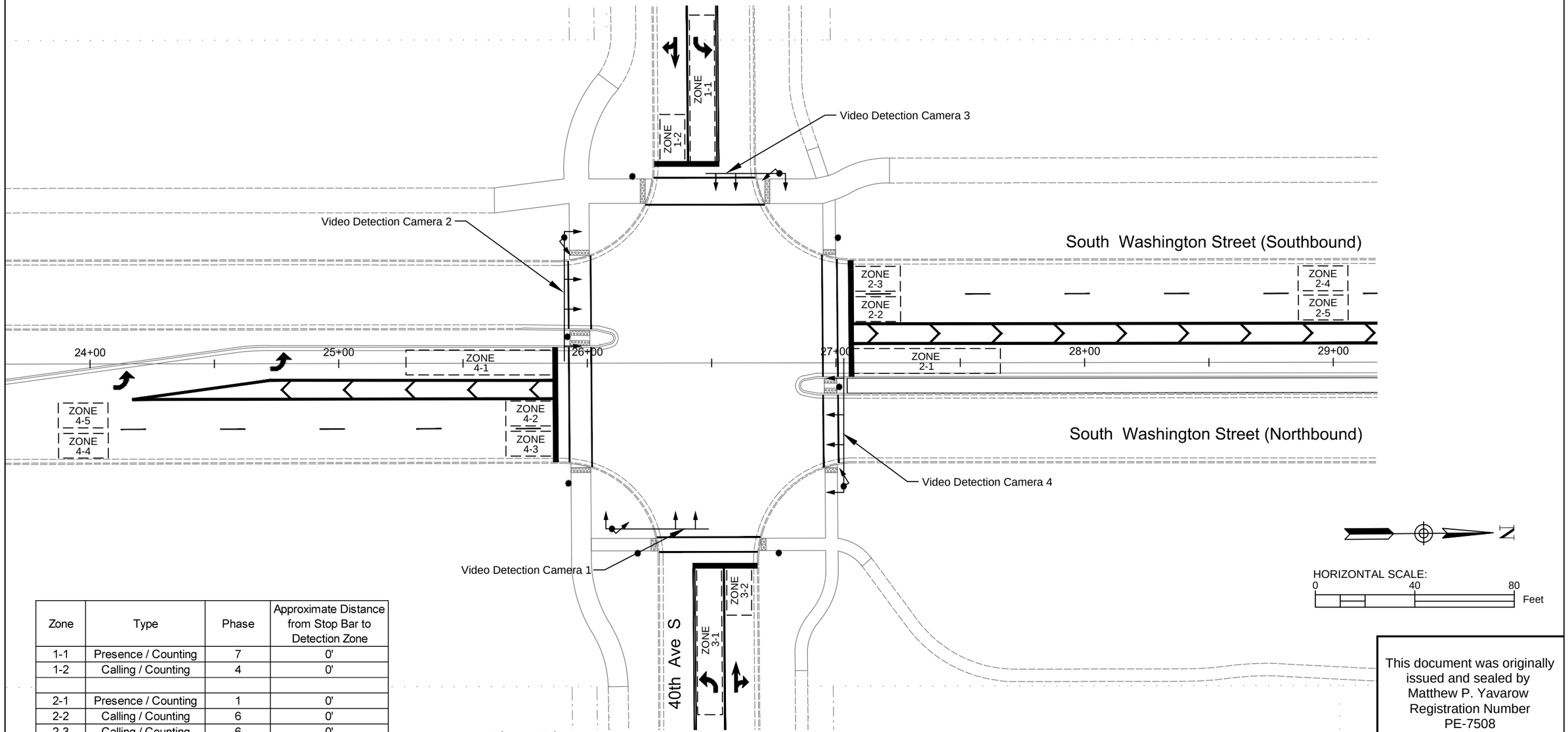
Traffic Signal System
Conduit & Conductor Layout

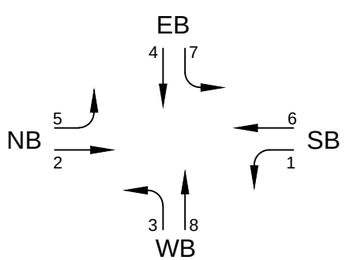
South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	150	4



Zone	Type	Phase	Approximate Distance from Stop Bar to Detection Zone
1-1	Presence / Counting	7	0'
1-2	Calling / Counting	4	0'
2-1	Presence / Counting	1	0'
2-2	Calling / Counting	6	0'
2-3	Calling / Counting	6	0'
2-4	Passage	6	180'
2-5	Passage	6	180'
3-1	Presence / Counting	3	0'
3-2	Calling / Counting	8	0'
4-1	Presence / Counting	5	0'
4-2	Calling / Counting	2	0'
4-3	Calling / Counting	2	0'
4-4	Passage	2	180'
4-5	Passage	2	180'

Phase Diagram



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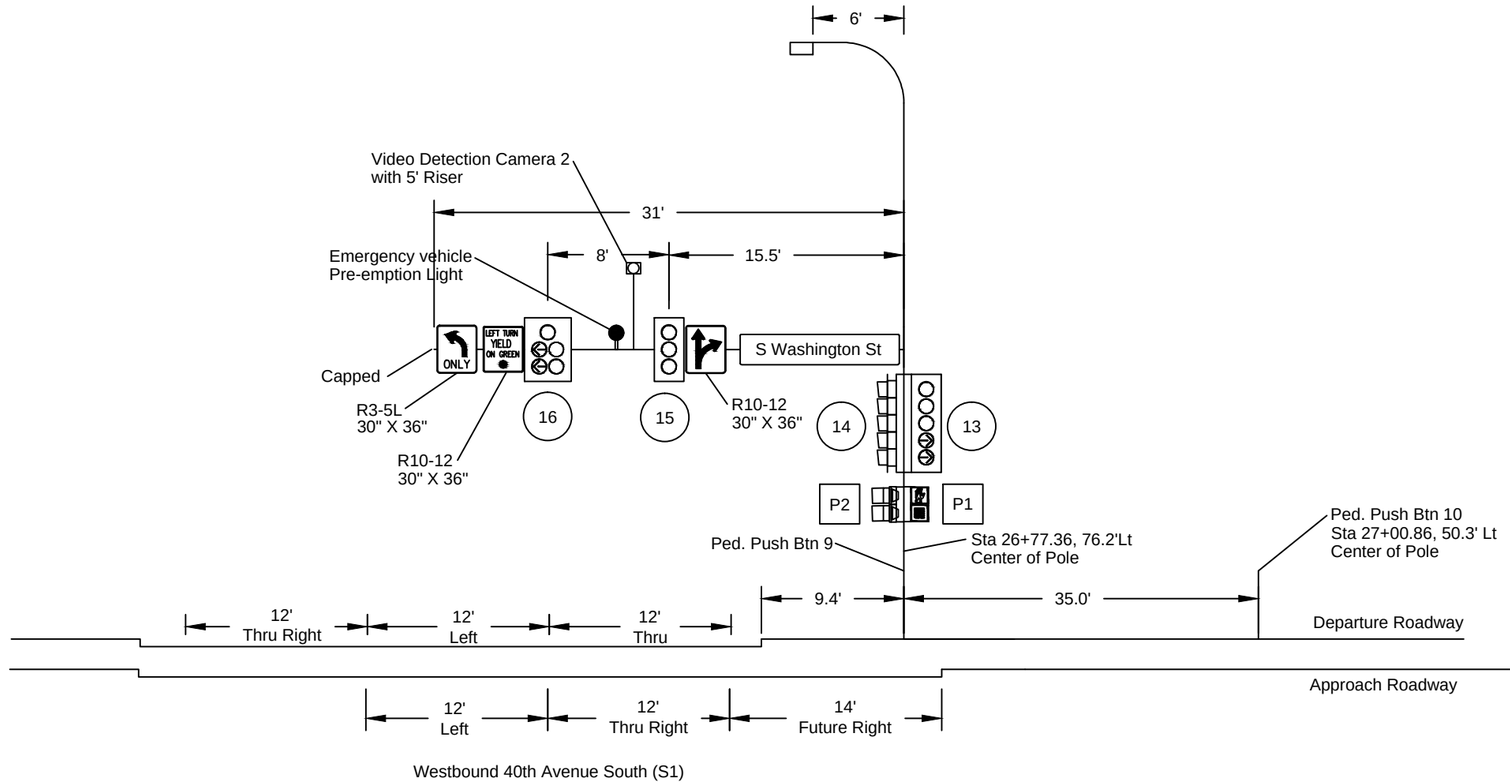
Traffic Signal System
Detector Zone Layout

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	150	5



Westbound 40th Avenue South (S1)

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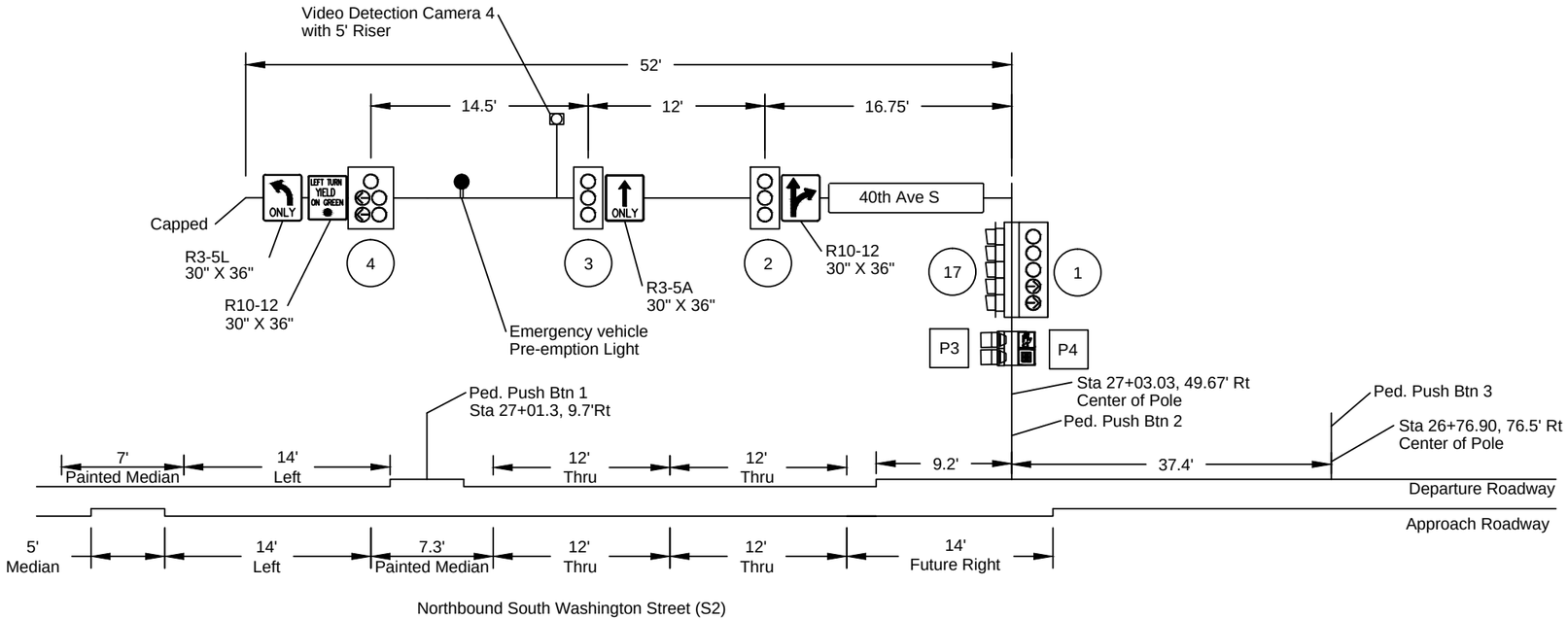
Traffic Signal System
Signal Standard & Head Locations

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	150	6



Northbound South Washington Street (S2)

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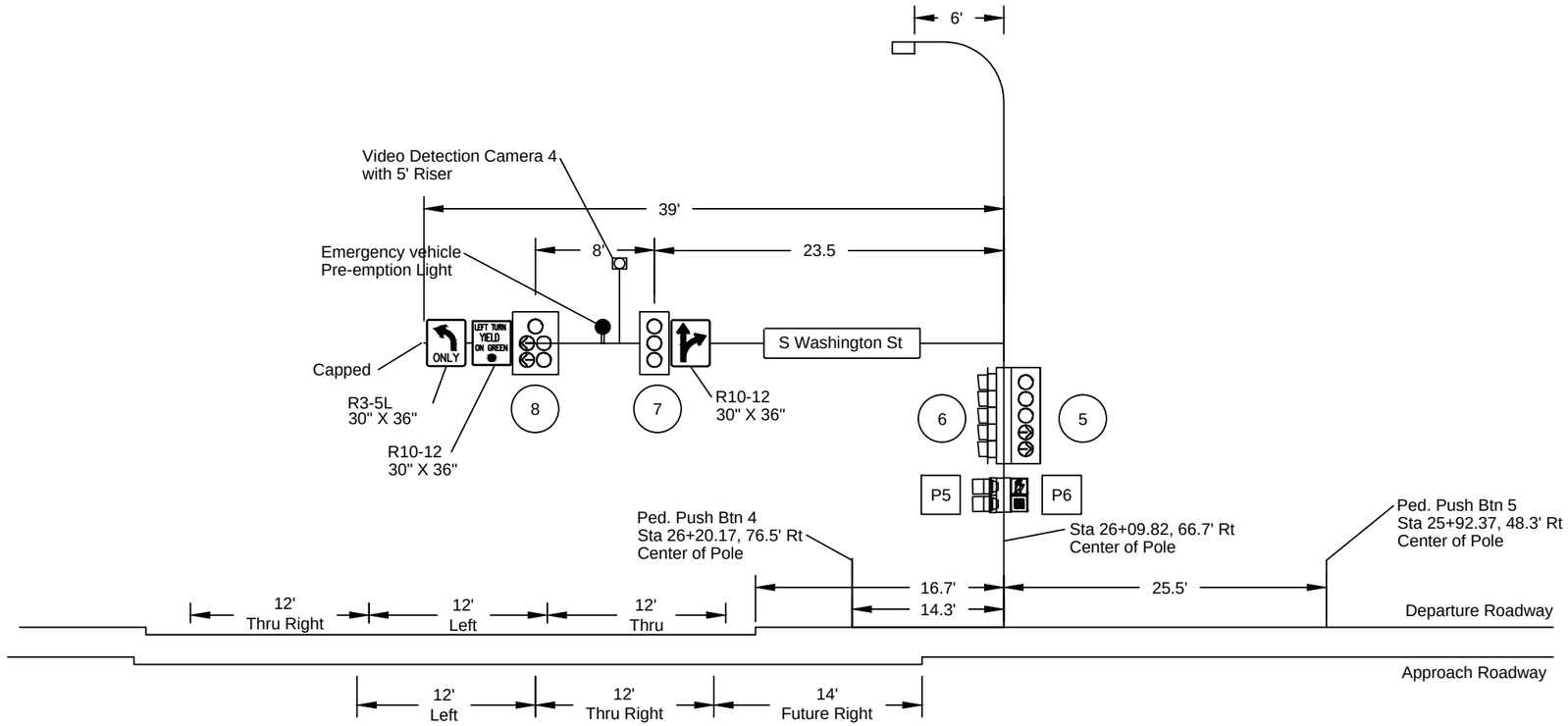
Traffic Signal System
Signal Standard & Head Locations

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	150	7



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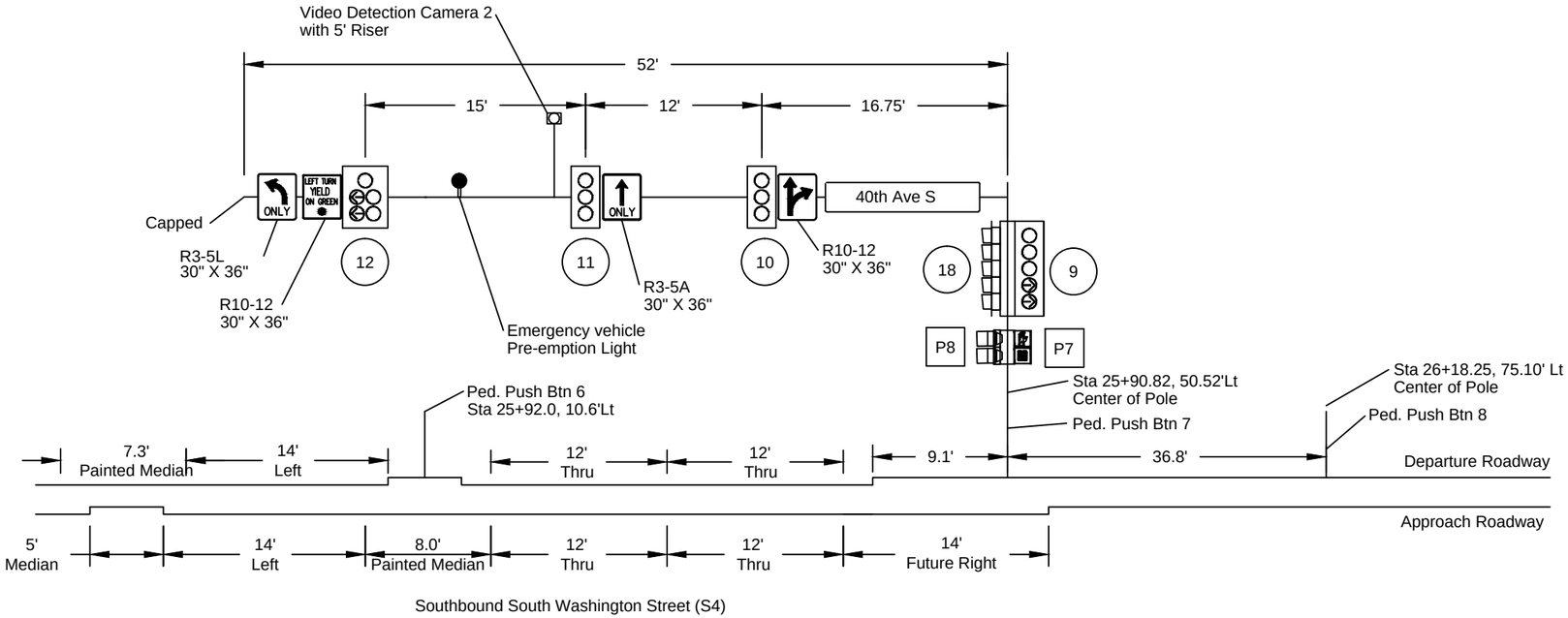
Traffic Signal System
Signal Standard & Head Locations

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	150	8



Southbound South Washington Street (S4)

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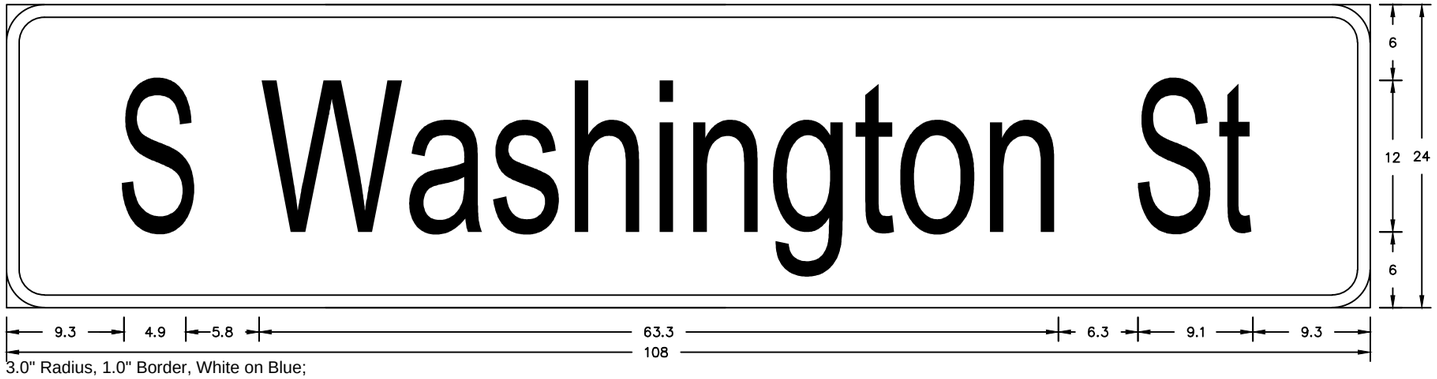
Traffic Signal System
Signal Standard & Head Locations

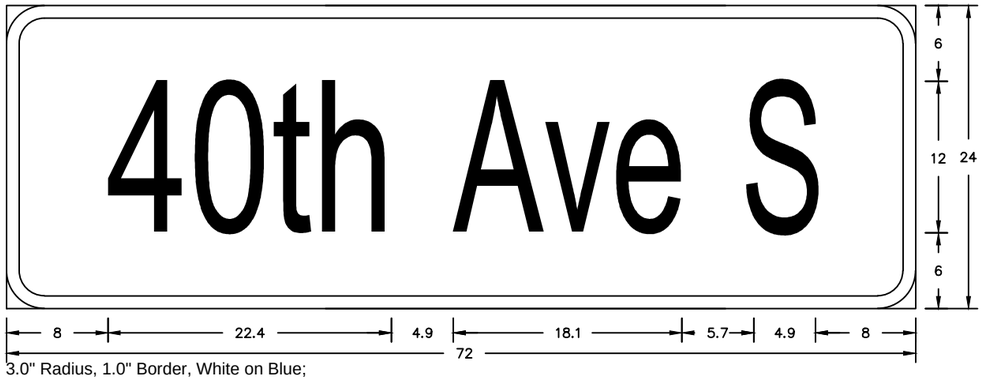
South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	150	9



3.0" Radius, 1.0" Border, White on Blue;
[S Washington St] Clearview Series 1W
Table of letter and objects lefts.

S	W	a	s	h	i	n	g	t	o	n	S	t
9.3	20.0	30.2	36.9	43.6	49.4	53.4	60.2	66.6	71.1	78.5	89.6	95.3



3.0" Radius, 1.0" Border, White on Blue;
[47th Ae S] Clearview Series 1W
Table of letter and objects lefts.

4	0	t	h	A	v	e	S
9.1	15.9	23.0	29.2	40.3	47.0	53.3	64.0

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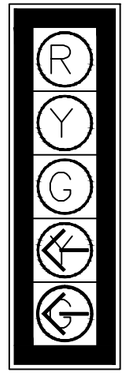
Sign Design Details

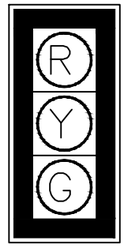
South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	150	10

Conductors			Cable 1 (No. 12 AWG 12)		Cable 2 (No. 12 AWG 12)		Cable 3 (No. 12 AWG 10)		Cable 4 (No. 12 AWG 12)		Cable 5 (No. 12 AWG 12)	
Run	Base	Tracer	Head	Indication	Head	Indication	Head	Indication	Head	Indication	Head	Indication
1	Black			Green Left Arrow		Spare	14	Sup. Green LT Arrow	12	Green Left Arrow		Spare
2	White			Neutral		Neutral		Neutral		Neutral		Neutral
3	Red		13,15,16	Red	P1	Walk	14	Sup. LT Red	9-12	Red	P7	Walk
4				Ground		Ground		Ground		Ground		Ground
5	Orange		13,15,16	Yellow	P1	Don't Walk	14	Sup. LT Yellow	9-12	Yellow	P7	Don't Walk
6	Blue		13,15,16	Green	P1	Countdown	14	Sup. LT Green	9-12	Green	P7	Countdown
7	White	Black		Yellow Left Arrow	P2	Walk	14	Sup. Yellow LT Arrow	12	Yellow Left Arrow	P8	Walk
8	Red	Black		Spare	P2	Don't Walk		Spare		Spare	P8	Don't Walk
9	Green	Black	Future	Green Right Arrow	P2	Countdown		Spare		Spare	P8	Countdown
10	Orange	Black	Future	Yellow Right Arrow		Spare		Spare		Spare		Spare
11	Blue	Black	Future	Spare		Spare			Future	Spare		Spare
12	Black	White	Future	Spare		Spare			Future	Spare		Spare

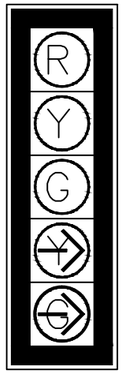


(12" Lenses)
Heads 14, 6, 17, 18

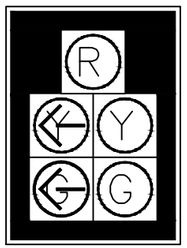


(12" Lenses)
Heads 2, 3, 7, 10, 11, 15

Conductors			Cable 6 (No. 12 AWG 10)		Cable 7 (No. 12 AWG 12)		Cable 8 (No. 12 AWG 12)		Cable 9 (No. 12 AWG 10)	
Run	Base	Tracer	Head	Indication	Head	Indication	Head	Indication	Head	Indication
1	Black		Future	Sup. Green LT Arrow				Spare	10	Sup. Green LT Arrow
2	White			Neutral		Neutral		Neutral		Neutral
3	Red		Future	Sup. LT Red	8,9,11	Red	P5	Walk	10	Sup. LT Red
4	Green			Ground		Ground		Ground		Ground
5	Orange		Future	Sup. LT Yellow	8,9,11	Yellow	P5	Don't Walk	10	Sup. LT Yellow
6	Blue		Future	Sup. LT Green	8,9,11	Green	P5	Countdown	10	Sup. LT Green
7	White	Black	Future	Sup. Yellow LT Arrow			P6	Walk	10	Sup. Yellow LT Arrow
8	Red	Black		Spare		Spare	P6	Don't Walk		Spare
9	Green	Black		Spare	Future	Spare	P6	Countdown		Spare
10	Orange	Black		Spare	Future	Spare		Spare		Spare
11	Blue	Black			Future	Spare		Spare		
12	Black	White				Spare		Spare		



(12" Lenses)
Heads 1, 5, 9, 13



(12" Lenses)
Heads 4, 8, 12, 16

(12" Lenses)
Heads P1 - P8

Conductors			Cable 10 (No. 12 AWG 12)		Cable 11 (No. 12 AWG 12)		Cable 12 (No. 12 AWG 10)	
Run	Base	Tracer	Head	Indication	Head	Indication	Head	Indication
1	Black		5	Green Left Arrow		Spare	Future	Sup. Green LT Arrow
2	White			Neutral		Neutral		Neutral
3	Red		1,3,4,5	Red	P3	Walk	Future	Sup. LT Red
4	Green			Ground		Ground		Ground
5	Orange		1,3,4,5	Yellow	P3	Don't Walk	Future	Sup. LT Yellow
6	Blue		1,3,4,5	Green	P3	Countdown	Future	Sup. LT Green
7	White	Black	4	Yellow Left Arrow	P4	Walk	Future	Sup. Yellow LT Arrow
8	Red	Black		Spare	P4	Don't Walk		Spare
9	Green	Black	Future	Green Right Arrow	P4	Countdown		Spare
10	Orange	Black	Future	Yellow Right Arrow		Spare		Spare
11	Blue	Black		Spare		Spare		
12	Black	White		Spare		Spare		

Note:
All Heads Shall use LED
5" Louvered Black Plate (typ.) on all heads

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Signal Heads & Conductor Schedule

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	150	11

Run	Station	Location	Conduit Run		Cable Runs			
			Length	Size	Length	Code		Type
1	27+09.96, 92.1'Rt to 27+03.45, 90.7'Rt	Feed Point to Controller	20	4"	32	C	1	#6 U.S.E.
2	27+03.45, 90.7'Rt to 26+88.88, 78.9'Rt	Controller to Pull Box 1	20	4" (2)	96	A	4	2 No. AWG Conductor Cable
					96	B	4	Emergency Detector Cable
					0	C	0	10 No. 12 AWG Conductor Cable
					288	C	12	12 No. 12 AWG Conductor Cable
					448	C	16	Push Button
					96	D	3	Video Detector Cable
3	27+03.45, 90.7'Rt to 27+08.55, 54.9'Rt	Controller to Pull Box 2	40	4"	52	A	1	2 No. AWG Conductor Cable
					52	B	1	Emergency Detector Cable
					0	C	0	10 No. 12 AWG Conductor Cable
					156	C	3	12 No. 12 AWG Conductor Cable
					208	C	4	Push Button
					52	D	1	Video Detector Cable
4	27+08.55, 54.9'Rt to 27+03.04, 46.7'Rt	Pull Box 2 to S2 Pole	8	4"	93	A	1	2 No. AWG Conductor Cable
					93	B	1	Emergency Detector Cable
					0	C	0	10 No. 12 AWG Conductor Cable
					279	C	3	12 No. 12 AWG Conductor Cable
					66	C	3	Push Button
					93	D	1	Video Detector Cable
5	27+03.04, 46.7'Rt to 27+05.75, 9.6'Rt	S2Pole to Pull Box 3	45	2"	57	C	1	Push Button
6	27+05.75, 9.6'Rt to 27+01.28, 9.7'Rt	Pull Box 3 to PPB Pole 1	5	2"	19	C	1	Push Button
7	26+88.88. 78.9'Rt to 26+76.90, 76.5'Rt	Pull Box 1 to PPB Pole 2	12	2"	24	C	1	Push Button
8	26+88.88, 78.9'Rt to 26+09.65, 78.7'Rt	Pull Box 1 to Pull Box 4	80	4" (2)	276	A	3	2 No. AWG Conductor Cable
					276	B	3	Emergency Detector Cable
					0	C	0	10 No. 12 AWG Conductor Cable
					828	C	9	12 No. 12 AWG Conductor Cable
					1196	C	6	Push Button
					276	D	3	Video Detector Cable
9	26+09.65, 78.7'Rt to 26+09.82, 66.7'Rt	Pull Box 4 to S3 Pole	12	4"	84	A	1	2 No. AWG Conductor Cable
					84	B	1	Emergency Detector Cable
					0	C	0	12 No. 12 AWG Conductor Cable
					252	C	3	12 No. 12 AWG Conductor Cable
					52	C	3	Push Button
					84	D	1	Video Detector Cable
10	26+09.65, 78.7'Rt to 26+20.17, 76.5'Rt	Pull Box 4 to PPB Pole 3	10	2"	22	C	1	Push Button
11	26+09.65, 78.7'Rt to 26+89.67, 63.8'Rt	Pull Box 4 to Pull Box 5	25	4"	74	A	2	2 No. AWG Conductor Cable
					74	B	2	Emergency Detector Cable
					0	C	0	12 No. 12 AWG Conductor Cable
					222	C	6	12 No. 12 AWG Conductor Cable
					370	C	5	Push Button
					74	D	2	Video Detector Cable
12	26+89.67, 63.8'Rt to 25+92.37, 48.3'Rt	Pull Box 5 to PPB Pole 4	15	2"	29	C	1	Push Button
13	25+89.67, 63.8'Rt to 25+88.15, 10.7'Lt	Pull Box 5 to Pull Box 6	75	4"	174	A	2	2 No. AWG Conductor Cable
					174	B	2	Emergency Detector Cable
					0	C	0	12 No. 12 AWG Conductor Cable
					522	C	6	12 No. 12 AWG Conductor Cable
					783	C	5	Push Button
					174	D	2	Video Detector Cable

Run	Station	Location	Conduit Run		Cable Runs			
			Length	Size	Length	Code		Type
14	25+88.15, 10.7'Lt to 25+92.04, 10.6'Lt	Pull Box 6 to PPB Pole 5	10	2"	24	C	1	Push Button
15	25+88.15, 10.7'Lt to 25+86.2, 56.9'Lt	Pull Box 6 to Pull Box 7	46	4"	116	A	2	2 No. AWG Conductor Cable
					116	B	2	Emergency Detector Cable
					0	C	0	12 No. 12 AWG Conductor Cable
					348	C	6	12 No. 12 AWG Conductor Cable
					464	C	4	Push Button
					116	D	2	Video Detector Cable
16	25+86.2, 56.9'Lt to 25+90.83, 50.5'Lt	Pull Box 7 to S4 Pole	10	4"	93	A	1	2 No. AWG Conductor Cable
					93	B	1	Emergency Detector Cable
					0	C	0	12 No. 12 AWG Conductor Cable
					279	C	3	12 No. 12 AWG Conductor Cable
					72	C	3	Push Button
					93	D	1	Video Detector Cable
17	25+86.2, 56.9'Lt to 26+07.17, 83.5'Lt	Pull Box 7 to Pull Box 8	35	4"	47	A	1	2 No. AWG Conductor Cable
					47	B	1	Emergency Detector Cable
					0	C	0	12 No. 12 AWG Conductor Cable
					141	C	3	12 No. 12 AWG Conductor Cable
					241	C	5	Push Button
					47	D	1	Video Detector Cable
18	26+07.17, 83.5'Lt to 26+18.25, 75.1'Lt	Pull Box 8 to PPB Pole 6	15	4"	29	C	1	Push Button
19	26+07.17, 83.5'Lt to 26+81.20, 80.7'Lt	Pull Box 8 to Pull Box 9	75	4"	87	A	1	2 No. AWG Conductor Cable
					87	B	1	Emergency Detector Cable
					0	C	0	12 No. 12 AWG Conductor Cable
					261	C	3	12 No. 12 AWG Conductor Cable
					352	C	4	Push Button
					87	D	1	Video Detector Cable
20	26+81.20, 80.7'Lt to 26+77.37, 76.2'Lt	Pull Box 9 to S1	6	4"	85	A	1	2 No. AWG Conductor Cable
					85	B	1	Emergency Detector Cable
					0	C	1	10 No. 12 AWG Conductor Cable
					255	C	2	12 No. 12 AWG Conductor Cable
					66	C	3	Push Button
					85	D	1	Video Detector Cable
21	26+81.20, 80.7'Lt to 27+00.86, 50.3'Lt	Pull Box 9 to PPB Pole 7	8	2"	49	C	1	Push Button

Cable Code

A Emergency Vehicle Indicator Lamp
B Emergency Vehicle Detector Cable
C Signal Control Cable
D Video Detection Cable
F Power Cable
E Interconnect Cable

Length includes slack and cable located in signal standard.
See Summary of Quantities for Cable Quantity

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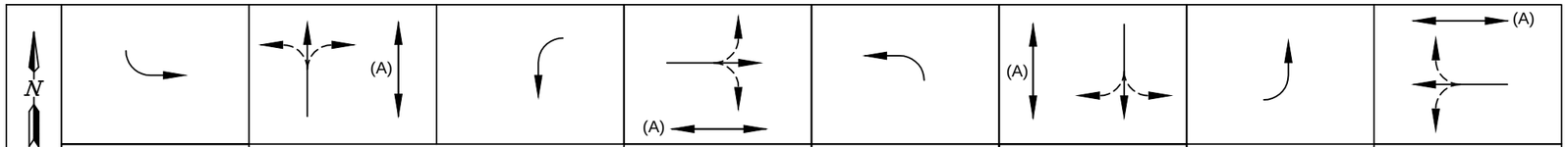
Conduit & Conductor Schedule

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	150	12



	PHASE 1								PHASE 2								PHASE 3							
	R/W	Clear to Ø							R/W	Clear to Ø							R/W	Clear to Ø						
	W	2	3	4	5	6	7	8	W	3	4	5	6	7	8	1	W							
1									G	Y	Y	(B)	(B)	Y	Y	Y								
2									G	Y	Y	(B)	(B)	Y	Y	Y								
3									G	Y	Y	(B)	(B)	Y	Y	Y								
4									G	Y	Y	(B)	(B)	Y	Y	Y								
5																								
6	G	✶	✶	✶	(B)	(B)	✶	✶																
7																								
8																								
9																								
10																								
11																								
12	G	✶	✶	✶	(B)	(B)	✶	✶																
13					(B)	(B)																		
14									G	Y	Y	(B)	(B)	Y	Y	Y								
15																								
16																								
17																								
18																								

	PHASE 4							PHASE 5							PHASE 6							PHASE 7							PHASE 8						
	R/W	Clear to Ø						R/W	Clear to Ø							R/W	Clear to Ø							R/W	Clear to Ø							R/W	Clear to Ø						
	W	5	6	7	8	1	2	3	W	6	7	8	1	2	3	4	W	7	8	1	2	3	4	5	W							W	1	2	3	4	5	6	7
1																																						
2																																						
3																																						
4									G	✶	✶	✶	(B)	(B)	✶	✶																								
5	G	Y	Y	(B)	(B)	Y	Y	Y					(B)	(B)																										
6																	G	Y	Y	(B)	(B)	Y	Y	Y															
7	G	Y	Y	(B)	(B)	Y	Y	Y																														
8	G	Y	Y	(B)	(B)	Y	Y	Y																														
9																	G	Y	Y	(B)	(B)	Y	Y	Y															
10																	G	Y	Y	(B)	(B)	Y	Y	Y															
11																	G	Y	Y	(B)	(B)	Y	Y	Y															
12																	G	Y	Y	(B)	(B)	Y	Y	Y															
13																																	G	Y	Y	(B)	(B)	Y	Y	Y
14									G	✶	✶	✶	(B)	(B)	✶	✶																								
15																																	G	Y	Y	(B)	(B)	Y	Y	Y
16																																	G	Y	Y	(B)	(B)	Y	Y	Y
17	G	Y	Y	(B)	(B)	Y	Y	Y																																
18																																	G	Y	Y	(B)	(B)	Y	Y	Y

Protected Movement

Permitted Movement

(A) Pedestrian Actuation

Black Squares Denote a Red Indication

(A) Pedestrian Movements, upon actuation

(B) When one phase is on alone, any nonconflicting phase may start timing concurrently without a clearance interval. (See Chart A)

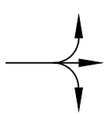
EMERGENCY VEHICLE PRE-EMPTION PHASING			
			
Westbound	Southbound	Eastbound	Northbound
Ø8	Ø6 & Ø1	Ø4	Ø2 & Ø5

Chart A

Phase On	Non-Conflicting Phase Allowed to Time Concurrently
1	5 or 6
2	5 or 6
3	7 or 8
4	7 or 8
5	1 or 2
6	1 or 2
7	3 or 4
8	3 or 4

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Signal Controller Phasing

South Washington Street & 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	150	13

	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
BASIC INTERVALS (OR FUNCTIONS)								
Minimum Initial	6	10	6	7	6	10	6	7
Passage Time	5	5		5	5	5		5
Maximum (Maximum Green or Ext. Limit)	20	40	20	40	20	40	20	40
Yellow Change	3.5	4.2		3.5	3.5	4.2		3.5
Red Clearance	2	2.5	2	3	2	2.5	2	3
Walk		7		7		7		7
Pedestrian Clearance		10		20		10		20
VOLUME DENSITY TIMING FUNCTIONS								
Variable Initial Timing Options								
Added Initial								
Minimum Initial	6	10	6	7	6	10	6	7
Added Initial per Actuation	3	3		3	3	3		3
Actuations Before Added Initial	2	2		2	2	2		2
Computed Initial								
Minimum Initial								
Maximum Initial								
Actuations to Reach Maximum Initial								
Extensible Initial								
Minimum Initial								
Maximum Initial								
Added Initial per Actuation								
TIME WAITING GAP REDUCTION OPTIONS								
Passage Time								
Minimum Gap								
Time to Reduce to Minimuim Gap								
Reduce Gap Every								
Reduce Gap Every Second By								
Reduce Gap Every								
Locking Memory								
Non-Locking Memory								
Flashing-Normal & Conflict Monitor	R	R	R	R	R	R	R	R
Start Up Phasing	R	G	R	R	R	G	R	R
Type of Detector — Presence	X		X		X		X	
Type of Detector — Calling		X		X		X		X
Type of Detector — Passing		X		X		X		X
Emergency Vehicle Pre-emption	X	X	X	X	X	X	X	X

Coordinated Cycle Lenght - XX Seconds

Coordinated Offset - X Seconds

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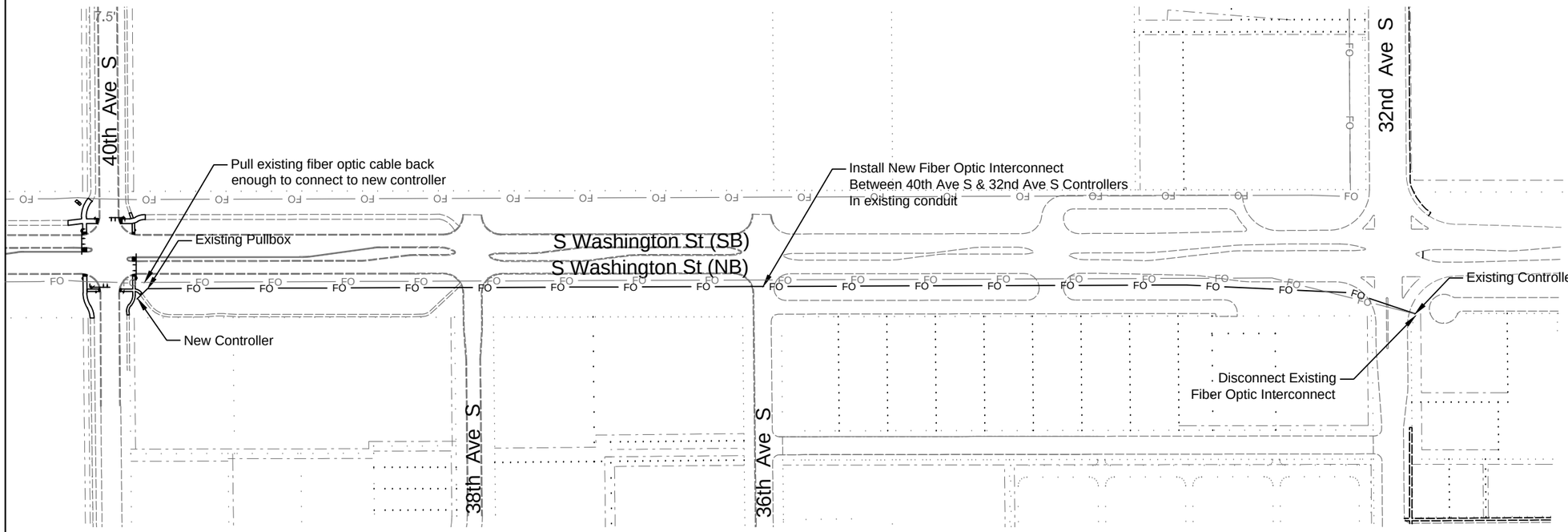
Signal Controller Timing

South Washington Street & 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	150	14



HORIZONTAL SCALE:
0 250 500
Feet

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Fiber Optic Interconnect

South Washington Street
& 40th Avenue South

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SU-6-986(109)113	19723	150	15

Traffic Signal System 1 LS

			Signal Standards				Conduit Runs																				Various
Item Description	Unit	Total	S1	S2	S3	S4	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21		Locations
Concrete Foundation - Traffic Signals	EA	4	1	1	1	1																							1
Pull Box	EA	9																											9
2IN Diameter Rigid Conduit	LF	160							40		45	5	12			10		15		10				15			8		160
4IN Diameter Rigid Conduit	LF	512					20	40		8				160	12		25		75		46	10	35		75	6			512
2 No. AWG Conductor Cable	LF	1277						96	52	93				276	84		74		174		116	93	47		87	85			1277
Emergency Detector Cable	LF	1277						96	52	93				276	84		74		174		116	93	47		87	85			1277
10 No. 12 AWG Conductor Cable	LF	0						0	0	0				0	0		0		0		0	0	0		0	0			0
12 No. 12 AWG Conductor Cable	LF	3831						288	156	279				828	252		222		522		348	279	141		261	255			3831
Push Button	LF	4603					32	448	208	66	57	19	24	1196	52	22	370	29	783	24	464	72	241	29	352	66	49		4603
Video Detector Cable	LF	1277						96	52	93				276	84		74		174		116	93	47		87	85			1277
#6 U.S.E.	LF	32					32																						32
Interconnect Cable	LF	2800																										2800	2800
30"X36" Through Only Lane Use Sign (R3-5A)	SF	30		1		1																							
30"X36" Right/Through Only Lane Use Sign (R3-6R)	SF	45		1	1	1																							
30"x36" Left Turn Only Lane Use Sign (R3-5L)	SF	45		1	1	1																							
30"x36" Right Turn Only Lane Use Sign (R3-5R)	SF	0	1																										
30"X36" Left/Through Only Lane Use Sign (R3-6R)	SF	0	1																										
30"X36" Left Turn Yield on Green Sign (R10-12)	SF	60	1	1	1	1																							
"40th Ave. S" Street Name Sign	SF	42		1		1																							
"S. Washington St." Street Name Sign	SF	60	1		1																								
Combo 39 FT MA SIG & STD. LED	EA	1			1																								
Combo 31 FT MA SIG & STD. LED	EA	1	1																										
TYPE IV 52 FT MA SIG & Light Std. - Type C	EA	1		1																									
TYPE IV 52 FT MA SIG & Light Std. - Type C	EA	1				1																							
1-Way 3 Sec. Head W/12IN Lens MA MTD	EA	8	2	2	2	2																							
1-Way 3 Sec. Head W/12IN Lens Signal Post MTD	EA	4	1	1	1	1																							
1-Way 5 Sec. Head W/12IN Lens Post MTD	EA	2	1	1	1	1																							
1-Way 5 Sec. Head W/12IN Lens MA MTD	EA	2		1																									
1-Way 2 Sec. Ped. Signal W/12IN Lens Signal Post MTD	EA	8	2	2	2	2																							
Pedestrian Push Button with Post and foundation	EA	7																											7
Pedestrian Push Button & Sign	EA	10	1	1		1																							
Video Detection System	EA	1																											1
Volume Density Con.t W/Ped Timing & Emerg. Pre-Emption	EA	1																											1
Battery Back Up System	EA	1																											1
Emergency Vehicle Advisory Light	EA	4	1	1	1	1																							
Emergency Vehicle Pre-Emption Detector	EA	1	1	1	1	1																							

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Traffic Signal System Quantities

South Washington Street & 40th Avenue South

NDDOT ABBREVIATIONS

D-20-1

Abn	abandoned
Abut	abutment
Ac	acres
Adj	adjusted
Aggr	aggregate
Ahd	ahead
ARV	air release valve
Align	alignment
Al	alley
Alt	alternate
Alum	aluminum
A	ampere
&	and
Appr	approach
Approx	approximate
ACP	asbestos cement pipe
Asph	asphalt
AC	asphalt cement
Assmd	assumed
@	at
Atten	attenuation
ATR	Automatic Traffic Recorder
Ave	Avenue
Avg	average
ADT	average daily traffic
Az	azimuth
Bk	back
BF	back face
Bs	backsight
Balc	balcony
B Wire	barbed wire
Barr	barricade
Btry	battery
Brg	bearing
BI	beehive inlet
Beg	begin
BM	bench mark
Bkwy	bikeway
Bit	bituminous
Blk	block
Bd Ft	board feet
BH	bore hole
BS	both sides
Bot	bottom
Blvd	Boulevard
Bndry	boundary
BC	brass cap
Brkwy	breakaway
Br	bridge
Bldg	building
BLM	Bureau of Land Management
BV	butterfly valve
Byp	bypass
C Gdrl	cable guardrail
Calc	calculate
Cd	candela
CIP	cast iron pipe
CB	catch basin
CRS	cationic rapid setting
C Gd	cattle guard
C To C	center to center
Cl or ℄	centerline
Cm	centimeter
Ch	chain
Chnlk	chain-link
Ch Blk	channel block
Ch Ch	channel change
Chk	check
Chsld	chiseled
Cir	circle
Cl	class
Cl	clay
Cl F	clay fill
Cl Hvy	clay heavy
Cl Lm	clay loam
Clnt	clean-out
Clr	clear
Cl&gr	clearing & grubbing
Co S	coal slack
Comb.	combination
Coml	commercial
Compr	compression
CADD	computer aided drafting & design
Conc	concrete
Cond	conductor
Const	construction
Cont	continuous
CSB	continuous split barrel sample
Contr	contraction
Contr	contractor
CP	control point
Coord	coordinate
Cor	corner
Corr	corrected
CAES	corrugated aluminum end section
CAP	corrugated aluminum pipe
CMES	corrugated metal end section
CMP	corrugated metal pipe
CPVCP	corrugated poly-vinyl chloride pipe
CSES	corrugated steel end section
CSP	corrugated steel pipe
C	coulomb
Co	County
Crse	course
C Gr	course gravel
CS	course sand
Ct	Court
Xarm	cross arm
Xbuck	cross buck
Xsec	cross sections
Xing	crossing
Xrd	Crossroad
Crn	crown
CF	cubic feet
M3	cubic meter
M3/s	cubic meters per second
CY	cubic yard
Cy/mi	cubic yards per mile
Culv	culvert
C&G	curb & gutter
CI	curb inlet
CR	curb ramp
CS	curve to spiral
C	cut
Dd Ld	dead load
Defl	deflection
Defm	deformed
Deg or D	degree
Dlnt	delineate
Dlntr	delineator
Depr	depression
Desc	description
Det	detail
DWP	detectable warning panel
Dtr	detour
Dia	diameter
Dir	direction
Dist	distance
DM	disturbed material
DB	ditch block
DG	ditch grade
Dbl	double
Dn	down
Dwg	drawing
Dr	drive
Drwy	driveway
DI	drop inlet
D	dry density
Ea	each
Esmt	easement
E	East
EB	Eastbound
Elast	elastomeric
EL	electric locker
E Mtr	electric meter
Elec	electric/al
EDM	electronic distance meter
Elev or El	elevation
Ellipt	elliptical
Emb	embankment
Emuls	emulsion/emulsified
ES	end section
Engr	engineer
ESS	Environmental Sensor Station
Eq	equal
Eq	equation
Evgr	evergreen
Exc	excavation
Exst	existing
Exp	expansion
Expy	Expressway
E	external of curve
Extru	extruded
FOS	factor of safety
F	Fahrenheit
FS	far side
F	farad
Fed	Federal
FHWA	Federal Highway Administration
FP	feed point
Ft	feet/foot
Fn	fence
Fn P	fence post
FO	fiber optic
FB	field book
FD	field drive
F	fill
FAA	fine aggregate angularity
FS	fine sand
FH	fire hydrant
Fl	flange
Flrd	flared
FES	flared end section

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
06-15-10	
REVISIONS	
DATE	CHANGE
04-20-11 03-15-13	Added Items Added Items

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NDDOT ABBREVIATIONS

D-20-2

F Bcn	flashing beacon
FA	flight auger sample
FL	flow line
Ftg	footing
FM	force main
Fs	foresight
Fnd	found
Fdn	foundation
Frac	fractional
Frwy	freeway
Frt	front
FF	front face
F Disp	fuel dispenser
FFP	fuel filler pipes
FLS	fuel leak sensor
Furn	furnish/ed
Gal	gallon
Galv	galvanized
Gar	garage
Gs L	gas line
G Reg	gas line regulator
GMV	gas main valve
G Mtr	gas meter
GSV	gas service valve
GVP	gas vent pipe
GV	gate valve
Ga	gauge
Geod	geodetic
GIS	Geographical Information System
G	giga
GPS	Global Positioning System
Gov	government
Grd	graded/grade
Gr	gravel
Grnd	ground
GWM	ground water monitor
Gdrl	guardrail
Gtr	gutter
H Plg	H piling
Hdwl	headwall
Ha	hectare
Ht	height
HI	height of instrument
Hel	helical
H	henry
Hz	hertz
HDPE	High Density Polyethylene
HM	high mast
HP	high pressure
HPS	high pressure sodium
Hwy	highway
Hor	horizontal
HBP	hot bituminous pavement
Hr	hour(s)
Hyd	hydrant
Ph	hydrogen ion content
Id	identification
In or "	inch
Incl	inclinometer tube
IMH	inlet manhole
ID	inside diameter
Inst	instrument
Intchg	interchange
Intmdt	intermediate
Intscn	intersection
Inv	invert
IM	iron monument
I Pn	Iron Pin
IP	iron Pipe
Jt	joint
J	joule
Jct	junction
K	kelvin
Kn	kilo newton
Kpa	kilo pascal
Kg	kilogram
Kg/m3	kilogram per cubic meter
Km	kilometer
K	Kip(s)
LS	Land Surveyor (licensed)
LSIT	Land Surveyor In Training
Ln	lane
Lg	large
Lat	latitude
Lt	left
L	length of curve
Lens	lenses
Lvl	level
LB	level book
Lvlng	leveling
Lht	light
LP	light pole
Ltg	lighting
Lig Co	lignite coal
Lig Sl	lignite slack
LF	linear foot
Liq	liquid
LL	liquid limit
L	litre
Lm	loam
Loc	location
LC	long chord
Long.	longitude
Lp	loop
LD	loop detector
Lm	lumen
Lum	luminaire
L Sum	lump sum
Lx	lux
ML	main line
M Hr	man hour
MH	manhole
Mkd	marked
Mkr	marker
Mkg	marking
MA	mast arm
Matl	material
Max	maximum
MC	meander corner
Meas	measure
Mdn	median
MD	median drain
MC	medium curing
M	mega
Mer	meridian
M	meter
M/s	meters per second
M	mid ordinate of curve
Mi	mile
MM	mile marker
MP	mile post
Ml	milliliter
Mm	millimeter
Mm/hr	millimeters per hour
Min	minimum
Misc	miscellaneous
Mon	monument
Mnd	mound
Mtbl	mountable
Mtd	mounted
Mtg	mounting
Mk	muck
Mun	municipal
N	nano
NGS	National Geodetic Survey
NS	near side
Neop	neoprene
Ntwk	network
N	newton
N	North
NDDOT	North Dakota Department of Transportation
NE	North East
NW	North West
NB	Northbound
No. or #	number
Obsc	obscure(d)
Obsn	observation
Ocpd	occupied
Ocpy	occupy
Off Loc	office location
O/s	offset
OC	on center
C	one dimensional consolidation
OC	organic content
Orig	original
O To O	out to out
OD	outside diameter
OH	overhead
PMT	pad mounted transformer
Pg	pages
Pntd	painted
Pr	pair
Pnl	panel
Pk	park
PK	Parker-Kalon nail
Pa	pascal
PSD	passing sight distance
Pvmt	pavement
Ped	pedestal
Ped	pedestrian
PPP	pedestrian pushbutton post
Pen.	penetration
Perf	perforated
Per.	perimeter
PL	pipeline
Pl	place
P&P	plan & profile
PL	plastic limit
Pl	plate
Pt	point
PCC	point of compound curve
PC	point of curve
PI	point of intersection
PRC	point of reverse curvature

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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03-15-13	Added Items

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NDDOT ABBREVIATIONS

D-20-3

PT	point of tangent
POC	point on curve
POT	point on tangent
PE	polyethylene
PVC	polyvinyl chloride
PCC	Portland Cement concrete
Lb or #	pounds
PP	power pole
Preempt	preemption
Prefab	prefabricated
Prfmd	preformed
Prep	preperation
Press.	pressure
PRV	pressure relief valve
Prestr	prestressed
Pvt	private
PD	private drive
Prod.	production/produce
Prog	programmed
Prop.	property
Prop Ln	property line
Ppsd	proposed
PB	pull box
Qty	quantity
Qtr	quarter
Rad or R	radius
RR	railroad
Rlwy	railway
Rsd	raised
RTP	random traverse point
Rge or R	range
RC	rapid curing
Rec	record
Rcy	recycle
RPCC	recycled Portland cement concrete
Ref	reference
R Mkr	reference marker
RM	reference monument
Refl	reflectorized
RCB	reinforced concrete box
RCES	reinforced concrete end section
RCP	reinforced concrete pipe
RCPS	reinforced concrete pipe sewer
Reinf	reinforcement
Res	reservation
Ret	retaining
Rev	reverse
Rt	right
R/W	right of way
Riv	river
Rd	road
Rdbd	road bed
Rdwy	roadway
RWIS	Roadway Weather Information System
Rk	rock
Rt	route
Salv	salvage(d)
Sd	sand
Sdy Cl	sandy clay
Sdy Cl Lm	sandy clay loam
Sdy Fl	sandy fill
Sdy Lm	sandy loam
San	sanitary sewer line
Sc	scoria
Sec	seconds
Sec	section
SL	section line
Sep	separation
Seq	sequence
Serv	service
Sh	shale
Sht	sheet
Shtng	sheeting
Shldr	shoulder
Sw	sidewalk
S	siemens
SD	sight distance
Sig	signal
Si Cl	silt clay
Si Cl Lm	silty clay loam
Si Lm	silty loam
Sgl	single
SC	slow curing
SS	slow setting
Sm	small
S	South
SE	South East
SW	South West
SB	Southbound
Sp	spaces
Spcl	special
SP	special provisions
G	specific gravity
Spk	spike
SC	spiral to curve
ST	spiral to tangent
SB	split barrel sample
SH	sprinkler head
SV	sprinkler valve
Sq	square
SF	square feet
Km2	square kilometer
M2	square meter
SY	square yard
Stk	stake
Std	standard
N	standard penetration test
Std Specs	Standard Specifications
Sta	station
Sta Yd	station yards
Stm L	steam line
SEC	steel encased concrete
SSD	stopping sight distance
SD	storm drain
St	street
SPP	structural plate pipe
SPPA	structural plate pipe arch
Str	structure
Subd	subdivision
Sub	subgrade
Sub Prep	subgrade preperation
Ss	subsoil
SE	superelevation
SS	supplement specification
Supp	supplemental
Surf	surfacing
Surv	survey
Sym	symmetrical
SI	Systems International
Tan	tangent
T	tangent (semi)
TS	tangent to spiral
Tel	telephone
Tel B	Telephone Booth
Tel P	telephone pole
Tv	television
Temp	temperature
Temp	temporary
TBM	temporary bench mark
T	tesla
T	thinwall tube sample
T/mi	tons per mile
Ts	topsoil
Twp or T	township
Traf	traffic
TSCB	traffic signal control box
Tr	trail
Transf	transformer
TB	transit book
Trans	transition
TT	transmission tower
Trans	transverse
Trav	traverse
TP	traverse point
Trtd	treated
Trmt	treatment
Qc	triaxial compression
TERO	Tribal Employment Rights Ordinance
Tpl	triple
TP	turning point
Typ	typical
Qu	unconfined compressive strength
Ugrnd	underground
USC&G	US Coast & Geodetic Survey
USGS	US Geologic Survey
Util	utility
VG	valley gutter
Vap	vapor
Vert	vertical
VC	vertical curve
VCP	vitrified clay pipe
V	volt
Vol	volume
Wkwy	walkway
W	water content
WGV	water gate valve
WL	water line
WM	water main
WMV	water main valve
W Mtr	water meter
WSV	water service valve
WW	water well
W	watt
Wrng	wearing
Wb	weber
WIM	weigh in motion
W	West
WB	Westbound
Wrng	wiring
W/	with
W/o	without
WC	witness corner
WGS	World Geodetic System
Z	zenith

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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NDDOT UTILITY COMPANY ABBREVIATIONS

D-20-10

702COM	702 Communications
ACCENT	Accent Communications
AGASSIZ WU	Agassiz Water Users Incorporated
All PI	Alliance Pipeline
ALL SEAS WU	All Seasons Water Users Association
AMOCO PI	Amoco Pipeline Company
AMRDA HESS	Amerada Hess Corporation
AT&T	AT&T Corporation
B PAW	Bear Paw Energy Incorporated
BASIN ELEC	Basin Electric Cooperative Incorporated
BEK TEL	Bek Communications Cooperative
BELLE PL	Belle Fourche Pipeline Company
BNSF	Burlington Northern Santa Fe Railway
BOEING	Boeing
BRNS RWD	Barnes Rural Water District
BURK-DIV ELEC	Burke-Divide Electric Cooperative
BURL WU	Burleigh Water Users
Cable One	Cable One
CABLE SERV	Cable Services
CAP ELEC	Capital Electric Cooperative Incorporat
CASS CO ELEC	Cass County Electric Cooperative
CASS RWU	Cass Rural Water Users Incorporated
CAV ELEC	Cavalier Rural Electric Cooperative
CBLCOM	Cablecom Of Fargo
CENEX PL	Cenex Pipeline
CENT PWR ELEC	Central Power Electric Cooperative
CONS TEL	Consolidated Telephone
CONT RES	Continental Resource Inc
CPR	Canadian Pacific Railway
D O E	Department Of Energy
DAK CARR	Dakota Carrier Network
DAK CENT TEL	Dakota Central Telephone
DAK RWD	Dakota Rural Water District
DGC	Dakota Gasification Company
DICKEY R NET	Dickey Rural Networks
DICKEY RWU	Dickey Rural Water Users Association
DICKEY TEL	Dickey Telephone
DNRR	Dakota Northern Railroad
DOME PL	Dome Pipeline Company
DVELEC	Dakota Valley Electric Cooperative
DVMW	Dakota, Missouri Valley & Western
ENBRDG	Enbridge Pipelines Incorporated
FALK MNG	Falkirk Mining Company
G FKS-TRL WD	Grand Forks-traill Water District
GETTY TRD & TRAN	Getty Trading & Transportation
GLDN W ELEC	Golden West Electric Cooperative
GRGS CO TEL	Griggs County Telephone
GT PLNS NAT GAS	Great Plains Natural Gas Company
HALS TEL	Halstad Telephone Company
INT-COMM TEL	Inter-Community Telephone Company
KANEB PL	Kaneb Pipeline Company
KEM ELEC	Kem Electric Cooperative Incorporated
KOCH GATH SYS	Koch Gathering Systems Incorporated
LKHD PL	Lakehead Pipeline Company
LNGDN RWU	Langdon Rural Water Users Incorporated
LWR YELL R ELEC	Lower Yellowstone Rural Electric
MCKNZ CON	McKenzie Consolidated Telcom
MCKNZ WRD	McKenzie County Water Resource District
MCKNZ ELEC	McKenzie Electric Cooperative
MCLEOD	Mcleod USA
MCLN ELEC	Mclean Electric Cooperative
MCLN-SHRDN R WAT	Mclean-Sheridan Rural Water
MDU	Montana-dakota Utilities
MID-CONT CABLE	Mid-Continent Cable
MIDSTATE TEL	Midstate Telephone Company
MINOT CABLE	Minot Cable Television
MINOT TEL	Minot Telephone Company
MISS W W S	Missouri West Water System
MNKOTA PWR	Minnkota Power
MRE LBTY TEL	Moore & Liberty Telephone
MOR-GRAN-SOU ELEC	Mor-gran-sou Electric Cooperative
MOUNT-WILLI ELEC	Mountrail-williams Electric Cooperative
MUNICIPAL	City Of '.....'
MUNICIPAL	City Water And Sewer
N CENT ELEC	North Central Electric Cooperative
N VALL W DIST	North Valley Water District
ND PKS & REC	North Dakota Parks And Recreation
ND TEL	North Dakota Telephone Company
NDDOT	North Dakota Department of Transportation
NDSU SOIL SCI DEPT	Ndsu Soil Science Department
NEMONT TEL	Nemont Telephone
NODAK R ELEC	Nodak Rural Electric Cooperative
NOON FRMS TEL	Noonan Farmers Telephone Company
NPR	Northern Plains Railroad
NSP	Northern States Power
NTH PRAIR RW	Northern Prairie Rural Water Association
NTHN BRDR PL	Northern Border Pipeline
NTHN PLNS ELEC	Northern Plains Electric Cooperative Incorporated
NTHWSTRN REF	Northwestern Refinery Company
NW COMM	Northwest Communication Cooperation
OTTR TL PWR	Otter Tail Power Company
P L E M	Prairielands Energy Marketing
POLAR COM	Polar Communications
QWEST	Qwest Communications
R&T W SUPPLY	R & T Water Supply Association
RAMSEY R SEW	Ramsey Rural Sewer Association
RAMSEY RW	Ramsey Rural Water Association
RAMSEY UTIL	Ramsey County Rural Utilities
RED RIV TEL	Red River Rural Telephone
RESVTN TEL	Reservation Telephone
ROBRTS TEL	Roberts Company Telephone
R-RIDER ELEC	Roughrider Electric Coop
RRVW	Red River Valley & Western Railroad
RSR ELEC	R.S.R. Electric Cooperative
S E W U	South East Water Users Incorporated
SCOTT CABLE	Scott Cable Television Dickinson
SHERDN ELEC	Sheridan Electric Cooperative
SHEYN VLY ELEC	Sheyenne Valley Electric Cooperative
SKYTECH	Skyland Technologies Incorporated
SLOPE ELEC	Slope Electric Cooperative
SLOPE ELEC	Slope Electric Cooperative Incorporated
SOURIS RIV TELCOM	Souris River Telecommunications
ST WAT COMM	State Water Commission
STATE LN WATER	State Line Water Cooperative
STUT RWU	Stutsman Rural Water Users
T M C	Turtle Mountain Communications
TCI	TCI of North Dakota
TRI-CNTY WU	Tri-County Water Users Incorporated
TRL CO RWU	Traill County Rural Water Users
UNTD TEL	United Telephone
UPPR SOUR WUA	Upper Souris Water Users Association
US SPRINT	U.S. Sprint
USAF MSL CABLE	U.S.A.F. Missile Cable
USW COMM	U.S. West Communications
VRNDRY ELEC	Verendrye Electric Cooperative
W RIV TEL	West River Telephone Incorporated
WEB	W. E. B. Water Development Association
WILLI RWA	Williams Rural Water Association
WILSTN BAS PL	Williston Basin Interstate Pipeline Company
WLSH RWD	Walsh Water Rural Water District
WOLVRTN TEL	Wolverton Telephone
XLENER	Xcel Energy
YSVR	Yellowstone Valley Railroad

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
6-15-10	
REVISIONS	
DATE	CHANGE
04-20-11	Added Items
03-15-13	Added Items

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 3/15/13 and the original document is stored at the North Dakota Department of Transportation

Line Styles

- Limits of Const Transition Line
- Bale Check
- Rock Check
- Sight Distance Triangle Line
- Small Hidden Object
- Dimension Leader
- Existing Ground
- Existing Topsoil (Cross Section View)
- Large Hidden Object
- Edge Drain
- Geotextile Fabric Type D
- Existing Electrical
- Existing Fiber Optic Line
- Existing TV Fiber Optic
- Existing Gas Pipe
- Geogrid
- Existing Overhead Utility Line
- Existing Power
- Existing Fuel Pipeline
- Existing Undefined Above Ground Pipe Line
- Geotextile Fabric Type R
- Geotextile Fabric Type R1
- Remove Line
- Geotextile Fabric Type RR
- Geotextile Fabric Type S
- Floating Silt Curtain
- Existing Telephone Line
- Existing TV Line
- Existing Assumed Ground (Not Surveyed)
- Tentative Ground Line
- Existing Water or Steam Line
- Existing Under Drain
- Under Drain
- Wall
- Existing Slotted Drain
- Existing Cemetary Boundary
- Centerline Pavement Marking
- Barrier with Centerline Pavement Marking
- Barrier Pavement Marking
- Stripe 4 IN Dotted Extension White
- Stripe 8 IN Dotted Extension White
- Stripe 8 IN Lane Drop
- Wetland Mitigation
- Existing Box Culvert Bridge
- Existing Concrete Surface
- Existing Drainage Structure
- Easement
- Existing Concrete
- Existing Easement
- Existing Gravel Surface
- Existing Aggregate (Cross Section View)
- Existing Curb and Gutter (Cross Section View)
- Existing Riprap
- Existing Underground Vault or Lift Station
- Tangent Line
- Hidden Object
- Existing Dirt Surface
- Existing Conduit
- Topsoil Profile
- Existing Conductor
- Conductor
- Fiber Optic
- Existing Loop Detector
- Subgrade, Subcut or Ditch Grade
- Existing Asphalt Surface
- Existing Asphalt (Cross Section View)
- Existing Reinforcement Rebar
- Existing Tie Point Line
- Existing State or International Line
- Existing Quarter Section Line
- Existing County
- Existing Section Line
- Existing Township
- Existing Railroad Centerline
- Centerline
- Existing Centerline
- Supplemental Contour
- Right of Way
- Existing Right of Way
- Existing Right of Way Railroad
- Failure Line
- Existing Conditions
- Existing Ground (Details)
- Existing Sixteenth Section Line
- Existing Right of Way Not State Owned
- Phantom Object
- Centerline Main
- Existing Guardrail Cable
- Existing Guardrail Metal
- Existing Edge of Water
- Excavation Limits
- Existing Government Lot Line
- Existing Adjacent Block Lines
- Existing Adjacent Lot Lines
- Existing Adjacent Property Line
- Existing Adjacent Subdivision Lines

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 4/20/11 and the original document is stored at the North Dakota Department of Transportation

Line Styles

- Subgrade Reinforcement
- Existing Down Guy Wire Down Guy
- Existing Fence
- Existing Railroad
- Existing Sanitary Sewer
- Existing Sanitary Force Main
- Existing Storm Drain
- Existing Storm Drain Force Main
- Fence
- Silt Fence
- Existing Field Line
- Exst Flow
- Flow
- Existing Culvert
- Existing Curb
- Existing Valley Gutter
- Existing Driveway Gutter
- Existing Curb and Gutter
- Existing Mountable Curb and Gutter
- Existing Double Micro Loop Detector
- Micro Loop Detector Double
- Existing Overhead Sign Structure
- Existing Micro Loop Detector
- Micro Loop Detector
- Existing Overhead Sign Structure Cantilever
- Existing Railroad Switch
- Overhead Sign Structure Cantilever
- 24 Inch Pipe
- Reinforced Concrete Pipe
- Signal Head with Mast Arm
- Existing Signal Head with Mast Arm
- Tie Bar at Random Spacing
- 3-Cable w Posts
- Existing 3-Cable w Posts
- Site Boundary
- Fiber Rolls
- Doweled Joint
- Tie Bar 30 Inch 4 Foot Center to Center
- Tie Bar 18 Inch 3 Foot Center to Center
- Existing Berm, Dike, Pit, or Earth Dam
- Existing Ditch Block
- Depression Contours
- Existing City Corporate Limits or Reservation Boundary
- Gravel Pit - Borrow Area
- Existing Tree Boundary
- Tree Row
- Existing Brush or Shrub Boundary
- Existing Retaining Wall
- Existing Planter or Wall
- Retaining Wall (Plan View)
- Sheet Piling
- W-Beam w Posts
- Existing W-Beam Guardrail with Posts
- Exst Wet Area-Vegetation Break
- Existing Wetland Delineated

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
REVISIONS	
DATE	CHANGE

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Symbols

D-20-30

North Arrow (Half Scale)

Truck Mounted Attenuator

Type I Barricade

Type II Barricade

Type III Barricade

Catch Basin

Cairn or Stone Circle

Video Detection Camera

Storm Drain Cap or Stub

Corrugated Metal End Section 18 Inch

Corrugated Metal End Section 24 Inch

Corrugated Metal End Section 30 Inch

Corrugated Metal End Section 36 Inch

Corrugated Metal End Section 42 Inch

Corrugated Metal End Section 48 Inch

Concrete Foundation

Ground Connection Conductor

Neutral Connection Conductor

Phase 1 Connection Conductor

Phase 2 Connection Conductor

Traffic Cone

Signal Controller

Pad Mounted Signal Controller

Alignment Data Point

Emergency Vehicle Detector

Attenuation Device

Diamond Grade Delineator Type A

Diamond Grade Delineator Type B

Diamond Grade Delineator Type C

Diamond Grade Delineator Type D

Diamond Grade Delineator Type E

Flexible Delineator

Flexible Delineator Type A

Flexible Delineator Type B

Flexible Delineator Type C

Flexible Delineator Type D

Flexible Delineator Type E

Delineator Type A

Delineator Type A Reset

Delineator Type B

Delineator Type B Reset

Delineator Type C

Delineator Type D

Delineator Type E

Delineator Drums

Spot Elevation

Existing Access Control Arrow

Existing Artifact

Existing Flashing Beacon

Existing Benchmark

Existing Railroad Battery Box

Existing Bush or Shrub

Existing Gas Cap or Stub

Existing Sanitary Cap or Stub

Existing Storm Drain Cap or Stub

Existing Water Cap or Stub

Existing Sanitary Cleanout

Existing Concrete Foundation

Existing Traffic Signal Controller

Existing Pad Mounted Signal Controller

Existing Sixteenth Section Corner

Existing Quarter Section Corner

Existing Section Corner

Existing Railroad Crossbuck

Existing Satellite Dish

Existing Fuel Dispensers

Existing Flexible Delineator Type A

Existing Flexible Delineator Type B

Existing Flexible Delineator Type C

Existing Flexible Delineator Type D

Existing Flexible Delineator Type E

Existing Delineator Type A

Existing Delineator Type B

Existing Delineator Type C

Existing Delineator Type D

Existing Delineator Type E

Existing EFB Misc

Existing Flashing Beacon

Existing Pipe Mounted Flasher

Existing Pad Mounted Feed Point

Existing Pipe Mounted Feed Point with Pad

Existing Pole Mounted Feed Point

Existing Railroad Frog

Existing Snow Gate 18

Existing Snow Gate 28

Existing Snow Gate 40

Existing Headwall

Existing Pedestrian Head with Number

Existing Signal Head

Existing Sprinkler Head

Existing Fire Hydrant

Existing Catch Basin Drop Inlet

Existing Curb Inlet

Existing Manhole Inlet

Existing Junction Box

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 4/20/11 and the original document is stored at the North Dakota Department of Transportation

Symbols

D-20-31

- Existing Light Standard
- Existing High Mast Light Standard 10 Luminaire
- Existing High Mast Light Standard 3 Luminaire
- Existing High Mast Light Standard 4 Luminaire
- Existing High Mast Light Standard 5 Luminaire
- Existing High Mast Light Standard 6 Luminaire
- Existing High Mast Light Standard 7 Luminaire
- Existing High Mast Light Standard 8 Luminaire
- Existing High Mast Light Standard 9 Luminaire
- Existing Overhead Sign Structure Load Center
- Existing Luminaire
- Existing Light Standard Luminaire
- Existing Federal Mailbox
- Existing Private Mailbox
- Existing Meander Section Corner
- Existing Meter
- Existing Electrical Manhole
- Existing Gas Manhole
- Existing Sanitary Manhole
- Existing Sanitary Force Main Manhole
- Existing Sanitary Manhole with Valve
- Existing Storm Drain Manhole
- Existing Force Main Storm Drain Manhole
- Existing Force Main Storm Drain Manhole with Valve
- Existing Telephone Manhole
- Existing Manhole with Valve Water
- Existing Water Manhole
- Existing Mile Post Type A
- Existing Mile Post Type B
- Existing Mile Post Type C
- Existing Reference Marker
- Existing RW Marker
- Existing Utility Marker
- Existing Monument Found
- Existing Monument set
- Existing RW Property Monument Found
- Existing RW PropertyMonument set
- Existing Object Marker Type I
- Existing Object Marker Type II
- Existing Object Marker Type III
- Existing Electrical Pedestal
- Existing Telephone Pedestal
- Existing Fiber Optic Telephone Pedestal
- Existing TV Pedestal
- Existing Fiber Optic TV Pedestal
- Existing Fuel Filler Pipes
- Existing Traverse PI Aerial Panel
- Existing Pole
- Existing Power Pole
- Existing Power Pole with Transformer
- Existing Telephone Pole
- Existing Wood Pole
- Existing Post
- Existing Pedestrian Push Button Post
- Existing Control Point CP
- Existing Control Point GPS-RTK
- Existing Control Point TRI
- Existing Reference Marker Point NGS
- Existing Pull Box
- Existing Intelligent Transportation Pull Box
- Existing Water Pump
- Existing Slotted Reinforced Concrete Pipe
- Existing RR Profile Spot
- Existing Fuel Leak Sensors
- Existing Highway Sign
- Existing Miscellaneous Spot
- Existing Lighting Standard Pole
- Existing Traffic Signal Standard
- Existing Transformer
- Existing Large Evergreen Tree
- Existing Small Evergreen Tree
- Existing Large Tree
- Existing Small Tree
- Existing Tree Trunk
- Existing Pad Mounted Traffic Signal Control Box
- Existing Undefined Manhole
- Existing Undefined Pull Box
- Existing Undefined Pedestal
- Existing Undefined Valve
- Existing Undefined Pipe Vent
- Existing Gas Valve
- Existing Water Valve
- Existing Fuel Pipe Vent
- Existing Gas Pipe Vent
- Existing Sanitary Pipe Vent
- Existing Storm Drain Pipe Vent
- Existing Water Pipe Vent
- Existing Weather Station
- Existing Ground Water Well Bore Hole
- Existing Windmill or Tower
- Existing Witness Corner
- Flashing Beacon
- Flagger
- Pipe Mounted Flasher
- Sanitary Force Main with Valve

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
REVISIONS	
DATE	CHANGE

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Symbols

D-20-32

- Pad Mounted Feed Point
- Pipe Mounted Feed Point with Pad
- Pole Mounted Feed Point
- Headwall
- Double Headwall with Vegitation Barrier
- Single Headwall with Vegitation Barrier
- Pole Mounted Head
- Sprinkler Head
- Fire Hydrant
- Inlet Type 1
- Inlet Type 2
- Double Inlet Type 2
- Inlet Grate Type 2
- Junction Box
- High Mast Light Standard 10 Luminaire
- High Mast Light Standard 3 Luminaire
- High Mast Light Standard 4 Luminaire
- High Mast Light Standard 5 Luminaire
- High Mast Light Standard 6 Luminaire
- High Mast Light Standard 7 Luminaire
- High Mast Light Standard 8 Luminaire
- High Mast Light Standard 9 Luminaire
- Relocate Light Standard
- Overhead Sign Structure Load Center
- Light Standard 100 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 150 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 175 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 200 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 250 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 310 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 35 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 400 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 50 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 70 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 700 Watt High Pressure Sodium Vapor Luminaire
- Manhole
- Manhole 48 Inch
- Sanitary Force Main Manhole
- Sanitary Sewer Manhole
- Storm Drain Manhole
- Storm Drain Manhole with Inlet
- Reset Mile Post
- Mile Post Type A
- Mile Post Type B
- Mile Post Type C
- Right of Way Marker
- Tubular Marker
- Concrete Monument to Be Set
- RW Property Monument to Be Set
- Object Marker Type I
- Object Marker Type II
- Object Marker Type III
- Caution Mode Arrow Panel
- Back to Back Vertical Panel Sign
- Double Direction Arrow Panel
- Left Directional Arrow Panel
- Right Directional Arrow Panel
- Sequencing Arrow Panel
- Truck Mounted Arrow Panel
- Power Pole
- Wood Pole
- Pedestrian Push Button Post
- Property Corner
- Pull Box
- Intelligent Transportation Pull Box
- Sanitary Pump
- Storm Drain Pump
- Reinforced Pavement
- Reinforced Concrete End Section 15 Inch
- Reinforced Concrete End Section 18 Inch
- Reinforced Concrete End Section 24 Inch
- Reinforced Concrete End Section 30 Inch
- Reinforced Concrete End Section 36 Inch
- Reinforced Concrete End Section 42 Inch
- Reinforced Concrete End Section 48 Inch
- Reinforced Concrete End Section 54 Inch
- Reset Right of Way Marker
- Reset USGS Marker
- Right of Way Markers
- Riser 30 Inch
- Continuous Split Barrel Sample (CSB)
- Flight Auger Sample (FA)
- Split Barrel Sample (SB)
- Thinwall Tube Sample
- Highway Sign
- SNOW GATE 18 FT
- SNOW GATE 28 FT
- SNOW GATE 40 FT
- Standard Penetration Test (N)
- Transformer
- Inclinometer Tube (Incl)
- Underdrain Cleanout
- Excavation Unit
- Water Valve

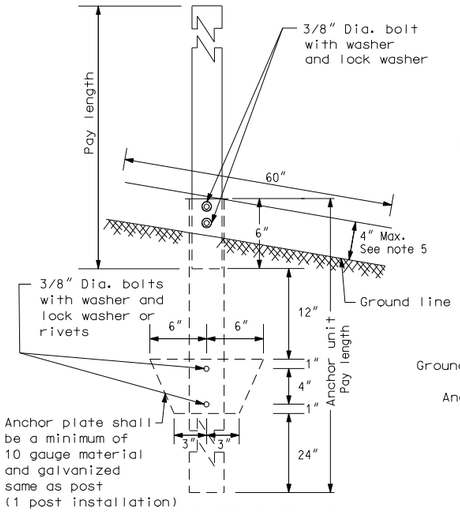
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 4/20/11 and the original document is stored at the North Dakota Department of Transportation

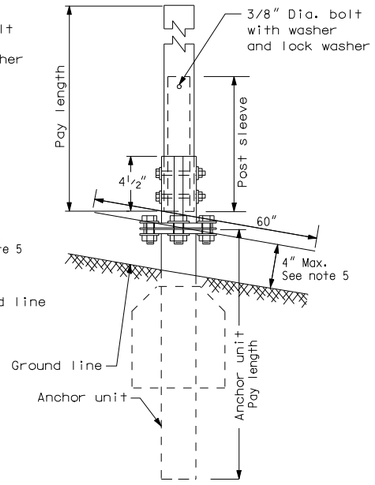
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

PERFORATED TUBE

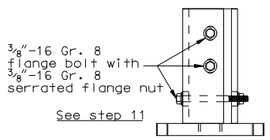
D-704-7

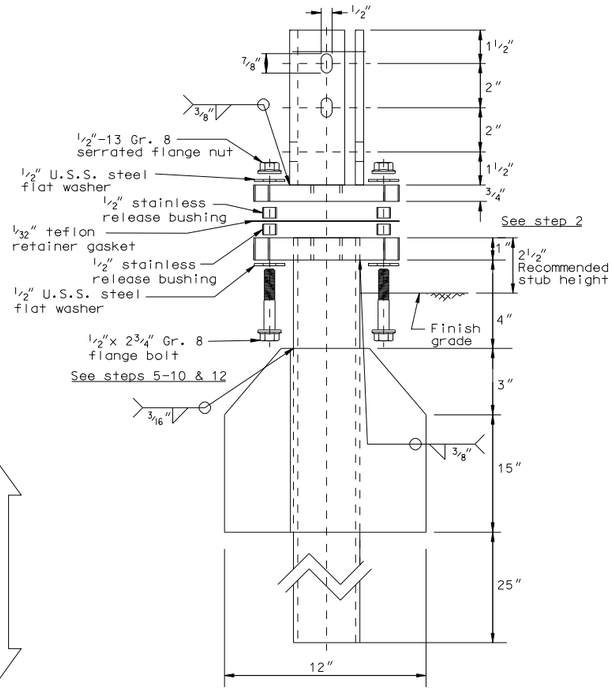


ANCHOR UNIT AND POST ASSEMBLY

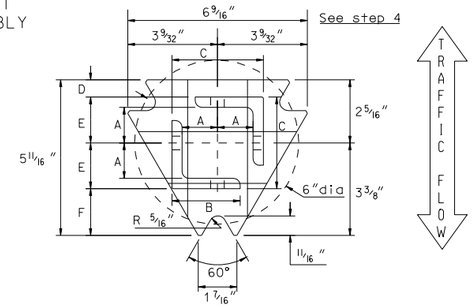


SLIP BASE ANCHOR UNIT AND POST SLEEVE ASSEMBLY





MULTI-DIRECTIONAL SLIP BASE ASSEMBLY

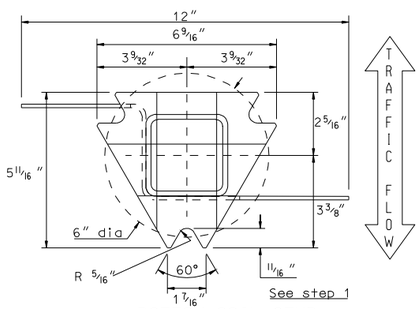


TOP POST RECEIVER

Materials: Plate - ASTM A572 grade 50
Angle receiver - $2\frac{1}{2}$"x $2\frac{1}{2}$"x $\frac{3}{8}$" ASTM A36 structural angle

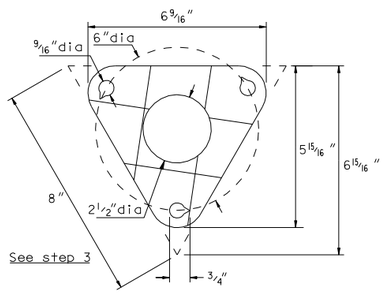
TOP POST RECEIVER DATA TABLE						
Square Post Sizes	A	B	C	D	E	F
2 3/16" x 10 Ga. Square Post	1 9/64"	2 1/2"	3 1/32"	25/32"	1 33/64"	1 7/8"
2 1/2" x 10 Ga. Square Post	1 9/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"

$2\frac{3}{16}$" x 10 gauge may be inserted into $2\frac{1}{2}$" x 10 gauge for additional wind load.



BOTTOM SOIL STUB

Materials: Tube - 3"x 3"x 7 gauge ASTM A500 Gr B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A 569
Plate - ASTM A572 grade 50



BOLT RETAINER FOR BASE CONNECTION

Materials: 1/32" reprocessed Teflon

Notes
1. Slip base bolts shall be torqued as specified by the manufacturer.
2. The $2\frac{3}{16}$" size 10 gauge is shown as 2.19" size on the plans. The $2\frac{1}{2}$" size 10 gauge is shown as 2.51" size on the plans.
3. Anchor for 2", $2\frac{1}{4}$", and $2\frac{1}{2}$" posts.
4. Anchor material shall be 7 gauge H.R.P.O. Commercial quality ASTM A569 and 3"x 3"x 7 gauge ASTM A500 Grade B. Anchor shall have a yield strength of 43.9 KSI and tensile strength of 59.3 KSI. Anchor shall be hot dipped galvanized per ASTM A123/A153. All tolerances on anchor unit and slip base bottom assembly are ± 0.005 unless otherwise noted.
5. 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
6. When used in concrete sidewalk, anchor shall be the same except without the wings.
7. Four post signs shall have over 8' between the first and fourth posts.

MULTI-DIRECTIONAL SLIP BASE ASSEMBLY	
STEP	INSTALLATION PROCEDURE
1.	Install bottom soil anchor stub plumb and squared up with road, with point of plate facing oncoming traffic.
2.	Depth of imbedment to leave $2\frac{1}{2}$" from grade to top of anchor plate.
3.	Place teflon bolt retainer gasket on top of bottom plate (make sure that notches in holes are pointing counter clockwise).
4.	Place top post receiver on to retainer gasket, properly indexed so that angle receivers are squared up with road.
5.	Slide 1 each $\frac{1}{2}$" flat washer on to 1 each inverted $\frac{1}{2}$"-13 gr. 8 flange bolt, followed by 1 each stainless steel release bushing.
6.	Insert above bolt with washer and bushing up through notched points of top and bottom plates, passing through hole in gasket.
7.	Slide second bushing down on to above bolt until it rests on top of gasket followed by second washer.
8.	Complete by threading $\frac{1}{2}$"-13 gr. 8 serrated flange nut snugly down against top of washer.
9.	Repeat steps 5,6,7 & 8 at the two remaining notched triangle points.
10.	Insert sign post into angle receivers on top half until post(s) bottom out. *NOTE: Where higher wind load is desired, insert the next size smaller square post inside bottom of main upright post (Minimum of 48", not to exceed beyond bottom edge of sign).
11.	Secure posts into receivers using 3 each $\frac{3}{8}$"-16 gr. 8 flange bolts and 3 each $\frac{3}{8}$"-16 serrated flange nuts in receiver slots (top 2 bolts should be parallel to highway) do not tighten nuts until all bolts are in place.
12.	After all sub-assembly hardware is tightened, then torque the three $\frac{1}{2}$"-13 nuts to 42 ft-lbs, in a circular pattern until all bolt assemblies reach the required torque. *NOTE: On multi-leg installations, be sure that all anchors are squared and lined up with each other.

Telescoping Perforated Tubes							
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In.^{4}	Cross Sect. area In.^{2}	Section Modulus In.^{3}
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.785
4 x 4	0.250	1/4	6.600	3.040	1.940	1.050

Number of Posts	Telescoping Perforated Tube					
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			B	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No	2 1/4
2	2 1/4	12			No	2 1/2
2	2 1/2	12			Yes	
2	2 1/2	10			Yes	
2	2 1/4	12	2	12	Yes	
2	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/2	12			Yes	
3 & 4	2 1/2	10			Yes	
3 & 4	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/4	12	2	12	Yes	
3 & 4	2 1/2	10	2 3/16	10	Yes	

B - The $2\frac{1}{2}$", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.

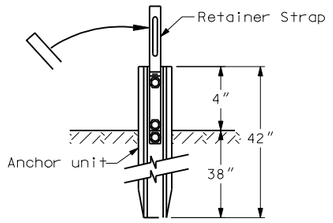
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-21-02	
REVISIONS	
DATE	CHANGE
12-01-04	PE stamp added

This document was originally issued and sealed by MARK S GAYDOS, Registration Number PE-4518, on 12/01/04 and the original document is stored at the North Dakota Department of Transportation

BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

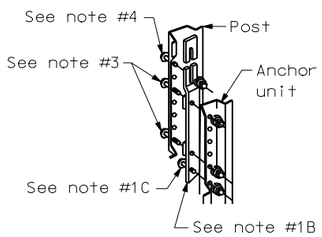
FLANGED CHANNEL



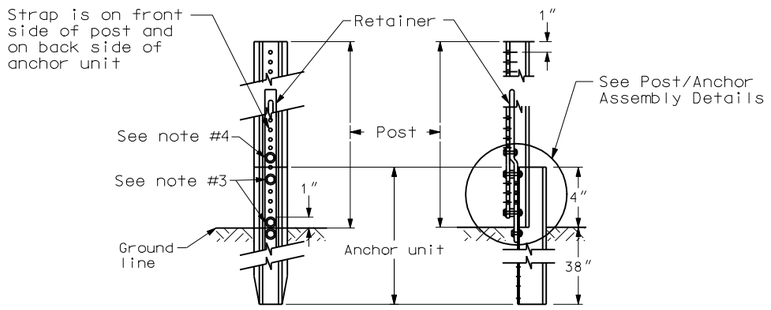
Anchor Unit &
Strap Assembly Detail

STEPS OF INSTALLATION

1. A) Drive anchor unit to within 12″ of ground level.
   B) Proper assembly established by lining up the top 3/4″ slot of retainer spacer strap with top hole of anchor unit.
   C) Assemble strap to back of anchor unit using 3/8″-16 UNC x 2.0″ long bolt, lock washer and nut.
   D) Rotate strap 90° to left.
2. A) Drive anchor unit to 4″ dimension.
   B) Rotate strap to vertical position.
3. A) Place 3/8″-16 UNC x 2″ bolt, lock washer & nut in bottom of sign post to facilitate alignment of sign post with proper hole in anchor unit (this coincides with the bottom 3/4″ slot in the strap).
   B) Alternately tighten two connector bolts.
4. A) Complete assembly by tightening 3/8″-16 UNC x 2″ long retainer bolt (this fastens sign post to retainer spacer strap).
5. The base post, strap & sign post shall be properly nested. Proper nesting occurs when all flat surfaces of the base post, strap and sign post at the bolts have full contact across the entire width.

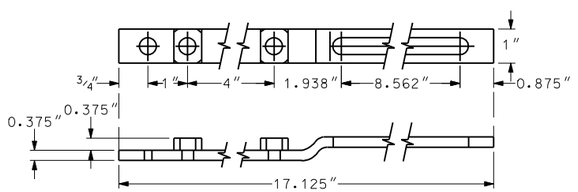


Post/Anchor
Assembly Details



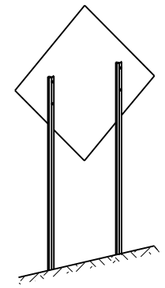
Front View Side View

Sign Post Assembly Detail

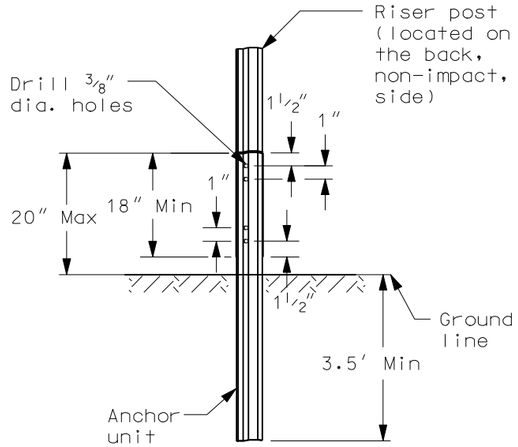


Retainer/Spacer Strap Detail

CHANNEL SIZE IN.	WALL THICKNESS IN.	WEIGHT PER FOOT LBS.	MOMENT OF INERTIA IN.4	CROSS SECT. AREA IN. SQ.	SECTION MODULUS IN.3
1.516 x 3.125"	.116	2.00	.179	.590	.225
1.532 x 3.125"	.124	2.25	.201	.648	.254
1.562 x 3.125"	.132	2.50	.233	.748	.289
1.578 x 3.125"	.140	2.75	.271	.819	.329
1.750 x 3.500"	.150	3.00	.372	.918	.403
1.750 x 3.500"	.175	4.00	.500	1.190	.560



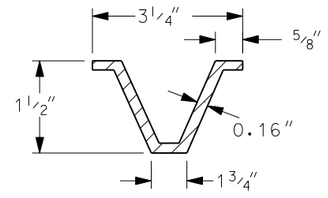
Typical
Installation



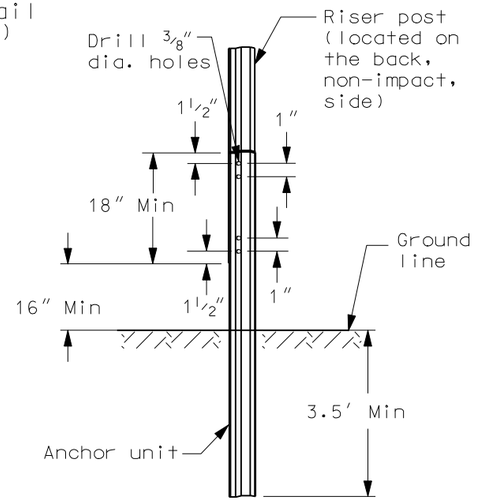
U-Channel Splice
Option 1

3 LB/FT U POSTS

Notes
1. Use 3 lb/ft riser anchor units and risers
2. Driven riser posts shall be at least 7′ long and embedded at least 3.5′.
3. A splice shall overlap a minimum of 18″.
4. Use 4 bolts 5/16″ diameter with washers and nuts. Two at top and two at bottom of splice.
5. Anchor unit for guy wires shall be no more than 4″ above ground and embedded at least 3.5′.



U-Post Detail
(3 lb/ft)



U-Channel Splice
Option 2

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-28-93	
REVISIONS	
DATE	CHANGE
03-07-01	Revised U-post details
11-21-02	Deleted perforated tube
05-08-03	Revised U-Channel splice
12-01-04	PE stamp added
06-29-05	Revised flanged channel note

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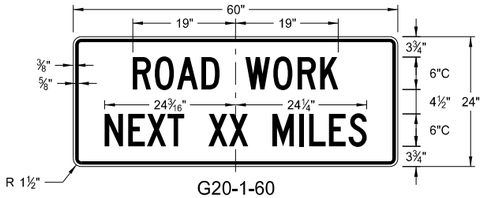
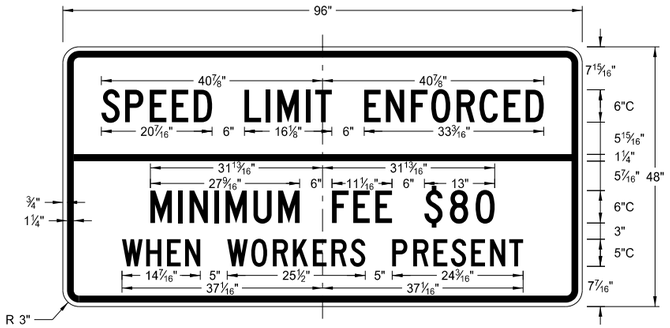
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



G20-1-60
Legend: black (non-refl)
Background: orange

G20-4b-36
Legend: black (non-refl)
Background; orange



G20-55-96
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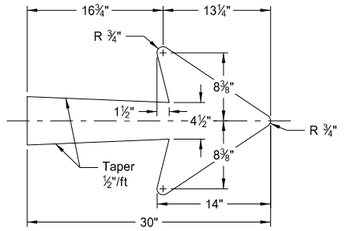
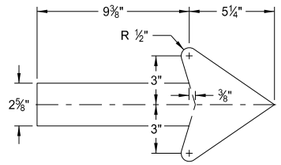
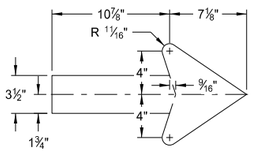
Background: orange



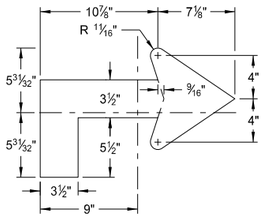
E5-1-48



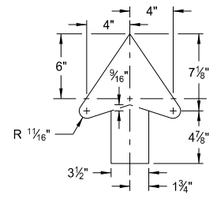
G20-50a-72
G20-52a-72



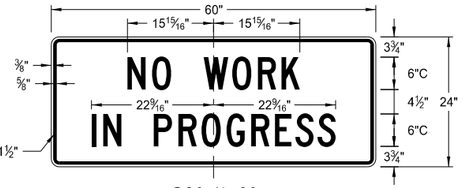
M4-9(L or R)-30
Right or Left



M4-9(L or R)-30
Advanced Right or Left



M4-9-30
Straight



G20-1b-60
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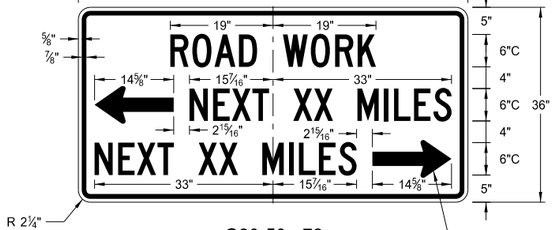
Background: orange



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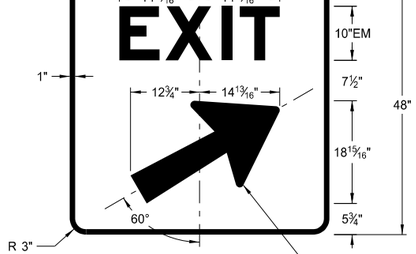
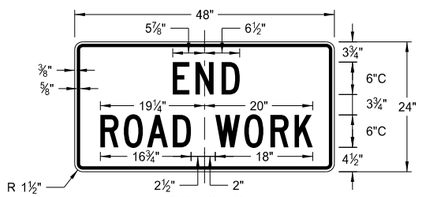
Background: orange



E5-1(L or R)-48
Legend: white
Background: green



G20-2-48
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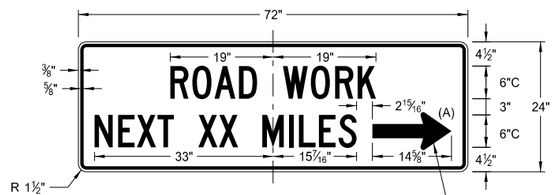
Background: orange



G20-52a-72
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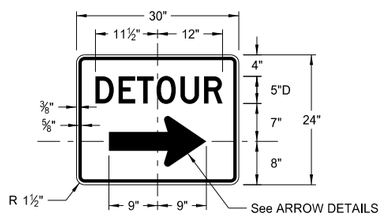
Background: orange



M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange

ARROW DETAILS

NOTES:

(A) Arrow may be right or left of the legend to indicate construction to the right or left.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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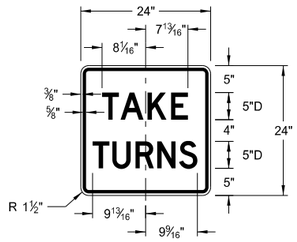
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



R1-50-24
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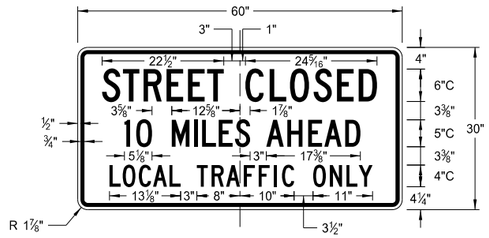
Background: white



R11-3c-60
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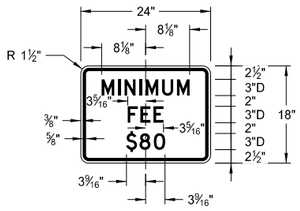

R2-1a-24
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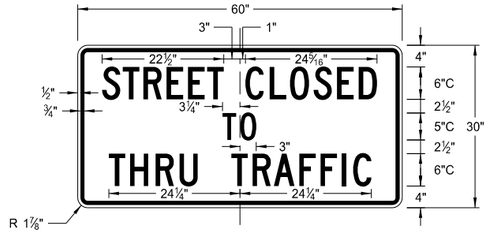

R11-4a-60
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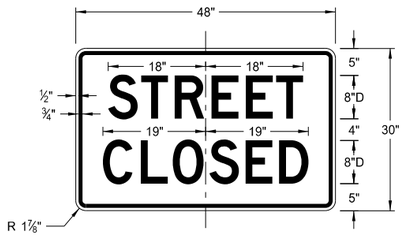

R11-2a-48
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Background: white

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8-13-13	
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DATE	CHANGE

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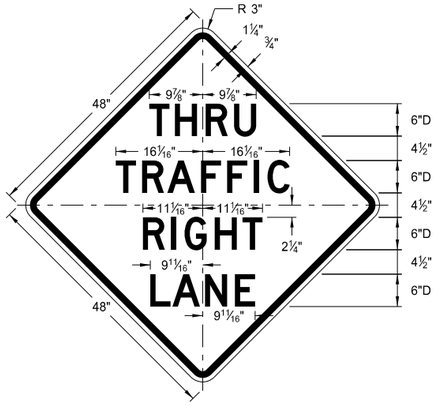
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



W5-8-48
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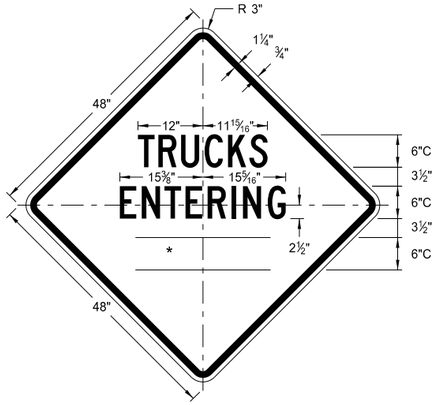
Background: orange



W8-54-48
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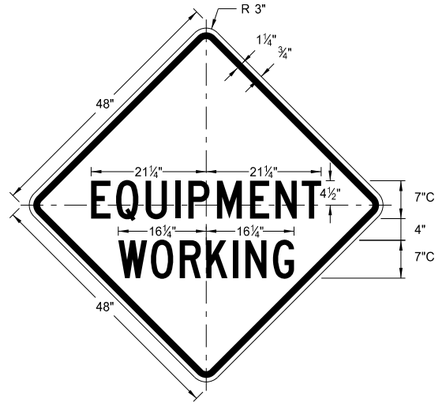
Background: orange



W20-51-48
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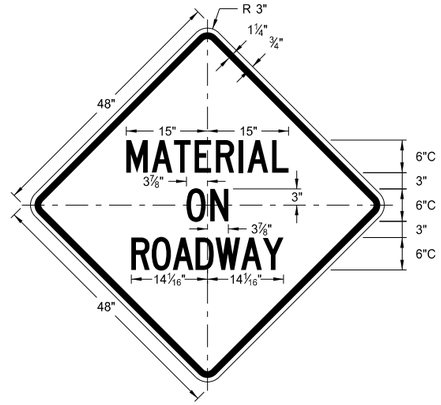
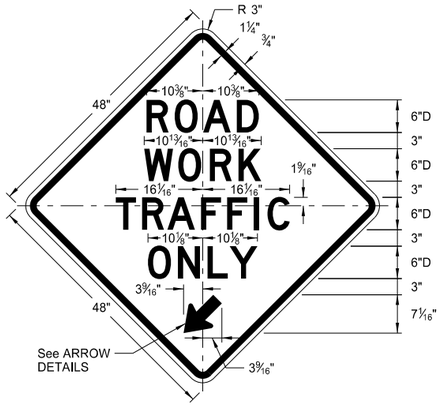
Background: orange



W21-51-48
Legend: black (non-refl)
Background: orange

WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

* DISTANCE MESSAGES



W5-9-48
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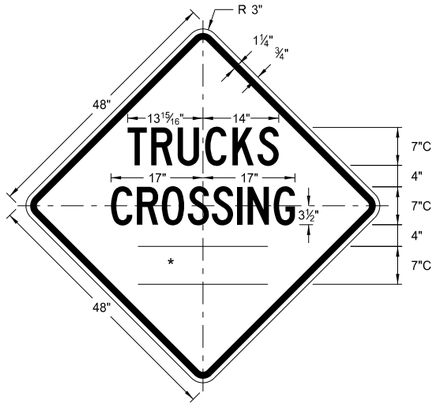
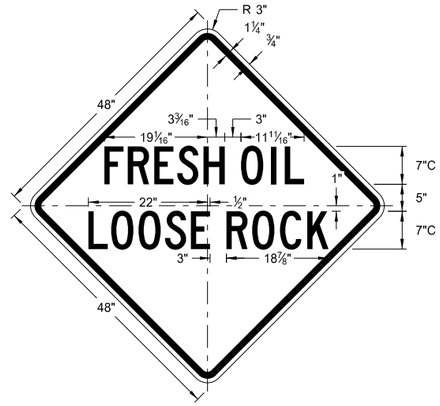


W8-55-48
Legend: black (non-refl)
Background: orange

W20-52-54
Legend: black (non-refl)
Background: orange



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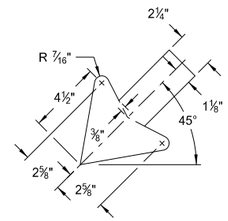
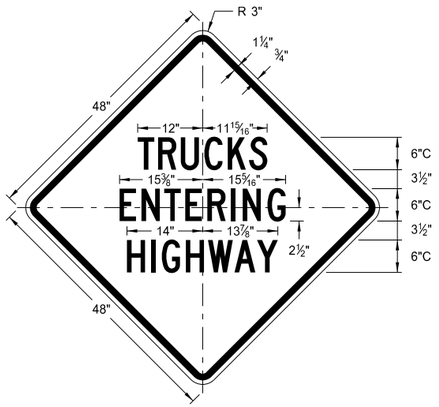


W5-9-48

ARROW DETAILS



W8-53-48
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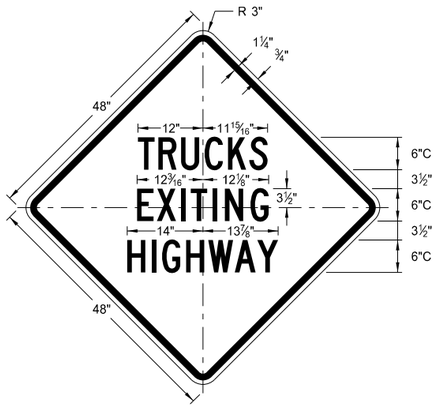

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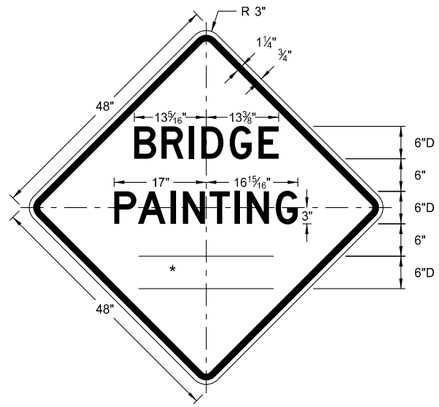

W21-50-48
Legend: black (non-refl)
Background: orange

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
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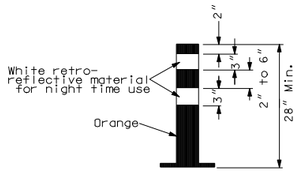
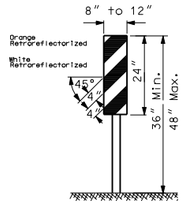
BARRICADE DETAILS AND CHANNELIZING DEVICES



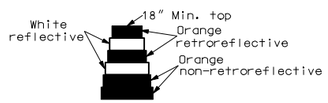
TUBULAR MARKER



VERTICAL PANEL

(Retroreflective sheeting shall be placed on both sides)

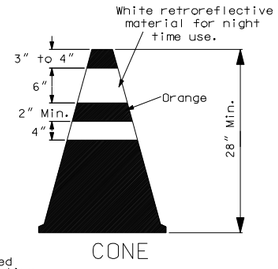
NOTE: Vertical panels used on the expressways or other high speed roadways shall be 12" by 24"



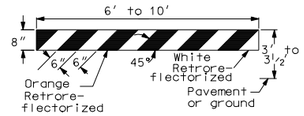
DELINEATOR DRUM

36" Min. height

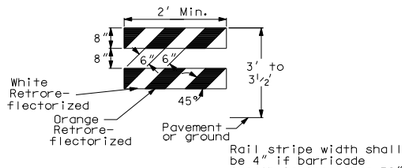
The markings on drums shall be orange and white stripes 4 to 6 inches wide. There shall be at least two orange and two white stripes. Where drums have ribs or indentations, there shall be no retroreflectorized sheeting in this area. This space shall be no more than 2 inches wide. The drum surface shall be prepared as recommended by the sheeting manufacturer before retro reflective sheeting is applied



CONE

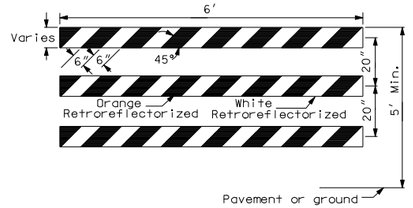


TYPE I BARRICADE



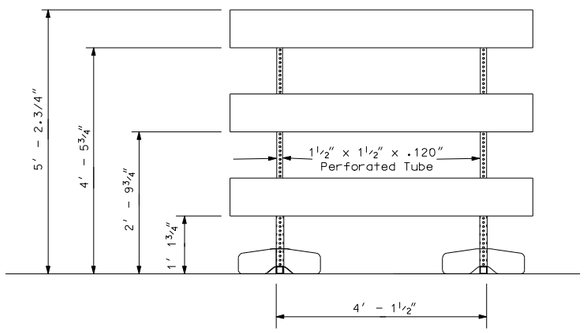
TYPE II BARRICADE

Rail stripe width shall be 4" if barricade length is less than 36".

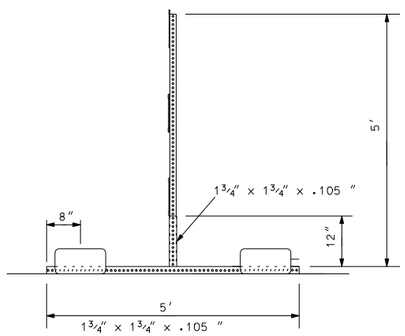


TYPE III BARRICADE

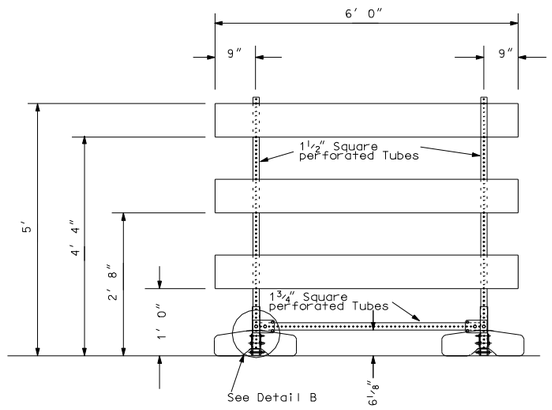
BARRICADES:
Number of retroreflectorized rail faces:
Type I - 2 (One each direction)
Type II - 4 (Two each direction)
Type III- 6 (Three in each direction)

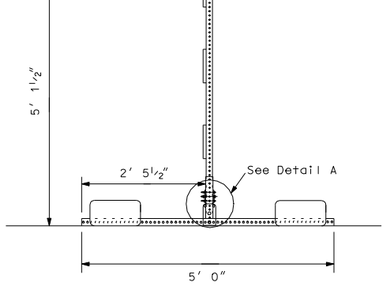


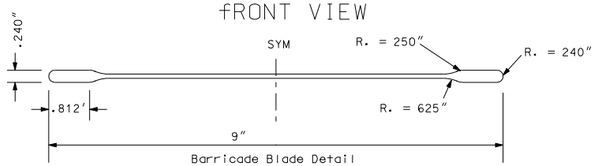
FRONT VIEW



END VIEW







Barricade Blade Detail

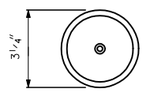
Ballast = 45lb sandbag at the end of each leg.

Barricade blade fastened to vertical supports with 2" corner bolts.

Vertical potion of leg is welded to horizontal portion on all four sides.

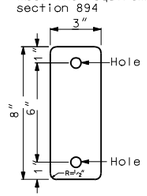
Masts slide inside vertical portion of legs. No bolts or fastenings devices used.

BARRICADE ASSEMBLY DETAIL
(Use when aluminum blade as detailed above)



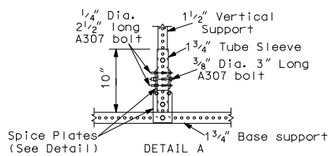
ACRYLIC PLASTIC REFLECTOR

Delineator reflector shall meet the requirements of section 894

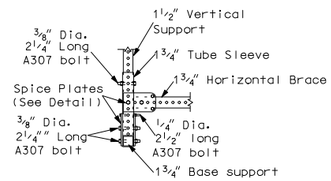


DELINEATOR REFLECTOR

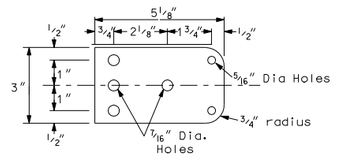
3"x8"- 18 Gauge galvanized steel sheet or 0.080" aluminum plate with white retroreflective sheeting (Type 3A or 3B) as specified in section 894 of the Standard Specifications.



DETAIL A



DETAIL B



SPLICE PLATE

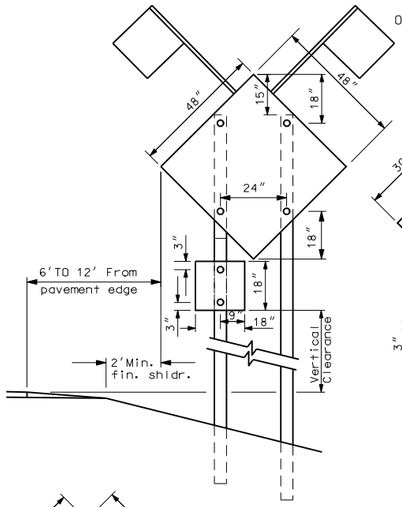
BARRICADE ASSEMBLY DETAIL
(Use when Plastic I-Beam w/ 1½" Hollow Core Flanges or 1" x 8" x72" wood boards.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
08-03-87	Type sheeting
10-01-87	Delineator drum note
06-08-88	Barricade type III
06-01-92	General revision
06-10-93	General revision
09-23-93	Vertical panel
06-09-95	Reflective sheeting
03-01-02	Barricade type III assembly details
04-01-02	Type III barricade
12-01-04	PE stamp added
06-29-05	Revised Type II barricade stripe

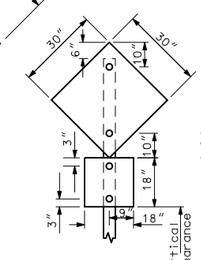
This document was originally issued and sealed by MARK S GAYDOS Registration Number PE-4518, on 06/29/05 and the original document is stored at the North Dakota Department of Transportation

D-704-14

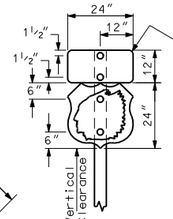
CONSTRUCTION SIGN AND BARRICADE ASSEMBLY DETAILS



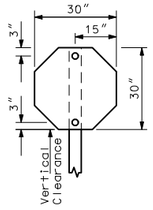
POST MOUNTING
48"x48" Signs



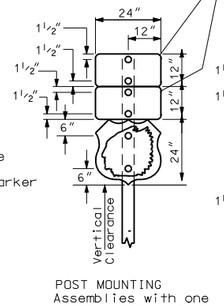
POST MOUNTING
30"x30" Signs



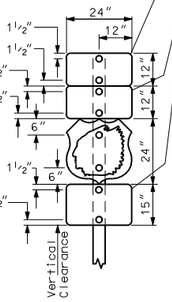
POST MOUNTING
Assemblies with one cardinal direction sign & one route marker



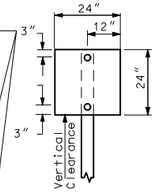
POST MOUNTING
Sign R1-1-30



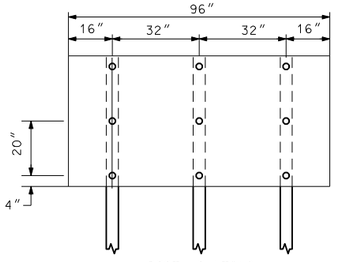
POST MOUNTING
Assemblies with one cardinal direction sign, one detour sign & one route marker



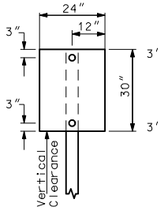
POST MOUNTING
Assemblies with one cardinal direction sign, one detour sign, one route marker & one directional arrow.



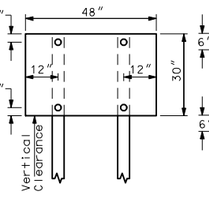
POST MOUNTING
24"x24" Signs



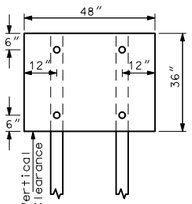
POST MOUNTING
48"x96" Signs



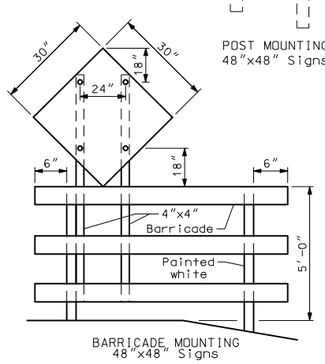
POST MOUNTING
24"x30" Signs



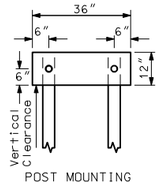
POST MOUNTING
48"x30" Signs



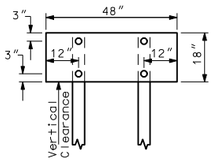
POST MOUNTING
48"x36" Signs



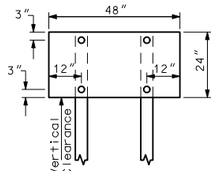
BARRICADE MOUNTING
48"x48" Signs



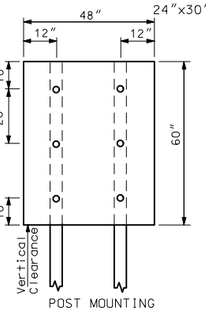
POST MOUNTING
36"x12" Signs



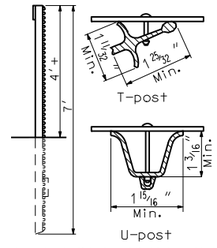
POST MOUNTING
48"x18" Signs



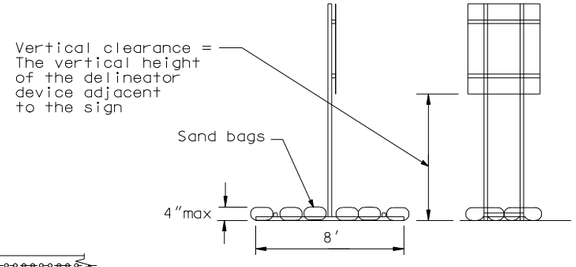
POST MOUNTING
48"x24" Signs



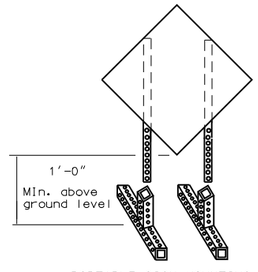
POST MOUNTING
48"x60" Signs



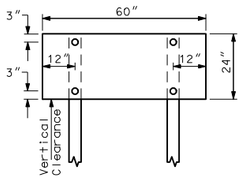
DELINEATOR ATTACHMENT AND POST MOUNTING DETAILS



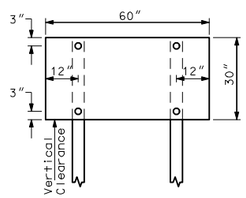
SKID MOUNTED SIGNS



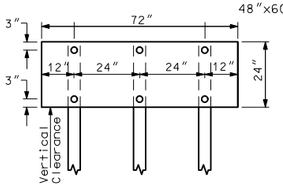
PORTABLE SIGN MOUNTING



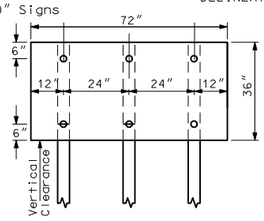
POST MOUNTING
60"x24" Signs



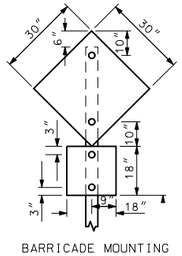
POST MOUNTING
60"x30" Signs



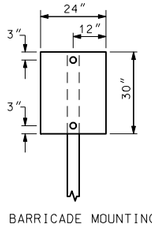
POST MOUNTING
72"x24" Signs



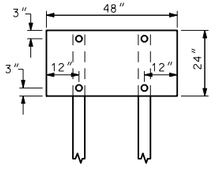
POST MOUNTING
72"x36" Signs



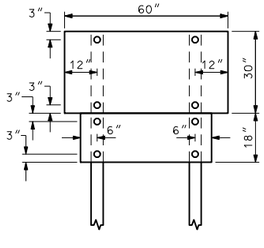
BARRICADE MOUNTING
30"x30" Signs



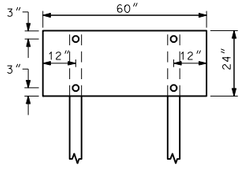
BARRICADE MOUNTING
24"x30" Signs



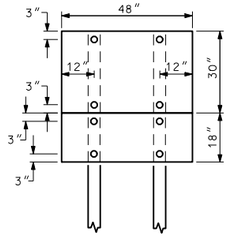
BARRICADE MOUNTING
48"x24" Signs



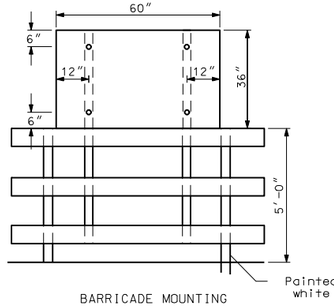
BARRICADE MOUNTING
60"x30" & 48"x18" Signs



BARRICADE MOUNTING
60"x24" Signs



BARRICADE MOUNTING
48"x30" & 48"x18" Signs



BARRICADE MOUNTING
G20-1-60 Signs

NOTES:

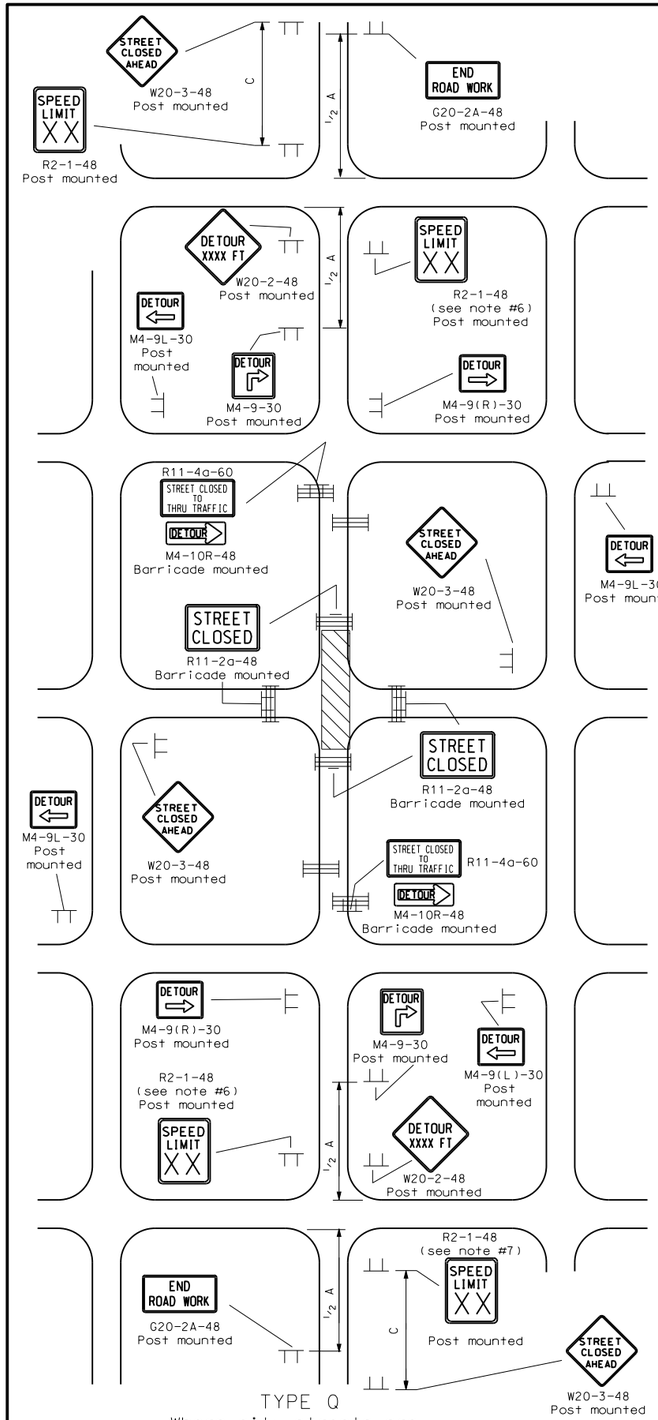
1. Barricade and Sign Supports: Wooden supports shall be painted white. Steel supports shall be galvanized or painted.
2. Barricade Mounting Signs: The bottom of the sign shall be flush with the top of the top rail. Wood sign posts shall be 4"x4" min. SFS or equivalent steel posts. All barricades and barricade mounted signs shall be assembled with 3/8" bolts.
3. Sign Supports: Sign supports shall be 4"x4" min. SFS or equivalent steel post. The anchor for steel supports shall have a stub height of 4" or less. Wood posts more than 4"x4" shall be breakaway. Sign supports shall be imbedded to a sufficient depth so that signs will remain plumb throughout duration of project. It is suggested that wood posts have a min. depth of embedment of 5' and steel posts be embedded a min. 3'-6".
   Material: All signs shall be 0.100" aluminum, 12 gauge steel, 1/2" plywood or other approved material.
   Holes: All holes to be punched round for 3/8" bolts.
4. Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate without a border and this plate installed and removed as required.
5. Advance Warning Flashing or Sequencing Arrow Panels: The minimum mounting height shall be 7 feet above the roadway to the bottom of the panel, except on vehicle mounted panels which shall be as high as practicable.
6. Delineator Posts: Typical fence post sections are shown in Attachment Details. Other types of metal fence posts may be substituted upon approval of the engineer. These substituted posts shall have reflectors attached similar to the ones shown.
7. Route Marker Auxiliary Signs: The route marker auxiliary signs such as the cardinal direction and directional arrows shall have background colors the same as the route marker they are used with (Interstate route markers, blue background, US and State route markers, white background, Interstate Business loop and spur, green background, and County route markers, blue background).
8. Vertical Clearance: Post mounted signs placed in rural areas shall have a vertical clearance of at least 5 feet measured from the bottom of the sign to the near edge of the driving lane. In business, commercial and residential districts where parking and/or pedestrian movement is likely to occur or where other obstructions to view, the distance between the bottom of the sign to the near edge of the driving lane shall be at least 7 feet. The height to the bottom of secondary signs mounted below another sign may be 1 foot less than the appropriate height specified. Large signs having an area exceeding 50 square feet that are installed on multiple breakaway posts shall be mounted a minimum of 7 feet above the ground.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
08-01-88	Sign assembly
05-01-92	Sign assembly
03-30-93	Sign supports note
03-04-96	Sign height
08-15-96	Note 8
07-10-97	Note revision
07-31-98	Note & portable sign
10-01-99	Skid mounted sign
02-07-03	Vertical clearance note
11-30-04	Third post added to some signs
12-01-04	PE stamp added

This document was originally issued and sealed by MARK S GAYDOS, Registration Number PE-4518, on 12/01/04 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

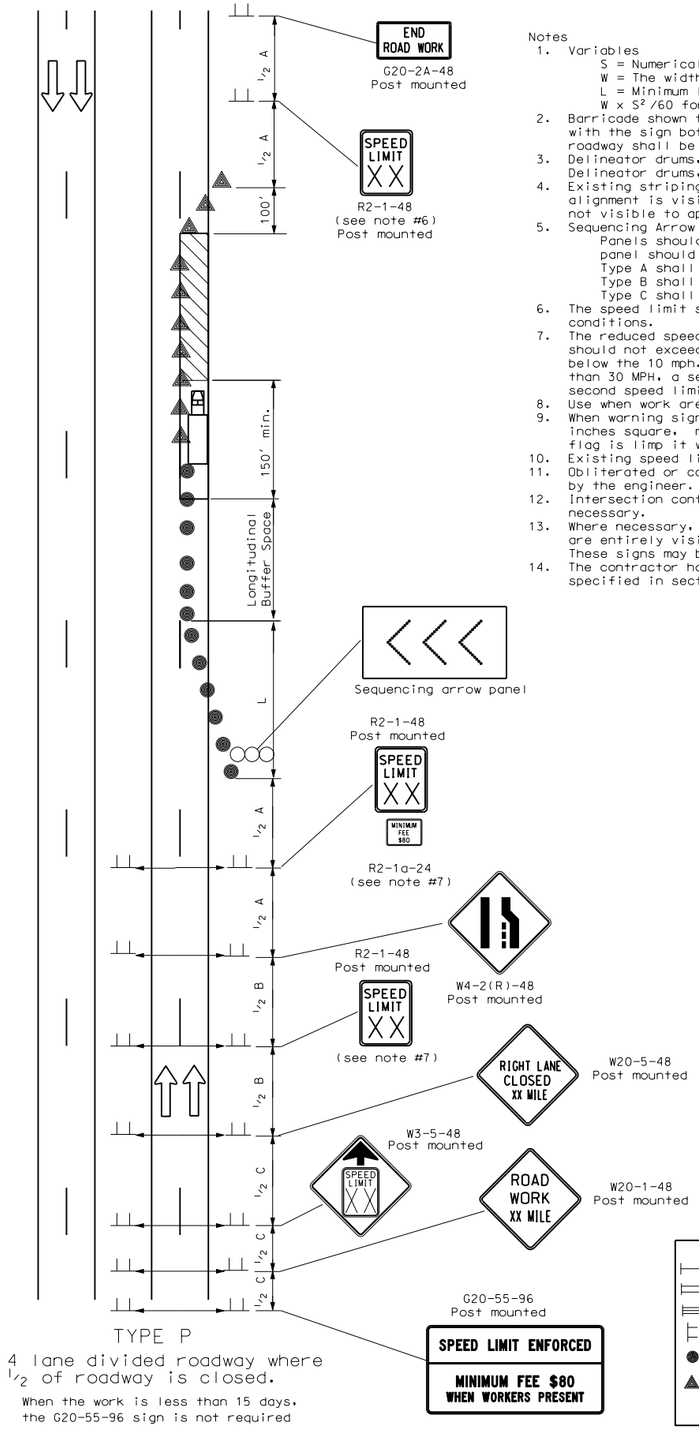
D-704-23



TYPE Q

Where city streets are used for detouring traffic

Urban projects do not need the G20-55-96 and R2-1a-24 signs.



TYPE P

4 lane divided roadway where ½ of roadway is closed.

When the work is less than 15 days, the G20-55-96 sign is not required

Notes

1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of taper
   L = Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x $S^2/60$ for urban, residential, and other streets with speeds of 40 mph or less.
2. Barricade shown to be placed on roadway shall be on a moveable assembly. Sign to be mounted on barricades shall be mounted with the sign bottom on the top of the top barricade bar. signs shown to be placed on the roadway shall be placed on skid mounted assemblies.
3. Delineator drums, or cones used for tapering traffic shall be spaced at dimension "S". Delineator drums, or cones used for tangents shall be spaced at 2 times "S".
4. Existing striping shall be removed as required. Delineator will only be used when inslope is 4:1 or better and roadway alignment is visible to approaching vehicles. Vertical panels shall be used where roadways has steep slopes and not visible to approaching vehicles. Delineators and vertical panels shall be installed back to back.
5. Sequencing Arrow Panels
   Panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room the panel should be moved closer to the work area so that it can be placed on the roadway surface.
   Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph and 750 ADT or less).
   Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph 5000 ADT or less)
   Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph and 5000 ADT).
6. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
7. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at ½ B.
8. Use when work area is 1 mile or longer.
9. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
10. Existing speed limit signs within a reduced speed zone shall be covered.
11. Obliterated or covered payment marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
12. Intersection control for Type Q may have to be changed on detour. The Engineer in the field shall determine what control is necessary.
13. Where necessary, safe speed to be determined by the Engineer. When parking is present, signs shall be placed so they are entirely visible above parked vehicles or placed at the edge of the parking area so they are visible to oncoming traffic. These signs may be skid mounted when placed on the roadway surface.
14. The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings as specified in section 704.03 C.

Longitudinal Buffer Space	
Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

KEY

Type I barricade	Work area
Type II barricade	Flagger
Type III barricade	Sequencing arrow panel
Sign	Type A delineator or vertical panels back to back
Delineator drum	
Cones	

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

10-1-86

REVISIONS

DATE	CHANGE
09-03-96	70 MPH
01-31-97	Sign spacing
10-01-99	General revisions
11-15-99	Add Taper Width to note
01-05-01	Revised note 3
07-19-02	Reversed End Road Work & Speed Limit Signs
07-25-03	Revised R2-1a and W20-1
04-01-04	Rev fee sign & warning & buffer spacing. Rev note 7
09-15-04	General revisions
12-01-04	PE Stamp added
06-29-05	Revised W4-2. Replaced R2-5a with W3-5. Rev. Adv. Warning Table. Rev. Note 7

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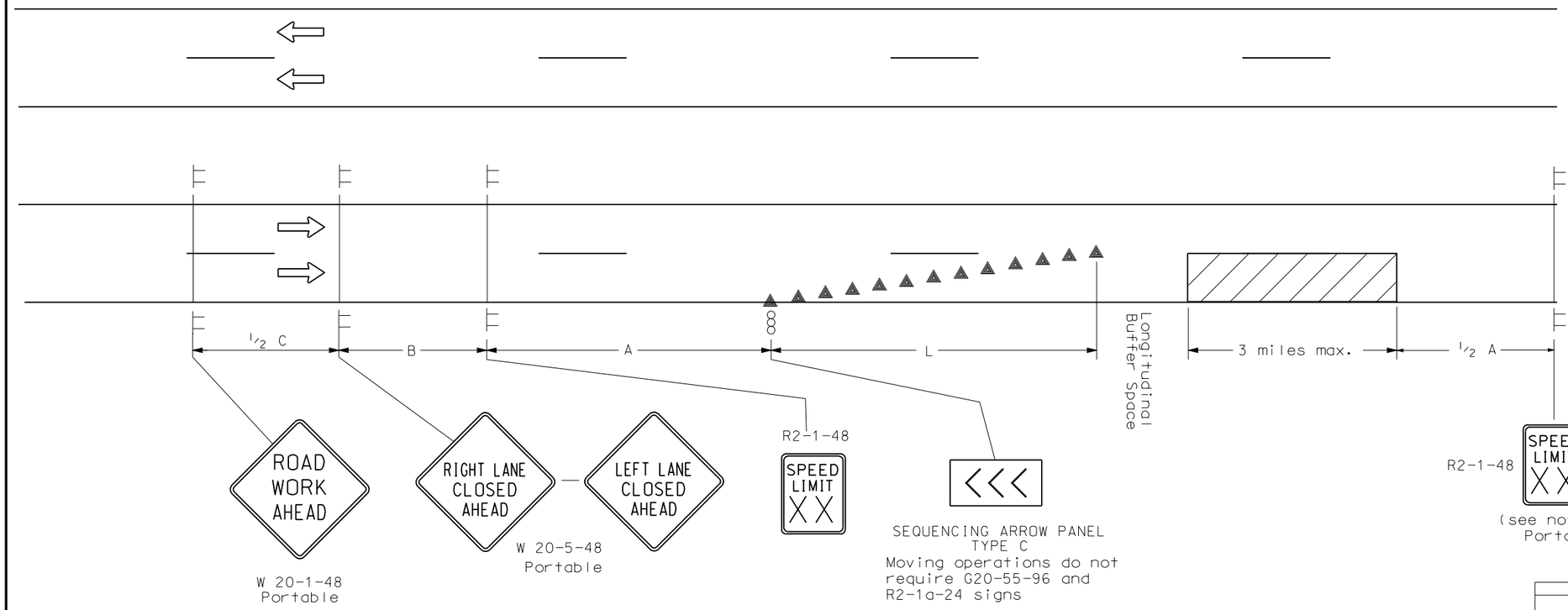
11/24/2008 1:02:45 PM R:\SUPPORT\DESSTD\D704-23.dgn

SIGN LAYOUT FOR ONE LANE CLOSURE DIVIDED HIGHWAY MOVING OPERATION

D-704-32



Longitudinal Buffer Space	
*Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

* Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.

ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

KEY

- Type I barricade
- Type II barricade
- Type III barricade
- Sign
- Delineator drum
- Cones
- Work area
- Flagger
- Sequencing arrow panel
- Type A delineator or vertical panels back to back

Notes

1. If the moving operation is not visible to the motorist from the end of the taper, an additional sequencing arrow panel should be provided near the work area placed in the closed lane.
2. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of the taper.
   L = Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or
   $W \times S^2/60$ for urban, residential, and other streets with speeds of 40 mph or less.
3. Cones used for tapering traffic shall be spaced at the dimension "S".
4. Sequencing Arrow Panels
   Panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room, the panel should be moved closer to the work area so that it can be placed on the roadway surface.
   Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph & 750 ADT or less).
   Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph and 5000 ADT or less).
   Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph and 5000 ADT).
5. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
6. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at ½ B.
7. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
8. Existing speed limit signs within a reduced speed zone shall be covered.
9. The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings as specified in section 704.03 C.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

08-01-92

REVISIONS

DATE	CHANGE
09-27-93	Arrow panel
06-20-95	Speed limit
05-28-96	Buffer space
08-15-96	Revise flag note
09-03-96	70 MPH
01-31-97	Sign spacing
10-01-99	General revisions
11-15-99	Add Taper Width to note
03-21-01	Revised note 3
07-05-01	Revised exiting A dim.
07-25-03	Revised W21-4 to W20-1
04-01-04	Revised warning and buffer spacing
12-01-04	PE Stamp added
06-29-05	Rev. Adv. Warning Table, Rev. Note 6

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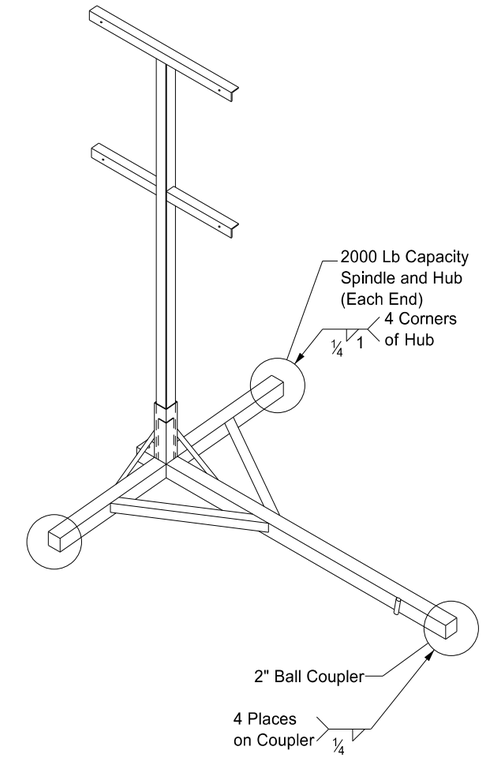
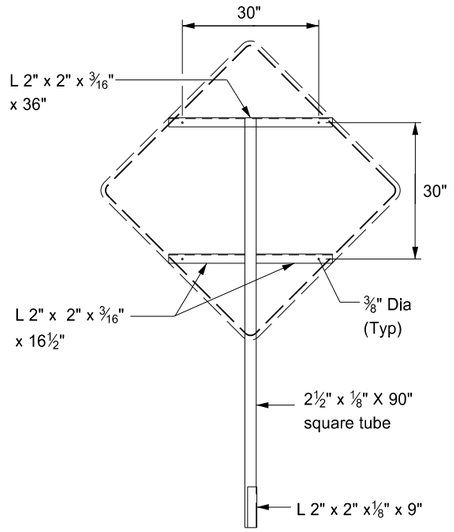
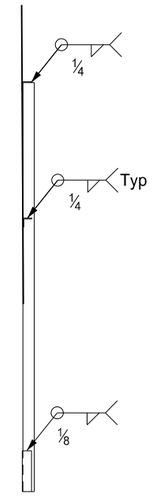
PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



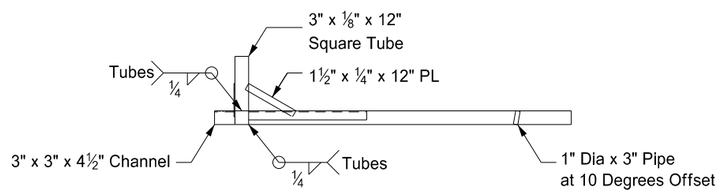


FRONT

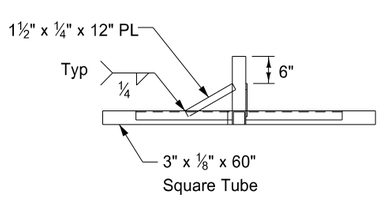


RIGHT

SIGN SUPPORT



FRONT



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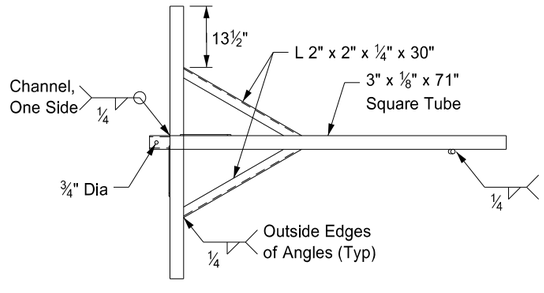


TOP

TRAILER

Notes:

1. The maximum weight of the assembly is 250 pounds.
2. Use a 14" wheel and tire.
3. Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
4. Other NCHRP 350 crash tested assemblies are acceptable.

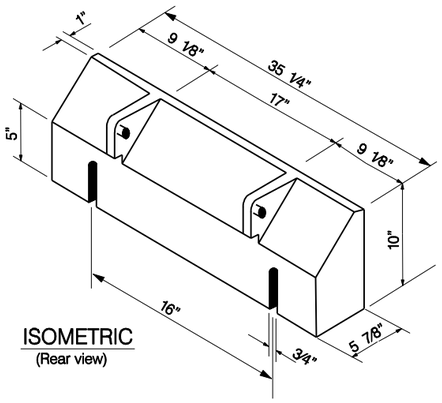
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 11/23/10 and the original document is stored at the North Dakota Department of Transportation

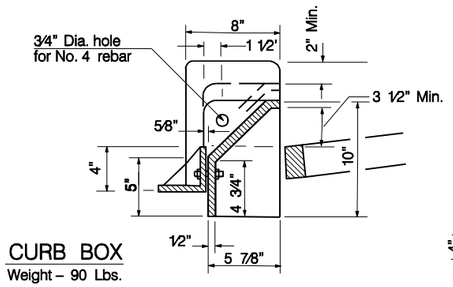
INLET – TYPE 2

D-722-2

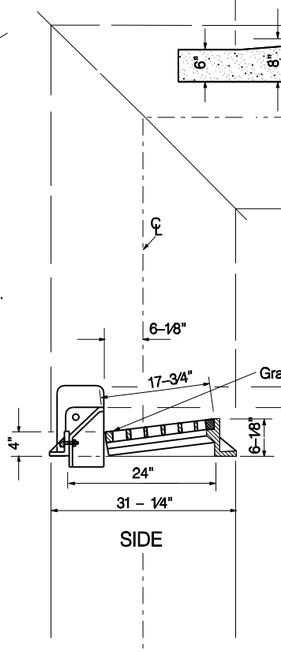
Pay Items
Inlet – Type 2 .....EA
Inlet – Type 2, Double.....EA



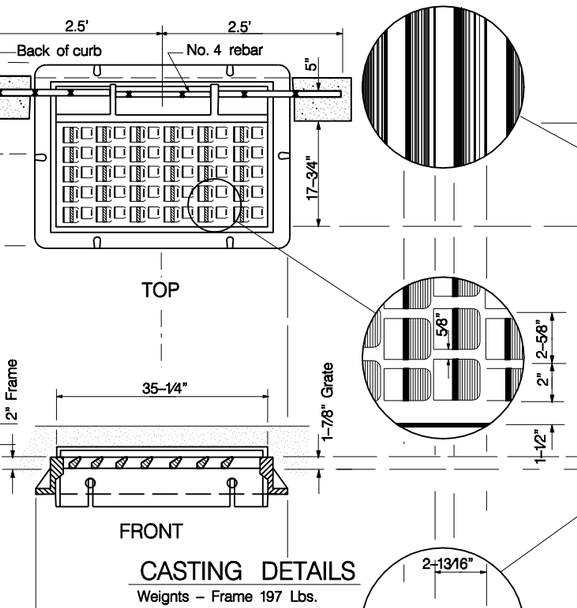
ISOMETRIC
(Rear view)



CURB BOX
Weight – 90 Lbs.



SIDE

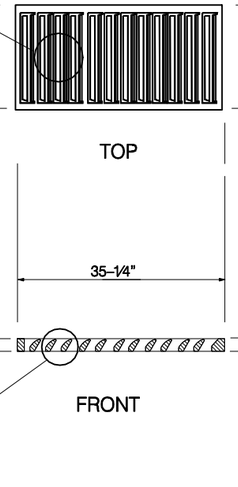


"L"

TOP

FRONT

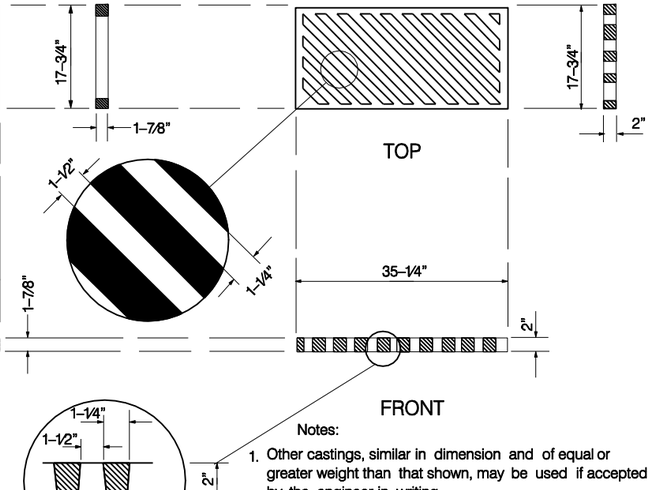
"V"



TOP

FRONT

"D"
(Waterway area – 1.9 Sq. Ft.)



TOP

FRONT

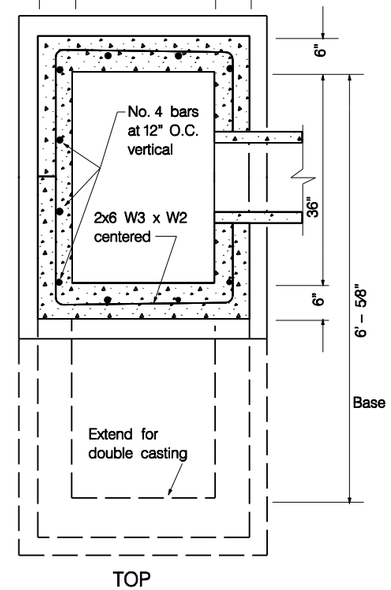
GRATE STYLES

CASTING DETAILS

Weignts – Frame 197 Lbs.
Grate 165 Lbs.

Notes:

1. Other castings, similar in dimension and of equal or greater weight than that shown, may be used if accepted by the engineer in writing.
   The grate style shall be as specified on the plans.
2. Metal used in the manufacture of castings shall conform to AASHTO M–105, Class 35B.
3. The contractor shall have the option of using precast or poured in place bases. Class of concrete shall be AE. The aggregate size shall be approved by the engineer in the field. Construction shall be in accordance with section 722.03 of the Standard Specifications.
4. Precast risers shall be constructed in accordance with AASHTO M199.
5. On projects with P.C.C. pavement all inlet risers or barrels shall be constructed 4 to 5 inches below final elevation and adjusted to final grade after the paving. Adjustment may be done with adjusting rings, masonry, or cast–in–place. All costs for this adjustment shall be included in the price bid for the inlet.



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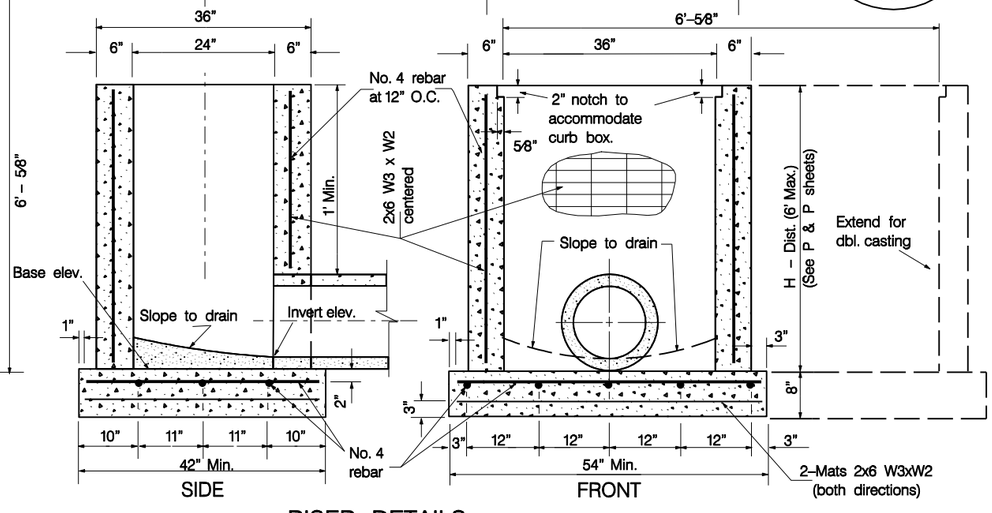
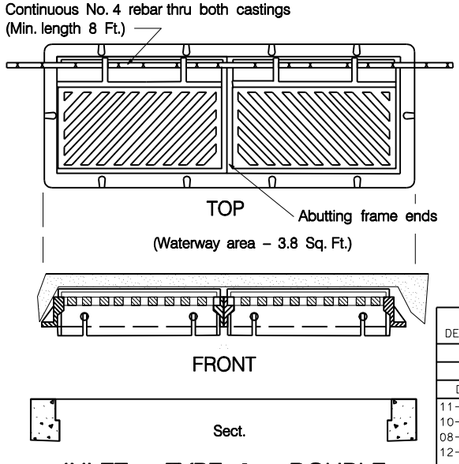


SIDE

FRONT

RISER DETAILS



TOP

(Waterway area – 3.8 Sq. Ft.)

FRONT

Sect.

INLET – TYPE 2 – DOUBLE

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-01-89	
REVISIONS	
DATE	CHANGE
11-01-90	Note 5 added
10-30-00	Added wire mesh
08-28-02	Revised pay item
12-01-04	PE Stamp added

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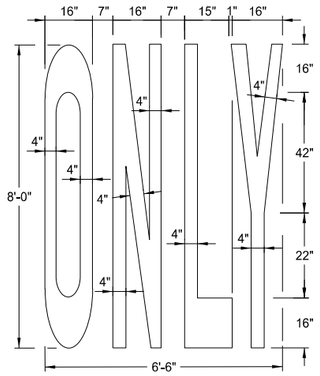
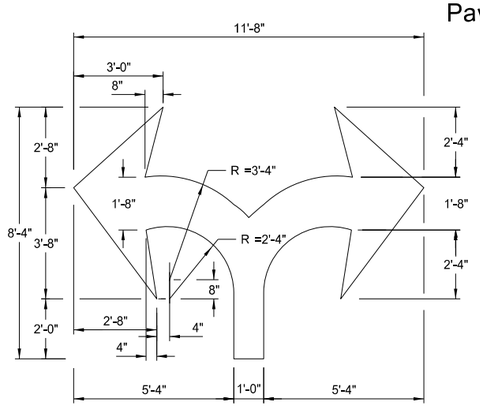
Pavement Marking Message Details

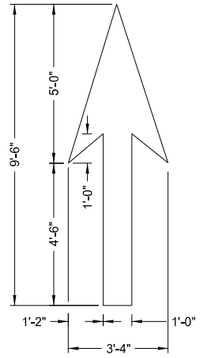
D-762-1



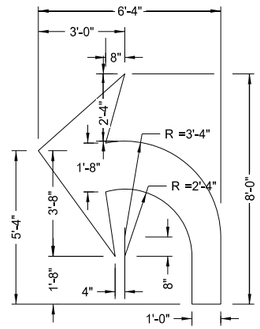
22 S. F.



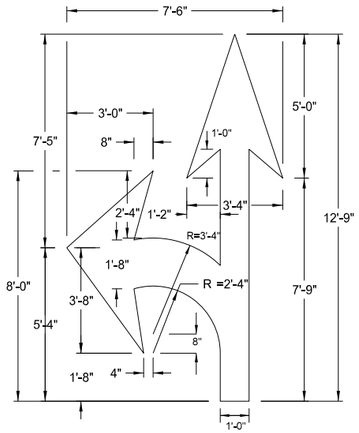
29 S. F.



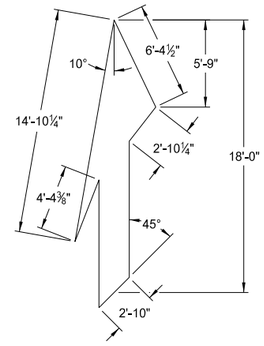
12 S. F.



16 S. F.

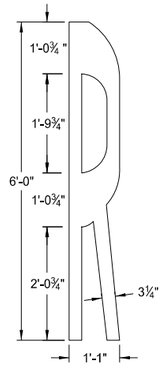


27 S. F.

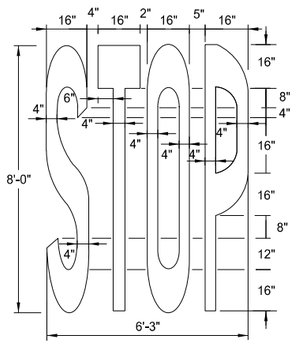


41 S. F.

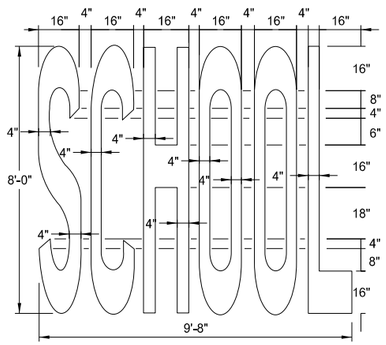
Note:
The merge arrow shall be rotated 20° from the edge of the roadway.



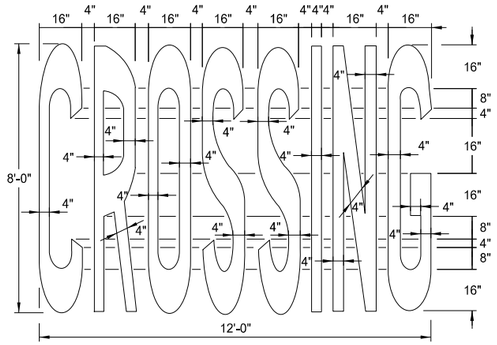
4 S. F.



22 S. F.



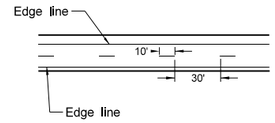
34.5 S. F.



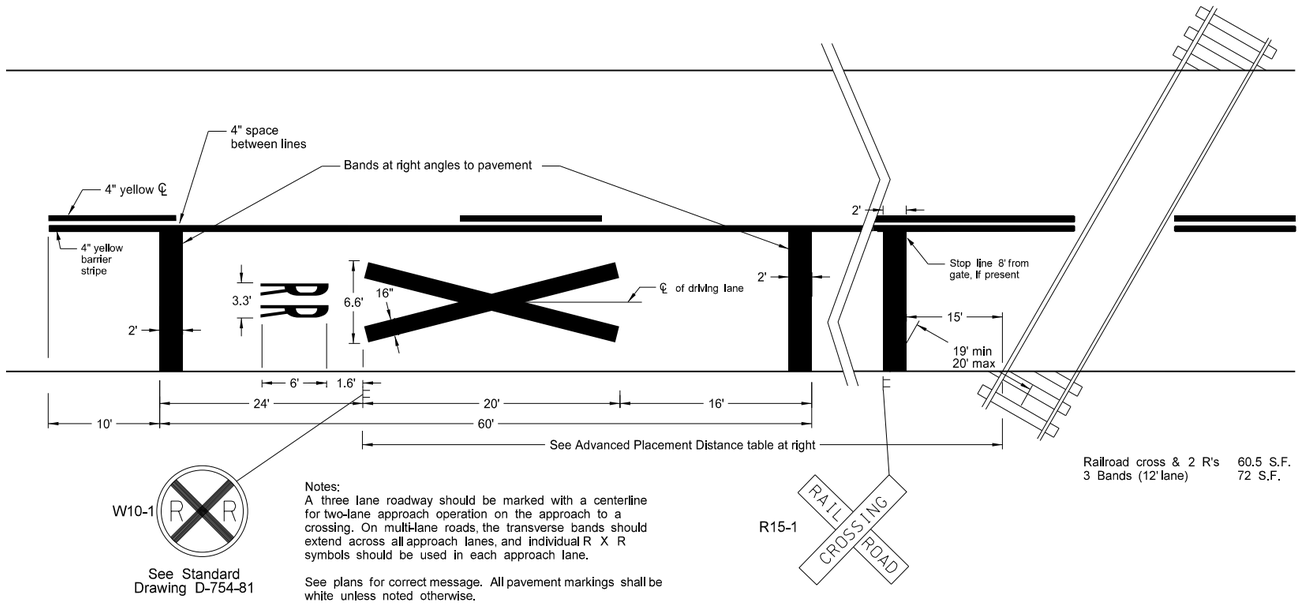
46 S. F.

Speed Limit	Chevron Width	Chevron Spacing 45° to Traffic
0-25 mph	8"	5'
30-40 mph	8"	15'
45 mph and above	12"	25'

Chevron Crosshatching Table



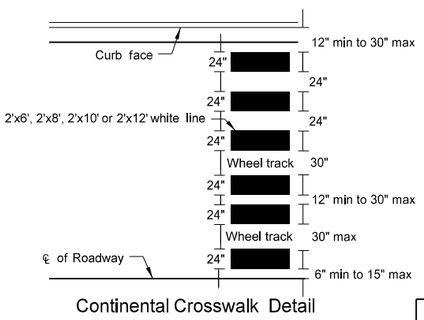
Centerline Pavement Marking Skip Spacing Detail



Railroad cross & 2 R's 60.5 S.F.
3 Bands (12' lane) 72 S.F.

Notes:
A three lane roadway should be marked with a centerline for two-lane approach operation on the approach to a crossing. On multi-lane roads, the transverse bands should extend across all approach lanes, and individual R X R symbols should be used in each approach lane.

See plans for correct message. All pavement markings shall be white unless noted otherwise.



Continental Crosswalk Detail

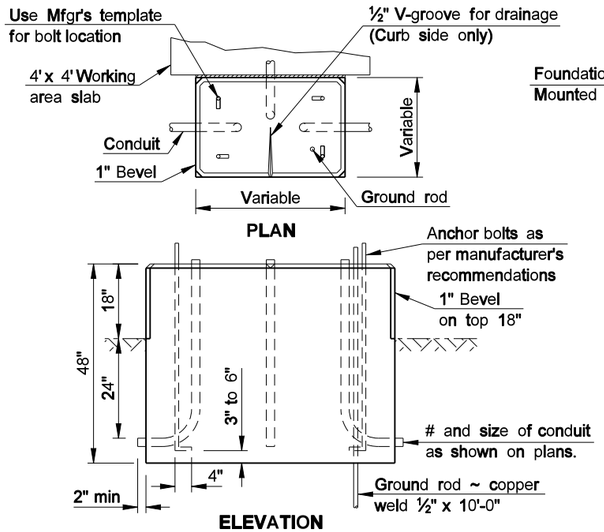
Advance Placement Distance for Railroad Warning Signs	
Posted or 85th Percentile Speed	Advance Distance
20 mph	min. 100 ft
25 mph	min. 100 ft
30 mph	min. 100 ft
35 mph	min. 100 ft
40 mph	125 ft
45 mph	175 ft
50 mph	250 ft
55 mph	325 ft
60 mph	400 ft
65 mph	475 ft
70 mph	550 ft

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-6-11	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 12/06/11 and the original document is stored at the North Dakota Department of Transportation

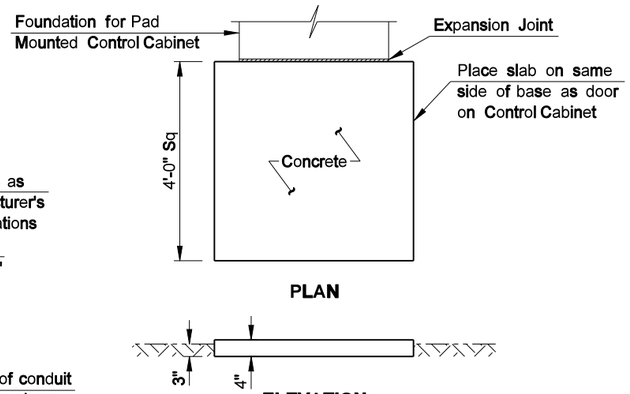
CONCRETE FOUNDATIONS
(TRAFFIC SIGNALS & HIGHWAY LIGHTING)

D-770-1



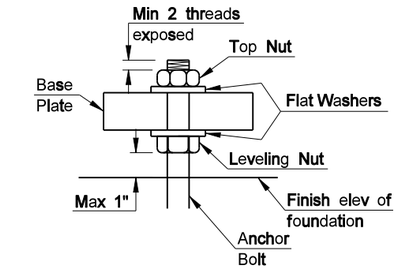
CONTROLLER CABINET FOUNDATION PAD MOUNT

The Controller Cabinet Foundation shall be bid as Concrete Foundation - Traffic Signals.

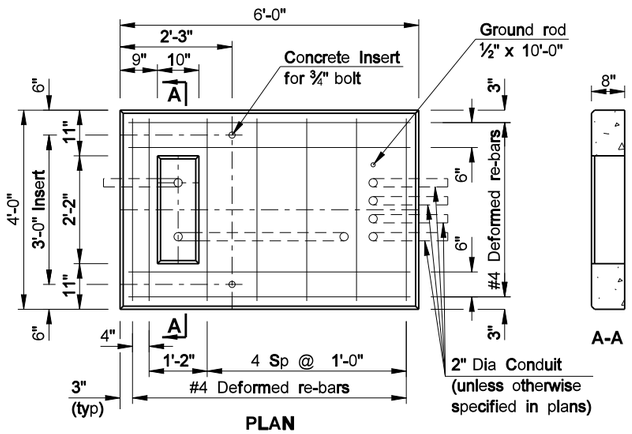


WORKING AREA SLAB

The Working Area Slab shall be installed where shown on the plans and shall not be bid separately but shall be included in the price bid for Concrete Foundation - Traffic Signals.

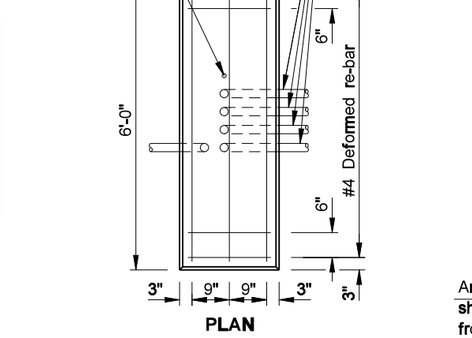


ANCHOR BOLT DETAIL



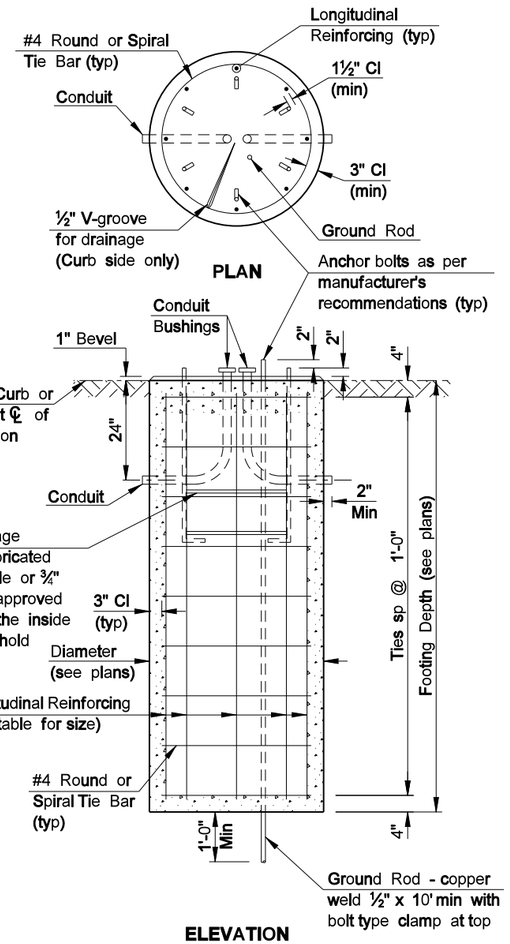
TRANSFORMER & FEED POINT CABINET FOUNDATION PAD MOUNT

The Transformer & Feed Point Cabinet Foundation Pad Mount shall be bid as Concrete Foundation ~ Feed Point ~ Type A.



FEED POINT CABINET FOUNDATION PAD MOUNT

The Feed Point Cabinet Foundation Pad Mount shall be bid as Concrete Foundation ~ Feed Point ~ Type B.



LIGHT & SIGNAL STANDARD FOUNDATION

NOTES:

LIGHT & SIGNAL STANDARD FOUNDATIONS: See plans for conduit size, number of bends and correct position for each foundation. When conduit does not continue beyond the foundation, conduit with a 105° bend and bushings on both ends may be substituted for the 90° bends shown. See plans for correct size & location of foundations. The grade and exact location shall be established by the Engineer in the field. All reinforcing shall be Grade 60. Tie bars shall have a minimum of a 12" lap. Reinforcing may be omitted for Type I, II, V, VI & VII signal standard foundations if the anchor bolts extend to within 3" to 6" above the bottom of the foundation. A minimum of 6 anchor bolts shall be used for cantilevered structures.

CONTROLLER CABINET FOUNDATION PAD MOUNT FOUNDATION: See plans for the number of 90° bends per foundation and correct positioning. The foundation for Pad Mounted Controller Cabinet shall be of sufficient size so that there is a minimum of 3" of clearance from the outside edge of cabinet to the outside edge of the foundation on any side. The contractor shall ensure a water-tight seal between the controler cabinet and the foundation by caulking, except for V-groove.

WORKING AREA SLAB: The materials and preparation of this slab shall be as approved by the Engineer in the field.

TRANSFORMER & FEED POINT CABINET FOUNDATION PAD MOUNTED: The foundation shall have a wood float finish. All conduits shown shall be installed. Conduit that is not used at this time shall be plugged with an expandable plug.

FEED POINT CABINET FOUNDATION PAD MOUNTED: The foundation shall have a wood float finish. All conduits shown shall be installed. Conduit that is not used at this time shall be plugged with an expandable plug.

LIGHT & SIGNAL FOUNDATION TABLE	
FOOTING DEPTH (ft)	LONGITUDINAL REINFORCING
≤ 12	8 - #5
13 - 14	8 - #6
15 - 16	8 - #7
17 - 19	8 - #8

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
6-15-10	
REVISIONS	
DATE	CHANGE

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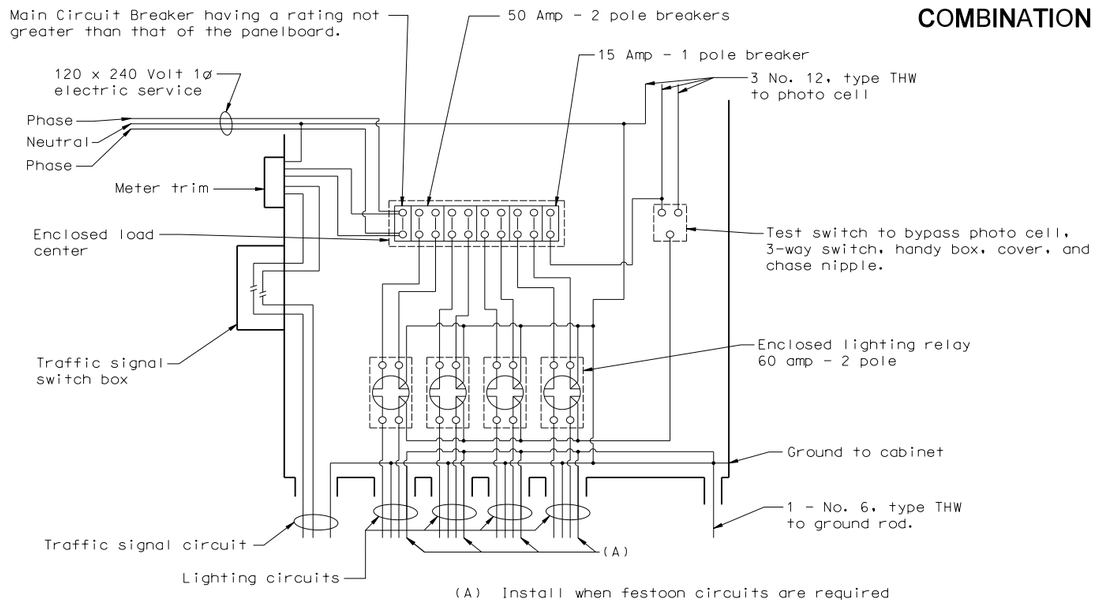
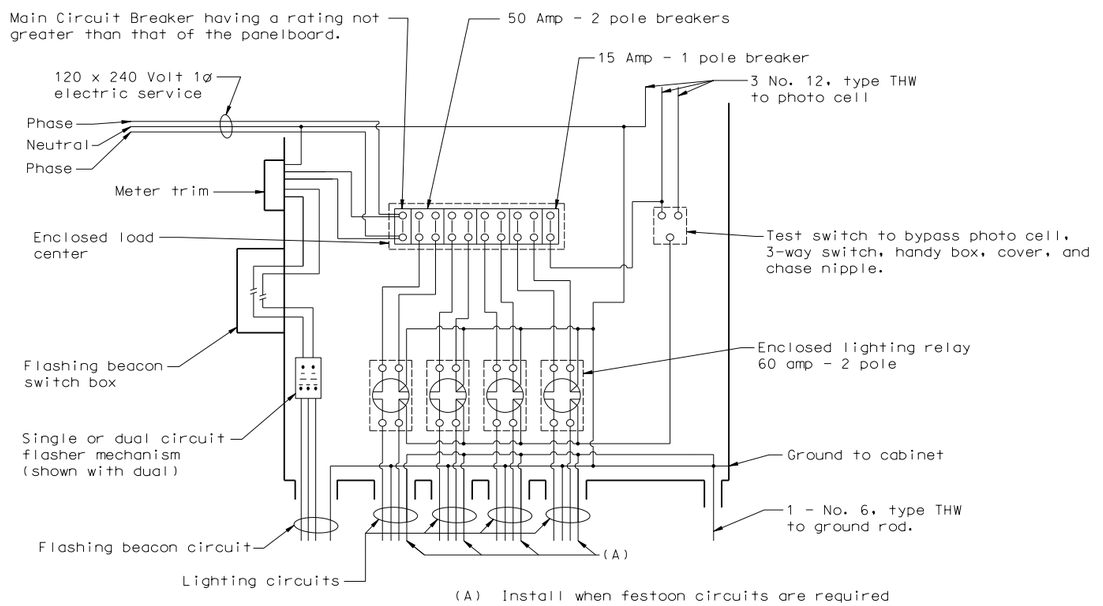
COMBINATION FEED POINT DETAILS

D-770-2A



(A) Install when festoon circuits are required

COMBINATION LIGHTING & SIGNAL
FEED POINT TYPE IV



(A) Install when festoon circuits are required

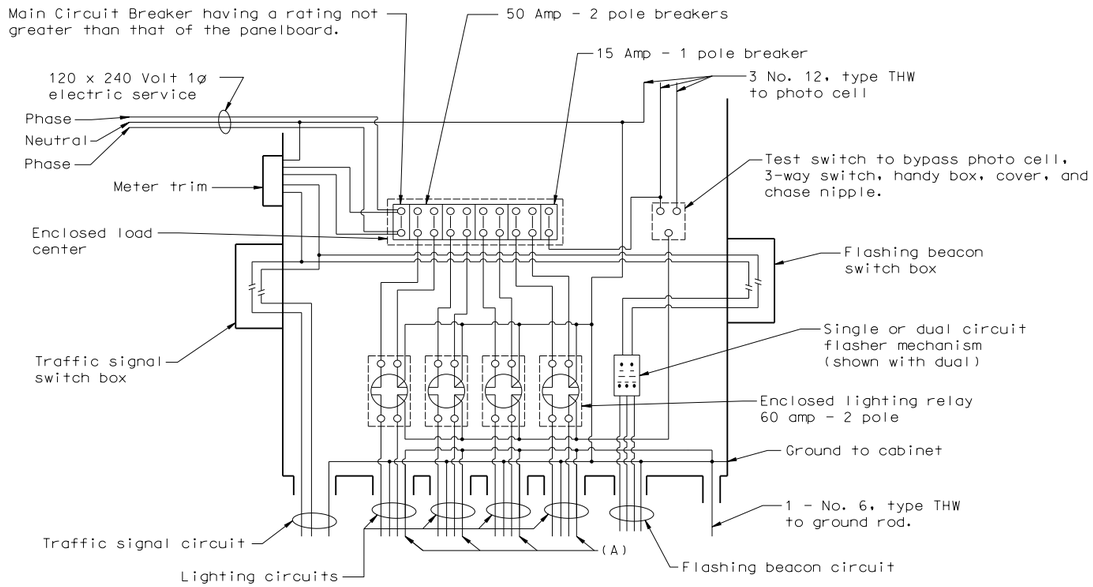
COMBINATION LIGHTING & FLASHING
BEACON FEED POINT TYPE IV

NOTES:

Type I feed point is similar to type IV except only one electrical circuit, one 50 amp - 2 pole breaker and one lighting relay, normally open, shall be installed.

Type II feed point is similar to type IV except only two electrical circuits, two 50 amp - 2 pole breakers and two lighting relays, normally open, shall be installed.

Type III feed point is similar to type IV except only three electrical circuits, three 50 amp - 2 pole breakers and three lighting relays, normally open, shall be installed.



(A) Install when festoon circuits are required

COMBINATION LIGHTING, SIGNAL, & FLASHING
BEACON FEED POINT TYPE IV

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-17-99	
REVISIONS	
DATE	CHANGE
12-01-04	PE Stamp added

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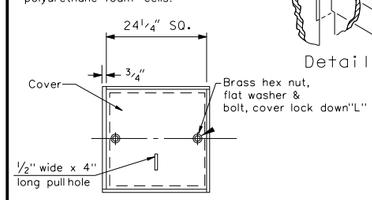
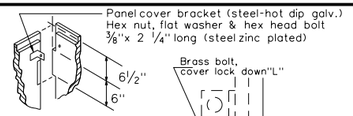
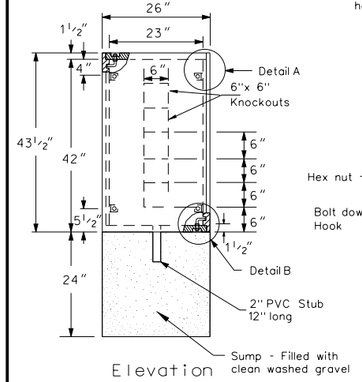
D-770-3

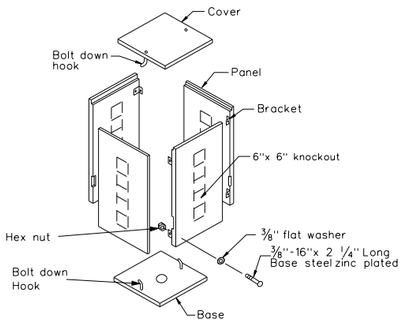
PULL BOX DETAILS

NOTE: Fiberglass pull box is composed of fiberglass skins and reinforced mortar structural elements in combination with polyurethane foam cells.

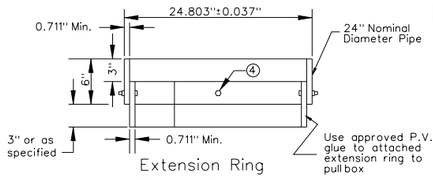


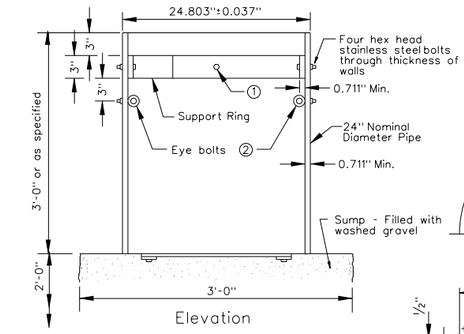


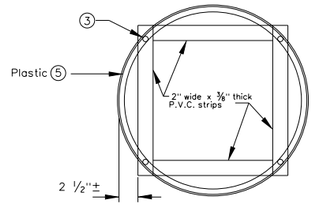


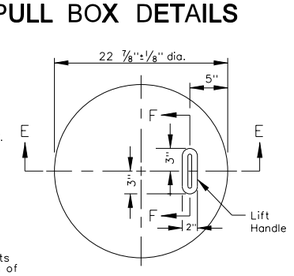


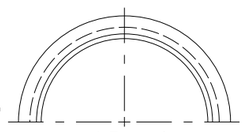
Fiberglass Pull Box

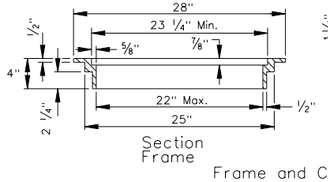


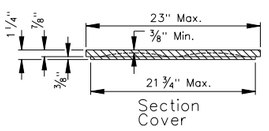




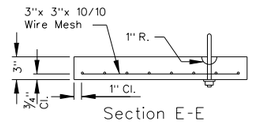


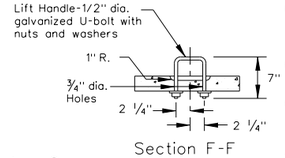


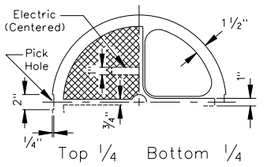




Frame and Cover Casting
Cast Iron Cover

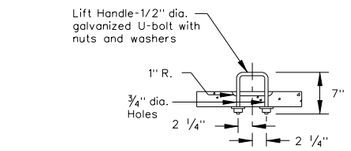


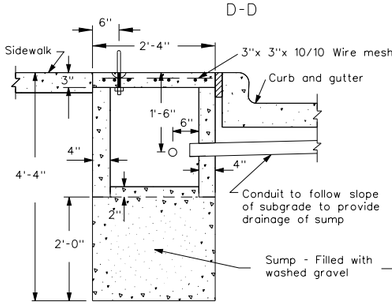


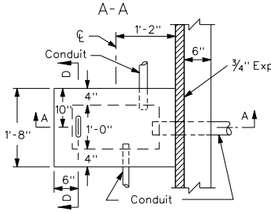


PVC PULL BOX NOTES;

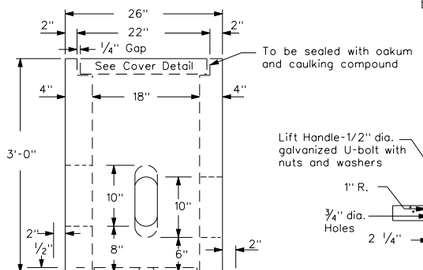
1. Attach split 24" nominal diameter PVC cover support ring with four 3/8" dia. x 2" long stainless steel hex head bolts with nuts at 90 degrees apart.
2. Two type 2 shoulder eye bolts, 3/8" dia. x 1 1/4" shank length with hex nuts 180 degrees apart (for lifting pull box and supporting electric cable).
3. Four 1/4inch x 1 1/4" long galvanized lag screws. screw assembly together.
4. Attach split 24" nominal diameter PVC cover support extension ring with four 3/8" dia. x 2" long stainless steel hex. head bolts with nuts at 90 degrees apart.
5. Bolt assembly together.
6. Conduit holes located in barrel section shall be sized no more than 1" larger than size of conduit being used.
7. After pull box & conduit installation all inside walls & cover shall be made water tight to the satisfaction of the Engineer.
8. PVC pipe to meet requirements of ASTM F679T-1 or equal.
9. Hex head bolts and nuts shall be austenitic stainless steel. Other fasteners to be galvanized as per AASHTO M-232.
10. Concrete cover shall be coated on top and sides with and approved epoxy coating. The epoxy protective coating shall be light gray, clear, or neutral in color and shall be applied as recommended by the manufacturer. The surfaces of the concrete to which the epoxy protective coating is applied, shall be cleaned by wire brush and shall be dry before application.
11. Cast Iron Cover: Cover castings shall be gray iron as pre AASHTO M 105, class 35B.

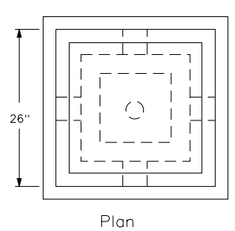


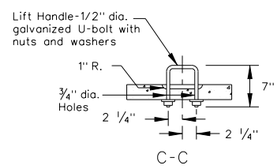


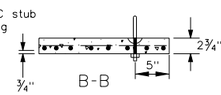


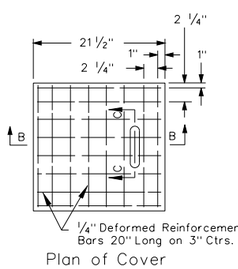
Concrete Pull Box



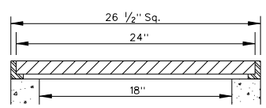




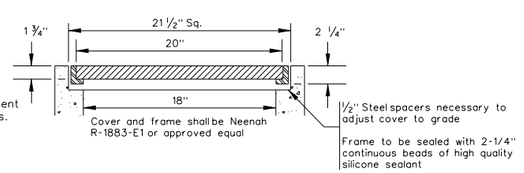




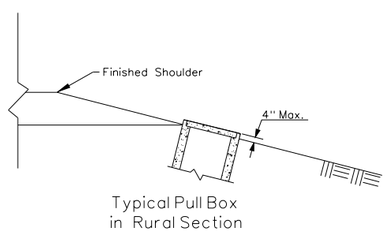
Precast Concrete

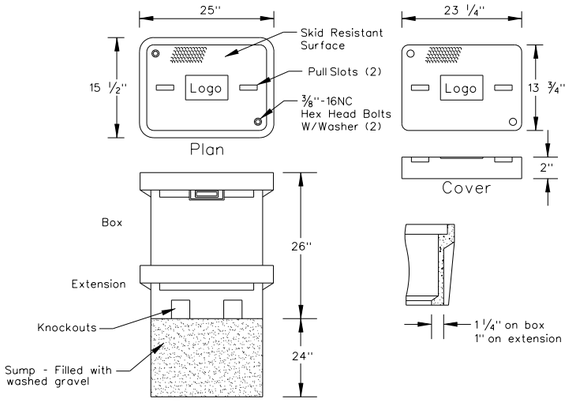


Cast In Place Concrete Pull Box Cover Detail



Precast Concrete Pull Box Cover Detail





Polymer Concrete Pull Box
(Polymer concrete reinforced by a heavy weave fiberglass)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
04-26-94	Add NEENAH cover
10-11-94	Lift handle & polymer
03-20-95	Concrete pull box Add PVC pull box
05-28-99	Pull box cover thickness
06-08-99	Rural pull box detail
09-14-99	Added cast iron cover
12-01-04	PE Stamp added

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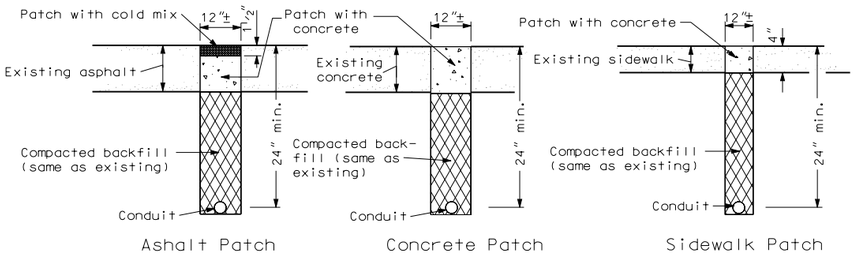
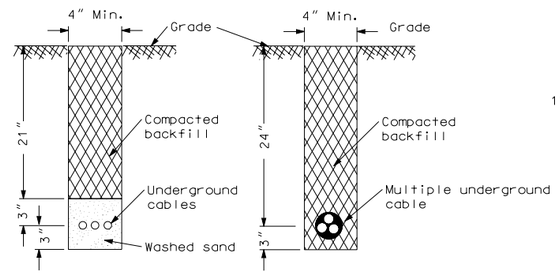
LIGHTING AND SIGNAL DETAILS

D-770-4



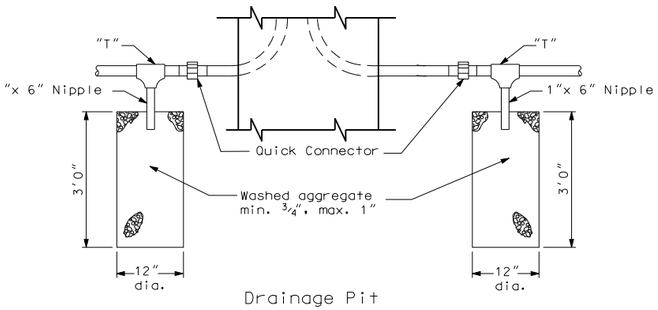
Surface Patch Details

Note:
Patches: All trenches shall be saw-cut. The replacement concrete shall be P.C.C. pavement and the coarse aggregate gradation, maximum size and method of curing shall be as approved by the Engineer. The cost shall be included in the price bid for Conduit.
Immediately prior to pouring replacement concrete, all surfaces shall be painted with an approved epoxy compound.



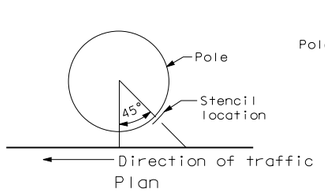
Cable Trench

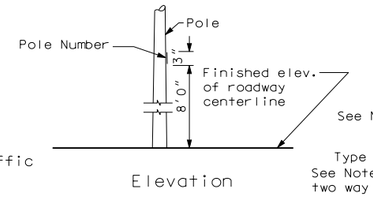
The entire area which is disturbed by the trenching shall be sodded, or as directed by the Engineer. The cost shall be included in the price bid for "Cable Trench."



Drainage Pit

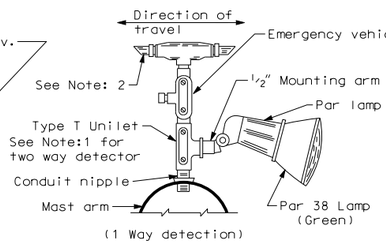
Drainage pits shall be installed in both ends of the conduit runs. Except where conduit slopes enough for drainage to one end. (To be used for Traffic Signal Conduit Runs Only)





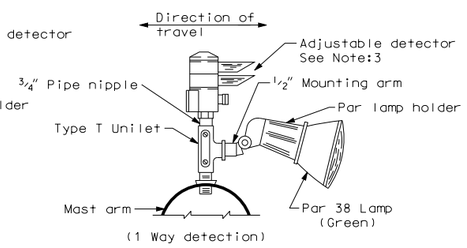
Light Standard Numbering

Note:
Pole Numbering: The contractor shall stencil on each light standard the pole number in black paint on the roadway side of the pole, or adhesive coated plastic such as Scotch cal. Manufactured by 3M as approved by the Engineer. See layout sheets for pole numbers.



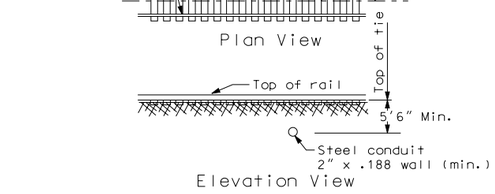
Emergency Vehicle Detector Detail
(Location as shown in plans)

Notes:
1. Two-way Detector shall have Type X Unilet with two Par lamp holders and lamps (one in each direction).
2. One-way Detector shall have the unused end plugged with metal pipe plug.

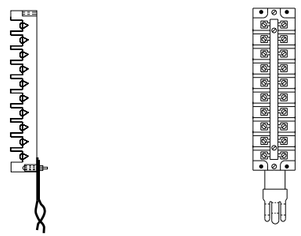


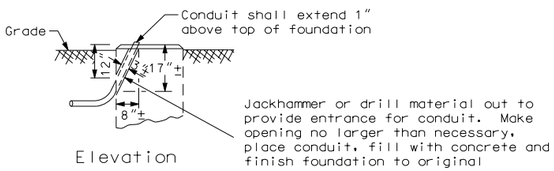
Alternate Emergency Vehicle Detector Detail (Adjustable)
(Location as shown in plans)

Notes:
3. Two-way Detector shall have the detector lens rotated to face the direction of travel, and shall have Type X Unilet with two Par lamp holders and lamps (one in each direction).



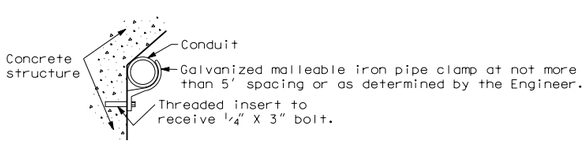
Railroad Track Conduit Placement



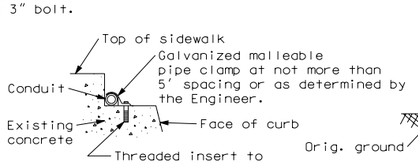


Jackhammer or drill material out to provide entrance for conduit. Make opening no larger than necessary, place conduit, fill with concrete and finish foundation to original appearance.

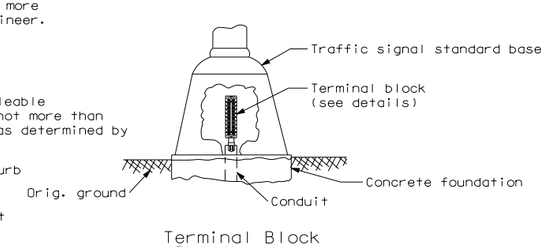
Revise Concrete Foundation



Bridge Mounted Conduit Hanger



Curb Mounted Conduit



Terminal Block
(Rigid Mounted)

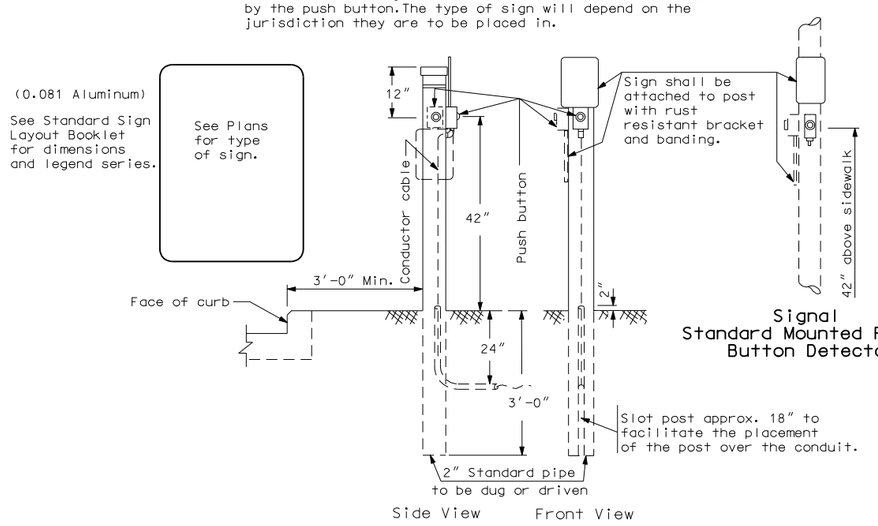
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
11-07-90	Track clearance
06-19-03	Minor revisions
12-01-04	PE Stamp added

This document was originally issued and sealed by MARK S. GAYDOS Registration Number PE- 4518 , on 12/01/04 and the original document is stored at the North Dakota Department of Transportation

TRAFFIC SIGNAL STANDARDS

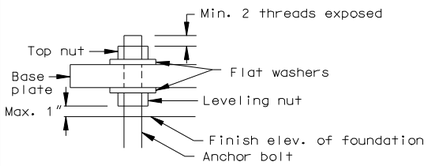
D-772-2

The positioning of the sign & pushbutton & direction of arrow shall clearly indicate which crosswalk is actuated by the push button. The type of sign will depend on the jurisdiction they are to be placed in.

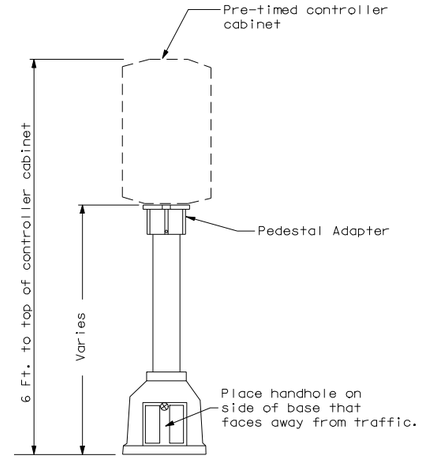


Pedestrian Push Button Post Details

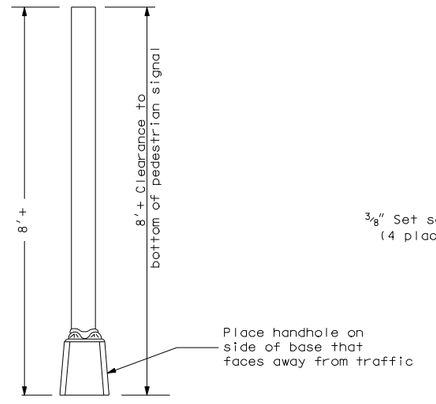
Signal Standard Mounted Push Button Detector



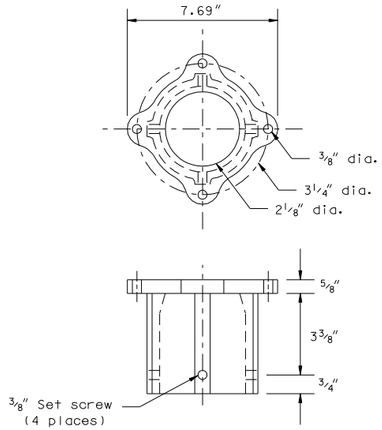
Anchor Bolt Detail



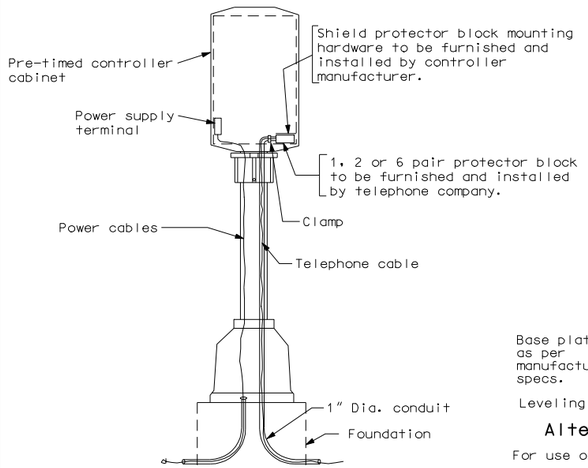
Type I



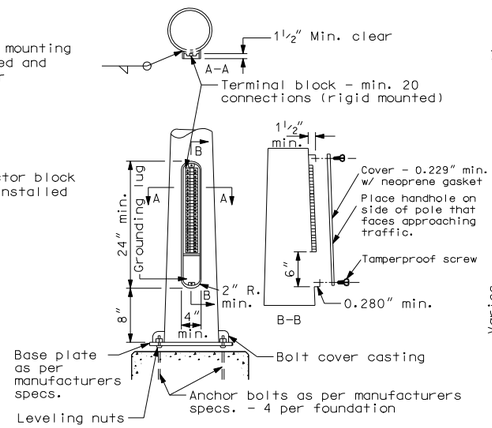
Type II



Pedestal Adapter Detail

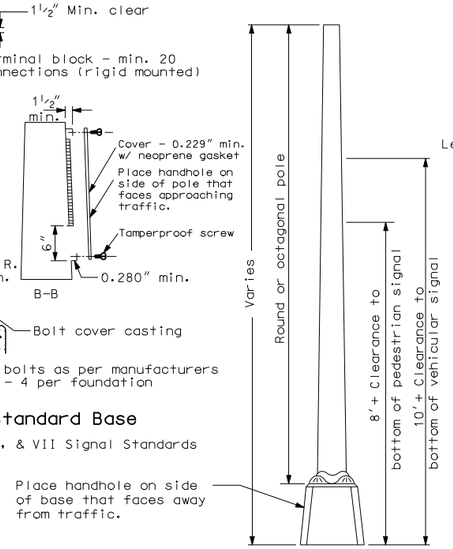


Telephone Interconnect Schematics Detail
(Control circuits not shown)

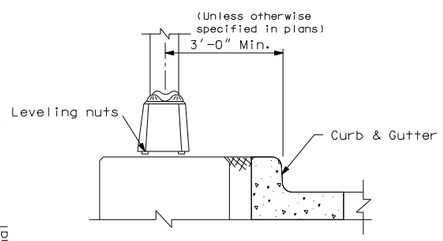


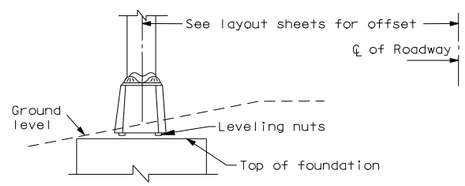
Alternate Signal Standard Base

For use only with Type V, VI, & VII Signal Standards



Type V, VI, VII





Signal Standard Min. Clearance Detail

NOTES:
Signal Heads: See traffic signal layout for correct mounting position, number, size, and arrangement of lenses.

Steel Standards: The center of the signal standard shall be a minimum of 3 feet from the face of the curb unless shown otherwise on the layout sheets.

Paint: See note sheet for required color of paint.

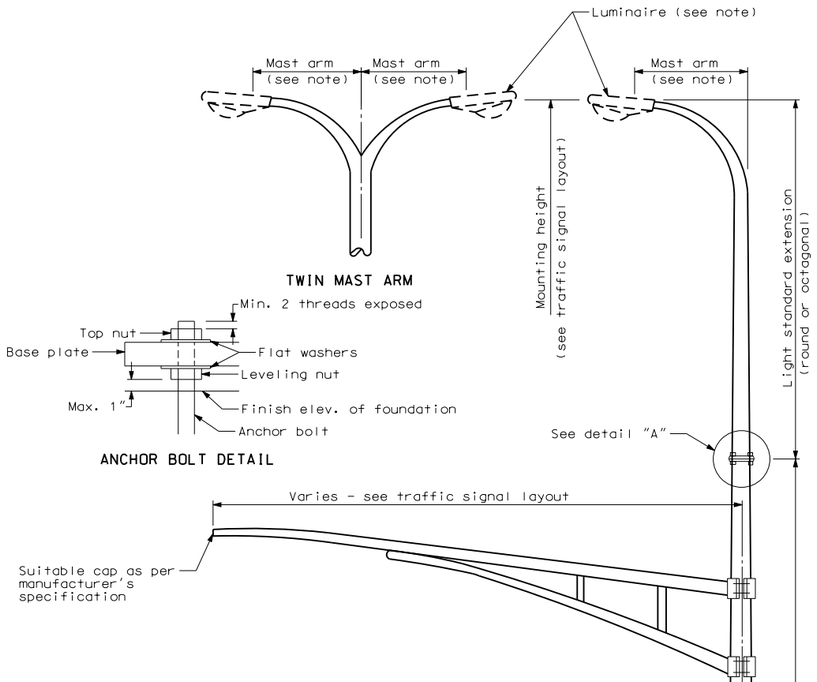
Transformer Base: In lieu of the transformer base the contractor may use the alternate signal standard base.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
12-01-88	Min. Clearance
06-16-94	Leveling nuts
08-29-95	Delete Type III
11-27-95	Pedestal adapter
12-15-00	Pushbutton height
12-01-04	PE Stamp added
04-24-06	Pedestrian sign rev.

This document was originally issued and sealed by MARK S. GAYDOS, Registration Number PE-4518, on 04/24/06 and the original document is stored at the North Dakota Department of Transportation

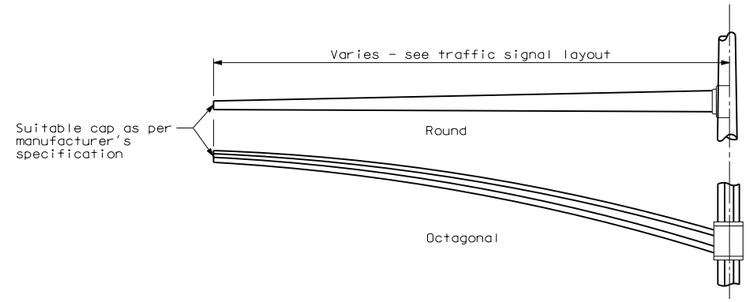
TRAFFIC SIGNAL STANDARDS
(MAST ARM TYPE)

D-772-3

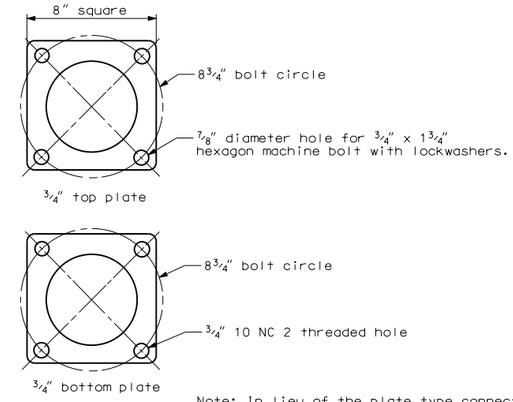


TWIN MAST ARM

ANCHOR BOLT DETAIL



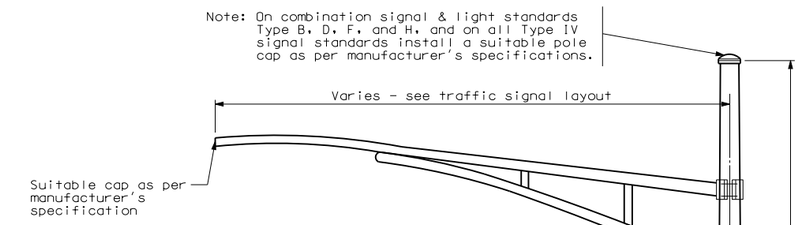
MONOTUBE TYPE MAST ARMS



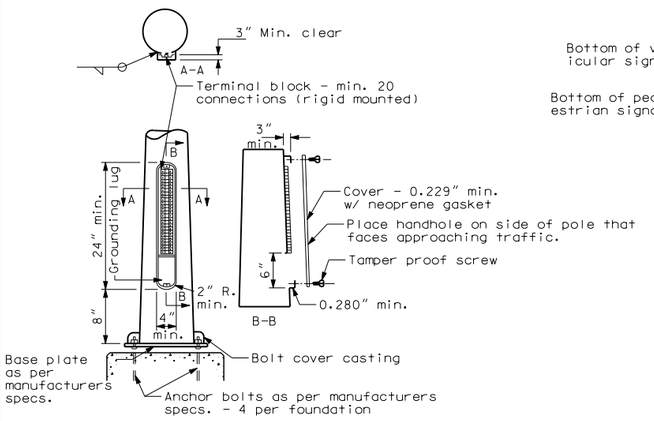
DETAIL "A"

Note: In lieu of the plate type connection a telescoping clamp type extension may be used.

Note: On combination signal & light standards Type B, D, F, and H, and on all Type IV signal standards install a suitable pole cap as per manufacturer's specifications.

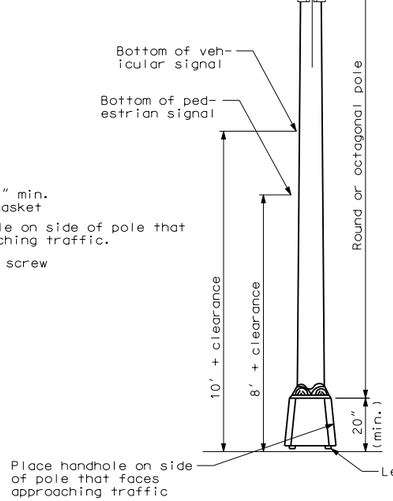


TRUSS TYPE MAST ARM

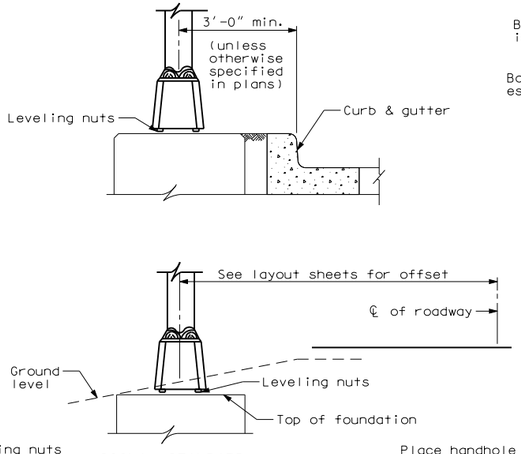


ALTERNATE SIGNAL STANDARD BASE

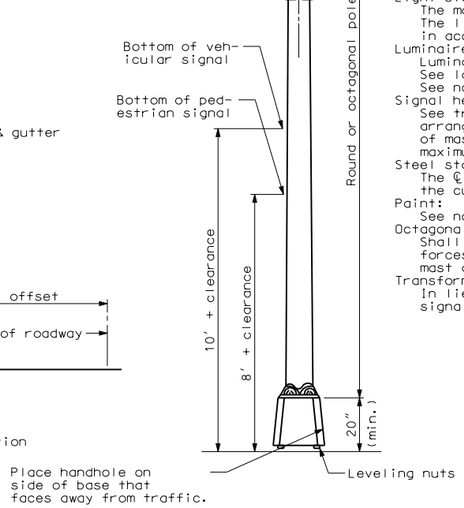
For use only with Type IV & combination signal standards



COMBINATION SIGNAL AND LIGHT STANDARD



SIGNAL STANDARD MIN. CLEARANCE DETAIL



TYPE IV SIGNAL STANDARD

Notes: COMBINATION SIGNAL AND LIGHT STANDARD:

Signal Standard Type	Luminaire Mounting Height	Install Light Standard Extension and Luminaire	Luminaire Mast Arm
A	30 ft.	yes	single
B	30 ft.	*	single
C	40 ft.	yes	single
D	40 ft.	*	single
E	30 ft.	yes	twin
F	30 ft.	*	twin
G	40 ft.	yes	twin
H	40 ft.	*	twin
I	50 ft.	yes	single
J	50 ft.	yes	twin

* The light standard extension for these signal standards shall be installed at a later date under a separate contract.

Light standard extension:
The mast arm shall be 6 ft., unless otherwise noted on the plans. The light standard extension shall be galvanized. Galvanizing shall be in accordance with ASTM A 123.

Luminaire:
Luminaires shall be internal ballast - constant wattage 120 x 240 voltage. See layout sheets for type of luminaire, wattage, and I.E.S. distribution. See note sheet for operating voltage.

Signal head:
See traffic signal layout for correct mounting position, number, size, and arrangement of lenses. Clearance from the ℄ of the roadway to the bottom of mast arm mounted signal heads shall be 17 ft. minimum and 19 ft. maximum.

Steel standard:
The ℄ of the signal standard shall be a minimum of 3 ft. from the face of the curb unless shown otherwise on the layout sheets.

Paint:
See note sheet for required color of paint.

Octagonal poles:
Shall have a means that will not allow the mast arm to be rotated by wind forces other than friction. This means shall be so fabricated so that the mast arm is rotatable. This feature shall be approved by the Engineer.

Transformer base:
In lieu of the transformer base the contractor may use the alternate signal standard base.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
10-1-86

REVISIONS

DATE	CHANGE
12-01-88	Min clearance
01-21-94	Add 50 ft.
06-16-94	Leveling nuts
10-12-94	Handhole location
05-28-96	Mast arm cap
06-28-99	Sig head mt ht.
12-01-04	PE Stamp added

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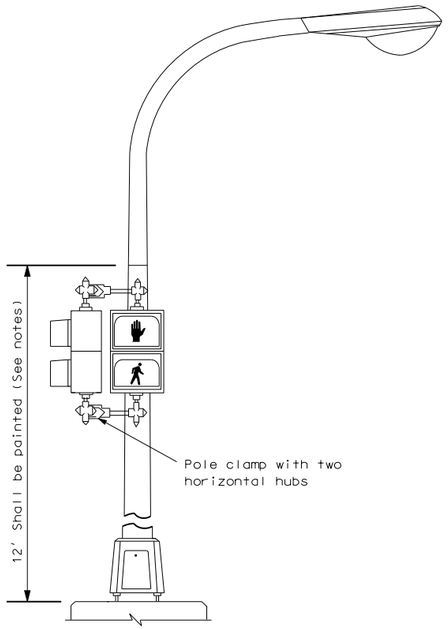
TRAFFIC SIGNAL HEAD MOUNTING

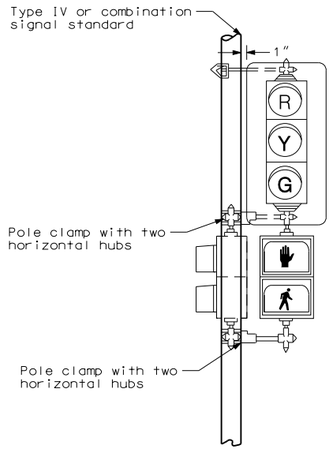
D-772-4



LIGHT STANDARD MOUNTED
PEDESTRIAN SIGNAL HEAD

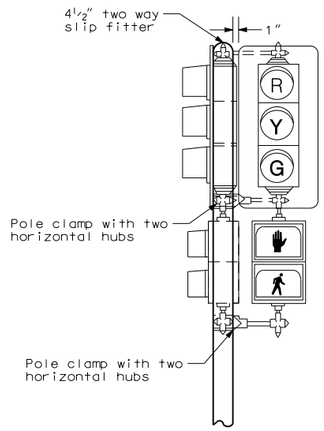
TYPE II

Pedestal mounted
pedestrian



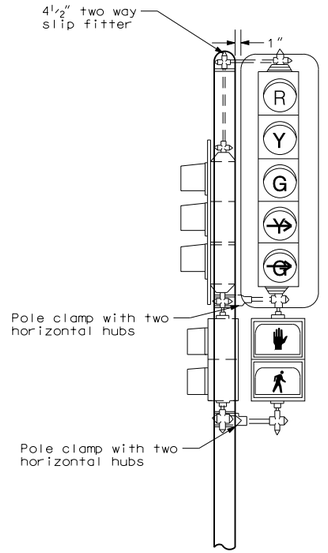
TYPE IV

Post mounted - vehicular
Post mounted - pedestrian



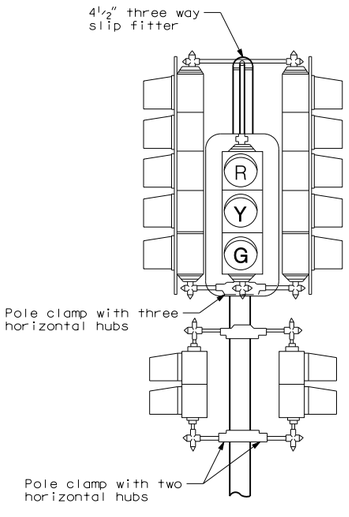
TYPE V

Post mounted - vehicular
Post mounted - pedestrian



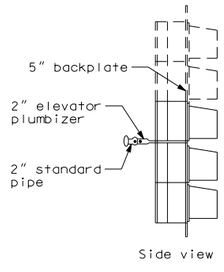
TYPE VI

Post mounted - vehicular
Post mounted - pedestrian



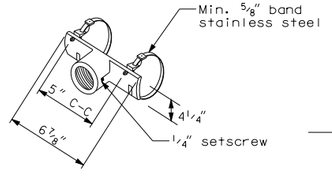
TYPE VII

Post mounted - vehicular
Post mounted - pedestrian

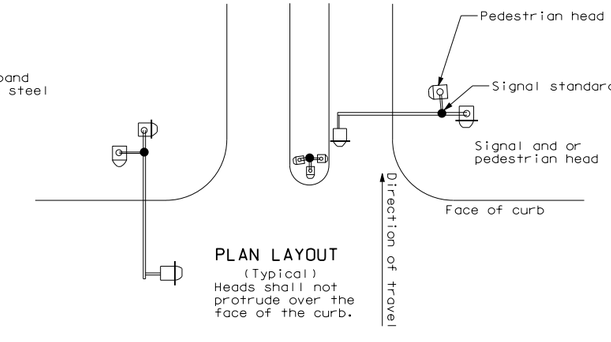


Side view

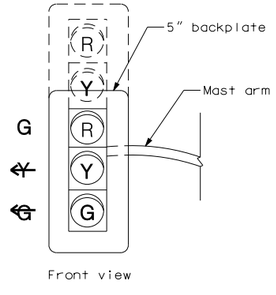
MID-SPAN MOUNTED
MAST ARM RIGID MOUNTED SIGNAL HEADS



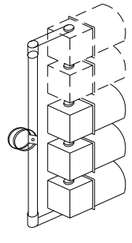
MAST ARM
SIGNAL HEAD BRACKET



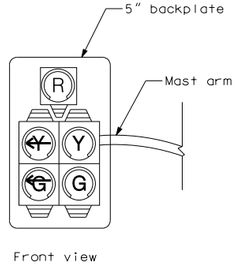
PLAN LAYOUT
(Typical)
Heads shall not protrude over the face of the curb.



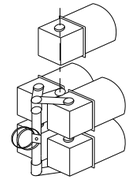
Front view



Isometric view



Front view



Isometric view

END MOUNTED
MAST ARM RIGID MOUNTED SIGNAL HEADS

Notes:

Clearance: Clearance from the ground line or sidewalk to the bottom of post or pedestal mounted vehicular signal heads shall be 10 ft. minimum, from pedestrian signal heads shall be 8 ft. minimum.

Signal Heads: See traffic signal layout for correct mounting position, numbers, size, and arrangement of lenses.

Pole Clamps: A pole plate with suitable banding material, as approved by the engineer in the field, may be substituted for the pole clamps. Where traffic signal heads and pedestrian signal heads are mounted one above the other, one pole clamp assembly may be used.

Paint: Signal housing shall be painted yellow. Back plates shall be painted dull black. Pole clamps and signal head mounting hardware shall be painted the same color as the signal standard shaft.

When pedestrian heads are light standard mounted, the lower 12 feet shall be painted the same color as the other traffic signal standards.

Mounting Details: All signal heads shown are viewed from direction of travel.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
05-23-94	Type II
10-19-94	Rev. visors & add 5-section head
08-01-95	5-section head end mounted detail
08-29-95	Delete Type III
11-29-95	Mast arm mounting bracket
08-14-01	Added pedestrian symbols
05-12-03	Added Lt Std Mt ped head
09-29-04	Revised head mounting
12-01-04	PE Stamp added
10-31-06	Removed pedestrian word messages

This document was originally issued and sealed by MARK S. GAYDOS Registration Number PE- 4518 , on 10/31/06 and the original document is stored at the North Dakota Department of Transportation