JOB# 4

FHWA REGION	STATE	PROJECT	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	1

DESIGN DATA

Traffic	Main Street Average Daily			Est. 30th Max, Hr.
Current Traffic (1988)	7290 Pass.	510 Trucks	7800 Total	780
Traffic Forecast (2010)	14,440 Pass.	1010 Trucks	15,450 Total	1545
	Hwy. #6			
Current Traffic (1988)	5820 Pass.	280 Trucks	6100 Total	610
Traffic Forecast (2010)	7630 Pass.	370 Trucks	8000 Total	800

Design Speed 35 MPH
Traffic Classification "M"
Minimum Sight Distance (Stopping) 250'

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

MORTON COUNTY
F-RRS-1-006(005)066
GRADING, SURFACING, SEWER, LIGHTING, SIGNALS & INCIDENTALS

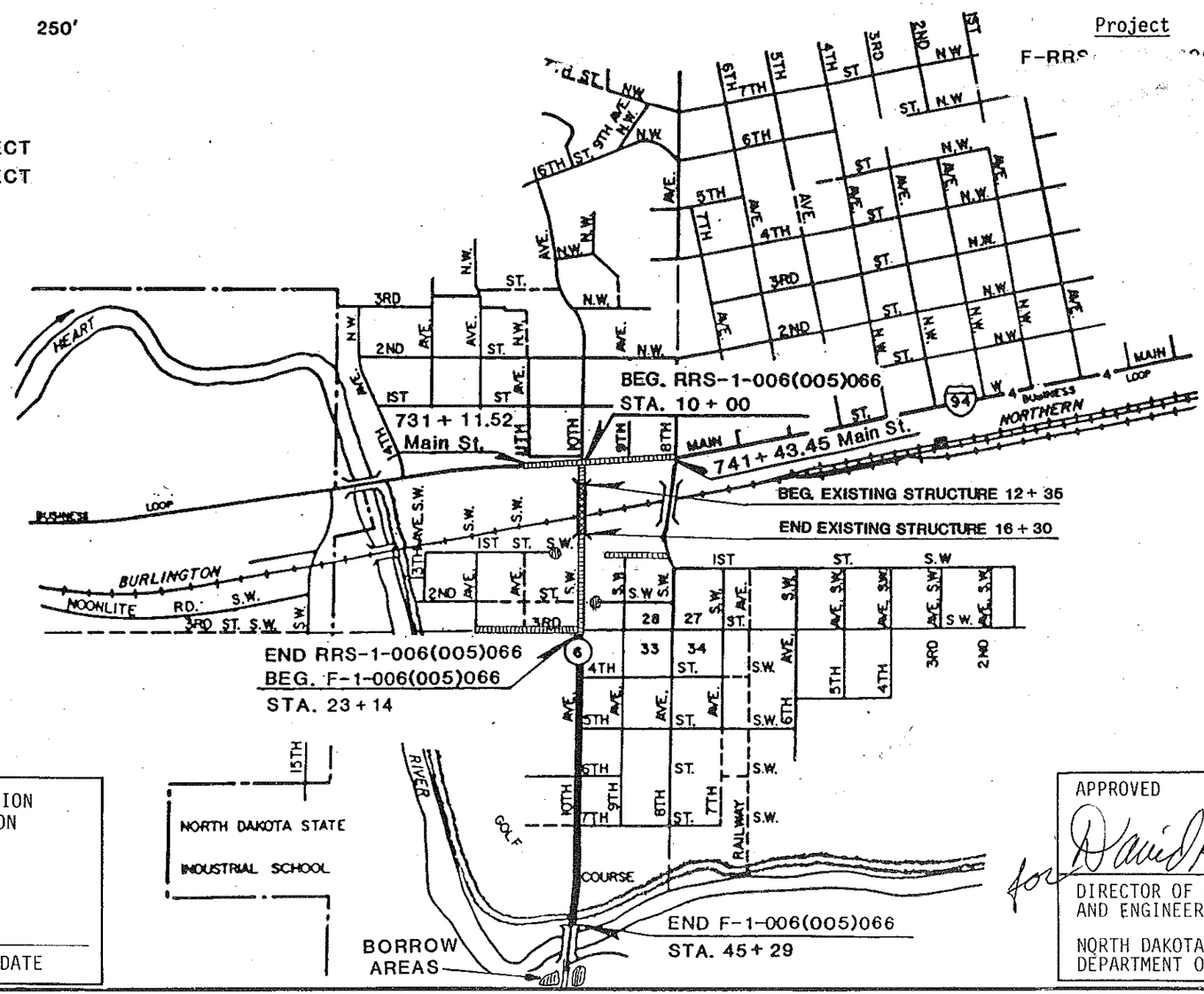
GOVERNING SPECIFICATIONS:

Standard Specifications for Road and Bridge Construction, adopted by the North Dakota State Highway Department, November 1986, shall apply to all North Dakota Department of Transportation contracts, standard drawings currently in effect, and other contract provisions submitted herein.

LENGTH OF PROJECT

Project	Miles-Gross	Miles-Net
F-RRS [illegible]066	0.668	0.668

RRS PORTION OF PROJECT
F PORTION OF PROJECT



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED

DIVISION ADMINISTRATOR DATE

APPROVED DATE SEPT. 1, 1990

for David K. O'Leer

DIRECTOR OF HIGHWAYS AND ENGINEERING

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

P.E. # 1199

22

SYMBOLS

STATE & NATIONAL LINES

COUNTY LINE

TOWNSHIP & RANGE LINES

SECTION LINE

QUARTER SECTION LINE

SECTION CORNER

QUARTER SECTION CORNER

OLD RIGHT OF WAY LINE

NEW RIGHT OF WAY LINE

GRADE LINE

CENTERLINE OF CONSTRUCTION

RAILROAD RIGHT OF WAY LINE

CITY OR VILLAGE CORPORATE LIMITS

PROPERTY LINE

EASEMENT LINE

FENCES

SNOW FENCE

DRAINAGE

WATERS EDGE

MARSH OR SWAMP

RIPRAP

DRAINAGE DITCH

APPROACH

502 + 00

TRAVELED WAY

RAILROADS

GUARD RAIL

GUIDE POSTS

DELINEATORS

HEDGES AND TREES

INTERCHANGE

HIGHWAY GRADE SEPARATION-NO CONNECTION

OTHER BRIDGE

SERVICE ROAD

TERMINATED CROSS-ROAD

BUILDINGS

TELEGRAPH LINES

TELEPHONE LINES

POWER LINES

CULVERTS (In Place)

CULVERTS (Install)

CONCRETE BOX CULVERTS (Install)

BRIDGES (Install)

CONCRETE CURB

CONCRETE CURB AND GUTTER

CONCRETE WALK

CATCH BASIN (Existing)

CATCH BASIN (New)

MANHOLE (Existing)

MANHOLE (New)

CURB INLET (Existing)

CURB INLET (New)

GROUND MOUNTED SIGNS

OVERHEAD SIGNS

HYDRANT

LIGHT STANDARDS

TRAFFIC SIGNALS (Plan & Profile Sheets)

HIGH MAST LIGHTING ASSEMBLY

GROUND ELEVATION 245

GRADE 245

CENTERLINE

SECTION LINE

DEFLECTION ANGLE (Delta)

SOD OR JUTE MESH

POLES TO BE MOVED

POLES TO BE LOWERED

CONCRETE FOUNDATION

CONDUIT

CONDUCTOR

CONCRETE PULL BOX

FEED POINT

250 WATT LIGHT STANDARDS

400 WATT LIGHT STANDARDS

700 WATT LIGHT STANDARDS

1000 WATT LIGHT STANDARDS

FLASHING BEACON

TRAFFIC SIGNAL - MAST ARM MOUNTED

TRAFFIC SIGNAL - POST MOUNTED

SIGNAL HEAD 3

PEDESTRIAN PUSHBUTTON POST

TRAFFIC SIGNAL CONTROLLER

FEED POINT - PAD MOUNTED

ABBREVIATIONS

Aggr	Aggregate
Ahd	Ahead
Alt	Alternate
Approx	Approximate or Approximately
Appr	Approach
Asph Cem or A C	Asphalt Cement
Asph Conc.	Asphaltic Concrete
Bit	Bituminous or Bitumen
Bk	Back
B M	Bench Mark
Bldg.	Building
Br.	Bridge
C.A.E.S.	Corrugated Aluminum End Section
C A P	Corrugated Aluminum Pipe
C B	Catch Basin
C & G	Curb and Gutter
Ch Blk	Channel Block
Ch Ch	Channel Change
C. I	Curb Inlet
C I P	Cast Iron Pipe
Cl	Class
C.S.E.S	Corrugated Steel End Section
C.S.P.	Corrugated Steel Pipe
CMS	Cationic Medium Setting
Comp	Compression
Const	Construction
Conc	Concrete
Cont. Reinf Conc Pvm't	Continuously Reinforced Concrete Pavement
Contn	Contraction
Crn	Crown
CRS	Cationic Rapid Setting
Crse	Course
C S	Curve to Spiral
C. to C.	Center to Center
C.Y	Cubic Yard
D	Degree of Curvature
D-Load	Dead Load
D.B.	Ditch Block
Def	Deformed
Del	Deliver
D G	Ditch Grade
El. or Elev	Elevation
Ellipt.	Elliptical
Emb	Embankment
Emul.	Emulsified
Engr	Engineer
Eq	Equation
E R	East Roadway
E S	End Section
Esmt	Easement
Esc	Excavation
Exp.	Expansion
F D	Field Drive
Found	Foundation
F P	Fence Post
Furn	Furnish
Ga	Gage or Gauge
Gr	Gravel
Grd	Graded
G V.	Gate Valve
Hel	Helical
Hyd	Hydrant
Ident	Identification
Inchg	Interchange
I M	Iron Monument
Inst	Install
Inter	Intersection
Inv	Invert
Jt	Joint
L	Length of Curve
Lc	Length of Spiral
Levg	Leveling
L F	Linear or Lineal Foot
Liq	Liquid
Long	Longitudinal
L P	Light Pole
Lt	Left
"M"	One Thousand
Matl	Material
Max	Maximum
MC	Medium Curing
M H	Manhole
Min	Minimum
M L	Main Line
N R	North Roadway
Off Loc	Office Location
O to O	Out to Out
P & P	Plan and Profile
P C	Point of Curvature
P C C	Point of Compound Curve
P C C Pvm't	Portland Cement Concrete Pavement
P D	Private Drive
Pen	Penetration
Perf	Perforated
P I	Point of Intersection
P O C	Point on Curve
P O T	Point on Tangent
P P	Power Pole
P R C	Point of Reverse Curvature
Pref	Preformed
P S D	Passing Sight Distance
P T	Point of Tangency
PVC	Polyvinyl Chloride Sewer Pipe
Quant	Quantity or Quantities
R	Radius
R or Rge	Range
RC	Rapid Curing
R C E S	Reinforced Concrete End Section
R C P	Reinforced Concrete Pipe
R C P S	Reinforced Concrete Pipe Sewer
Rd	Road
Rdbd	Roadbed
Rdwy	Roadway
Reflt	Reflectorized
R R	Railroad
Rt	Right
R/W	Right of Way
Salv	Salvage
San	Sanitary
S C	Spiral to Curve
SC	Slow Curing
Sc	Spiral Deflection Angle
S D	Sight Distance
S E	Superelevation
Sec	Section
Sec Line Appr	Section Line Approach
Sep	Separation
Serv	Service
Sgr Prep	Subgrade Preparation
Shldr.	Shoulder
SP	Special Provision
S P P	Structural Plate Pipe
S P P A	Structural Plate Pipe Arch
S R	South Roadway
SS	Slow Setting or Supplement Specification
S S D	Stopping Sight Distance
S T.	Spiral to Tangent
Sta.	Station
Std.	Standard
Std. Specs	Standard Specifications
Struct.	Structure
Surf	Surface or Surfacing
Surv	Survey
S W	Sidewalk
S Y	Square Yard
T	Tangent Length (circular curve)
T or Twp	Township
Tel	Telephone
Temp	Temporary
T P	Telephone Pole
Tr	Traffic
Trans	Transverse or Transition
Trtd	Treated
Ts	Tangent Length (curve with spirals)
T S	Tangent to Spiral
U S C & G S	United States Coast and Geodetic Survey
V C	Vertical Curve
V C P	Vitrified Clay Pipe
W M	Water Main
W M V	Water Main Valve
W R	West Roadway
Wrng	Wearing
W S V	Water Service Valve
X-Sec	Cross Section
Xc	Spiral Coordinate
Yc	Spiral Coordinate

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	2

TABLE OF CONTENTS

SHEET NO.	DESCRIPTION
1	Title Sheet
2	Table of Contents
3-9	General Notes
10-15	Quantities
16	Basis of Estimate
17	List of Standards
18-19	Typical Sections
20	Right of Way and Easement Layout
21	Curb and Gutter Detail
22	Concrete Driveway Detail
23	Sidewalk and Curb Ramp Details
24-27	Concrete Pavement Joint Details
28-30	Concrete Bridge Approach Details
31	Manhole Blockout Details
32	Lift Station Details
33	Perforated PVC Underdrain Detail
34	Watermain Installation Detail
35	Bedding and backfill Detail
36-37	Pit Plats
38-50	Construction Signing and Marking
51	Construction Sequence Layout
52-57	Plan and Profile Sheets - Main Street
58-66	Plan and Profile Sheets - Highway 6
67-69	Plan and Profile Sheets - First Street SW
70	Plan and Profile Sheet - Second Street SW
71-72	Plan and Profile Sheets - Third Street SW
73	Borrow Area Layout
74-76	Pavement Layout Details
77-81	Temporary Lighting System
82-83	Guardrail Layout
84-95	Traffic Signal System
96-100	Flashing Beacon System
101-145	Lighting System
146-169	Signing and Pavement Marking
170-171	Soil Survey Sheets
172-199	Cross Section Sheets
200-203	Borrow Area Cross Sections

FHWA REGION	STATE	FED. AID PROJ NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	3

GENERAL NOTES

100 GENERAL: The engineer will see to the removal of existing
010 fences to the highway right of way line and to the relocation or adjustment of utility facilities as shown on the plans. All privately-owned light poles, guard posts, signs, etc., within the right of way limits shall be removed by the owners.

100 WORK SCHEDULE: In order to minimize interference with traffic
020 operations, a detailed schedule shall be agreed to prior to beginning work, between the engineer, utility companies, and the contractor and subcontractors, if any.

100 UNDERGROUND UTILITIES: The contractor shall notify the local
030 utility companies prior to the beginning of construction, so they may determine the location of all utilities in the project area. Subcutting or scarifying over utility lines may be eliminated if, in the opinion of the engineer, a hazardous situation exists. Separate plans, if any, showing relocation or adjustment work to be performed by utility companies to accommodate highway construction will be made available to the contractor, upon request to the engineer.

100 UNDERGROUND UTILITIES: The Contractor will be required to place
035 approximately 3 feet of additional embankment over any underground utilities located under the cartways during any hauling operations. The cost of furnishing, placing and removing the embankment will not be paid for separately but shall be included in the price bid for other items.

100 DETOURS: The contractor shall maintain the streets used as
060 detours (streets to be designated by the engineer) and repair areas damaged by the detoured traffic. Upon completion of the project, the contractor shall restore the streets to a condition at least equal to that which existed at the time traffic was routed over them. Work shall be as deemed necessary by the engineer. The repair and maintenance of the detours will be paid for in accordance with Section 107.05 B of the Standard Specifications - Haul Roads. Necessary route markers will be furnished by the state highway department and erected and maintained by the contractor as an incidental item.

100 TREES, SHRUBS, AND NATIVE GRASSES: The contractor shall exercise
130 care in his construction operations to ensure that trees, shrubs, and native grasses within the right of way and outside the construction area are not disturbed.

100 The contractor will be required to conduct the construction
133 activities in such a manner as to comply with the Air Pollution Control Regulations of the state of North Dakota. Water will be used to control dust on the construction site.

100 CONTRACTOR LOCATED AGGREGATE AND/OR BORROW PITS: Prior to
145 surface disturbance or removal of material from a contractor located pit, the contractor shall provide the North Dakota Department of Transportation (NDDOT) with the legal description of the location of the pit. The NDDOT will review this information to determine the probability of any significant cultural resources being affected. The contractor shall submit this information to the NDDOT at least fourteen days prior to stripping the surface or removing any material from the pit. If the NDDOT determines that there is a moderate or higher potential for cultural resources to exist in the affected area, the contractor will be required to obtain the State Historical Preservation Officer's (SHPO) clearance before any material from the pit will be accepted. In order to obtain SHPO clearance, the contractor will be responsible for having a cultural resource survey conducted by a qualified archeologist. They survey shall be submitted to the NDDOT. NDDOT will coordinate with the SHPO once the cultural resource survey is received. Apart from an extension of time, no payment or claim for any damages shall be made to the contractor as compensation for damage for any delays or hindrances from any cause whatsoever in the progress of the work because of this required review. This review conducted by the NDDOT will not relieve the contractor of any responsibility for complying with all federal and state laws and regulations concerning the preservation of cultural resources that are discovered during the operation of the pit. The NDDOT will not participate in the cost of complying with federal or state laws and regulations regarding the salvage or preservation of cultural resources that are discovered during operation of the pit.

100 The contractor will be required to contact the two individuals
P01 listed in Note 200-P06 at least 48 hours prior to starting any work on this project that is located on railroad right of way.

100 U.S. SPRINT CABLE: A U.S. Sprint transcontinental fiber optic
P02 cable crosses the survey line at approximately Sta. 16+10.The exact location of this cable will be determined by a representative of U.S. Sprint prior to any work in this area. The cost of repairing any damage caused by the construction activities will be the responsibility of the contractor.

100 WORK HOURS: The contractors construction activities will be
P03 limited to the hours of 7 a.m. to 10 p.m.

100 CONSTRUCTION COORDINATION: The city of Mandan may install a new
P04 underground sprinkler system in the approach fills north and south of the structure over the railroad tracks. This installation would be made prior to the installation of the new sod. If the city decides to proceed, the contractor shall coordinate the construction activities to avoid scheduling conflicts and allow the new sprinkler system to be installed.

107 RAILWAY PROTECTION INSURANCE: Insurance policies for Railway
100 Projection Insurance and for Public Liability insurance as required by Section 107.06 of the Standard Specifications and Supplemental Specification 107.07 shall be obtained by the contractor at Station(s) 11+20 to 16+40 and including the removal of the existing railroad structure for protection of Burlington Northern Railroad.

200 Any costs for the disposal of excess excavation from the trenches
045 of storm drains, water lines, water mains, sanitary sewers, and related items shall be included in the price bid for the respective pay item.

200 WASTE DISPOSAL: All excess excavation and old concrete
252 sidewalks, driveways, curb and gutter, pavement, bituminous surfacing, etc., shall be disposed of off the highway right of way at a site selected by the contractor and approved by the engineer. Disposal in wetland areas will not be approved. The cost of disposal (and obtaining of the disposal area) shall be included in the price bid for other items.

The quantity of excavation shown in the plans to be wasted is approximate only. It has been assumed that a portion of the excavation in the subcut areas will not be suitable for placement in the embankment. This determination shall be made by the engineer in the field and the quantity shown to be wasted and for borrow shall be adjusted accordingly.

200 COMPACTION AND DENSITY CONTROL: Compaction and density controls
360 shall be in accordance with Section 203.02 F of the Standard Specifications T-180.

200 RAILROAD FLAGGING: The contractor shall coordinate the need for
421 railroad flagging with the Burlington Northern Railroad. The contractor shall notify the two individuals listed in Note 200-P06 at least 48 hours before any flagging is needed. Payment for this flagging will be made directly to the railroad by the North Dakota Department of Transportation. There will be no charge to the contractor.

200 REMOVAL OF CONCRETE: The removal of the existing concrete
P01 sidewalks and concrete driveways on this project and the existing integral curbs, concrete steps, and concrete retaining wall on the approach to the existing railroad structure shall be measured and paid for as "Removal of Concrete." The area of the retaining wall shall be determined by multiplying the height times the length. Any existing sidewalk or curb and gutter that will be under a minimum of 3 feet of fill can remain in place. The cost of any sawing required for this removal shall be included in the price bid for "Removal of Concrete."

200 REMOVAL OF EXISTING RETAINING WALL: On Third Street, SW at
P02 Sta. 5+62 Rt., approximately 6 feet of the existing retaining wall shall be removed. The height of this wall is about 4.5 feet above the ground. A vertical saw cut shall be used to remove the segment of the wall. The existing chain link fence on top of the wall shall be removed and reset as required. The price bid for "Removal of Existing Retaining Wall" shall be full compensation for all labor, equipment, and materials necessary to complete the work.

200 REMOVAL OF BITUMINOUS SURFACING: The removal of the existing
P03 bituminous surfacing as required for construction of this project has been included in the quantities and shall be paid for at the unit price bid for "Common Excavation - Type A."

200 REMOVAL OF TREE STUMPS: Any existing tree stumps within the
P04 right of way limits shall be removed as directed by the engineer. Cost of the stump removal shall be included in the prices bid for "Removal of Trees.

200 WATER: The cost of water required for compaction, for the
P05 aggregate base course, and for use as a dust palliative has been included in the quantities and shall be paid for at the unit price bid for "Water."

200 REMOVAL OF STRUCTURE: The existing structure over the railroad
P06 tracks is a five span structure consisting of two warren trusses and three steel I-beam spans. The structure has a reinforced concrete deck with reinforced concrete piers and abutments. The truss spans are 132'-8" and 152'-4". The I-beam spans are 40', 38'-2", and 40'. The roadway is 24' clear and there is a pedestrian walkway on the west side.

This structure (and approaches) shall not be removed until the new structure and connecting roadways are fully open to traffic. The removal of the structure shall be done in a manner satisfactory to Burlington Northern and to ND Department of Transportation and as necessary to prevent damage to, or interference with, Burlington Northern tracks or trains. The concrete piers and abutments shall be removed to a minimum of two (2) feet below the existing ground. All materials removed shall become the property of the contractor for proper disposal. The contractor shall be responsible for the cost of repairing any damage to Burlington Northern property caused by the structure removal.

Before the contractor can move any equipment across the railroad tracks to perform this removal, temporary crossings will have to be installed by Burlington Northern. The ND Department of Transportation has entered into an agreement with Burlington Northern which requires them to construct the temporary crossings as needed. The contractor shall give notice to the following individuals at least 48 days before the crossings are needed:

Rudy Almaguer
Supt. of Mtnce. & Engr.
51 Broadway Street North
Suite 201
Fargo, ND 58120
Telephone (701)280-7230

P.A. Yauney
Roadmaster, Dakota Division
PO Box 1205
Mandan, ND 58554
Telephone (701)667--2235

The contractor will be required to submit to the project engineer a detailed plan outlining the proposed removal procedures. This plan shall be submitted a minimum of 30 days prior to the actual removal. Plans of the existing structure are available at the NDDOT central office in Bismarck.

203 P01 MANDATORY BORROW AREA: The contractor will be required to obtain the necessary borrow from the designated borrow areas located south of the Heart River and east and west of Highway 6. The location, typical sections, and gradients for these borrow areas are shown on the borrow area layout sheet. The entire available borrow shall be removed from the west borrow area first. The remaining borrow required to complete the embankment shall be obtained from the east borrow area. Special care shall be taken to prevent any damage to the existing telephone and television cables. The cost of repairing any damage to the cables caused by the construction activities will be the responsibility of the contractor. The mandatory borrow areas are furnished at no cost to the contractor.

203 P02 TOPSOIL: The existing topsoil on this project (including the borrow areas) shall be removed to its full depth, but not to exceed 6 inches, and stockpiled. Upon completion of the grading operations, the topsoil shall be spread evenly over the areas to be seeded or sodded. On the previous project (RRS-1-006(004)067) borrow was obtained from the south portion of the borrow area on the east side of Highway 6. The topsoil from this area was removed and stockpiled at approximately Station 42+50-350 feet left. The contractor shall reshape the slopes from this previous borrow area (if required) and spread the stockpiled topsoil prior to seeding. The removal, stockpiling, and spreading of the existing topsoil shall not be paid for separately but shall be measured and paid for as "Common Excavation - Type A" or "Borrow." Cost of reshaping the slopes (if required) and spreading the existing stockpiled topsoil shall be included in the price bid for "Borrow."

1200 cubic yards of "Topsoil for Seeding" has been provided and shall be used in areas to be seeded or sodded where there is a shortage of existing topsoil. The quantity shown is advisory only and the actual amount needed shall be determined in the field and payment made accordingly.

302 P01 COMPACTION OF AGGREGATE BASE: The Class 5 Aggregate Base Course shall be compacted to 85% of the maximum dry density as determined by AASHTO T-180.

302 P02 AGGREGATE BASE COURSE - CLASS 5: The percentage of material passing the No. 200 sieve shall be 4-10 rather than 0-10 as shown in the Standard Specifications.

400 050 AUTOMATIC BATCHING EQUIPMENT: The automatic batching equipment as specified in AASHTO M-156 will not be required on this project.

400 080 HOT BITUMINOUS PAVEMENT: The 7 inches hot bituminous pavement shall be laid in three (3) lifts with the top lift having a depth of approximately 2 inches.

400 P01 HOT BITUMINOUS PAVEMENT: Approximately 60 tons of hot bituminous pavement and 4 tons of 85-100 asphalt cement have been provided in the quantities and shall be used at street returns and where concrete construction abuts existing asphalt such as parking lots, etc, at the property line. The street return patches shall be 6 inches thick and the property line patches shall be a minimum of 4 inches thick. The widths and lengths of the patches shall be determined in the field.

400 P02 PAVEMENT JOINT: The contractor shall provide a straight joint with a vertical face at all street locations where the new pavement will abut existing surfacing. This shall be done by sawing. This sawing shall be measured and paid for at the unit price bid for "Saw Bituminous Surfacing (Full Depth)."

550 040 SURFACE TOLERANCE: After the concrete has hardened sufficiently, the pavement surface shall be tested with a 10-foot straight edge. Areas showing high spots of more than 1/4 inch but not exceeding 5/8 inch in 10 feet shall be ground down with an approved grinding tool to an elevation where deviation is less than 1/4 inch. Areas where deviations exceed 5/8 inch shall be ground with diamond grinding equipment to an elevation where deviation is less than 1/4 inch or the pavement shall be removed and replaced at the contractor's expense. The area of pavement removed shall be at least 5 feet in length and at least the full width of the lane involved. If the limits of removal extend to within 5 feet of a transverse joint, the pavement shall be removed to that joint.

GENERAL NOTES

550 050 The requirements for the transverse metal tine finish of Section 550.04-J-6 (Final Surface Finish) of the Standard Specifications shall be deleted.

550 P01 HIGH EARLY STRENGTH CONCRETE: The 1800 S.Y. of high early strength concrete that has been included in the quantities shall be used for constructing street approaches and to complete gaps left in the pavement for traffic control. The exact location, use, and quantity of high early strength concrete shall be determined by the engineer in the field.

704 300 FLEXIBLE DELINEATOR: The flexible delineator shall be installed in the location shown on the plans. The post shall be tough, resilient PVC in orange color, similar to Services and material Co., Inc., Deluxe delineator post, or polyethylene similar to Safety Guide Traf-Flex Post. The post shall have 4" wide white bands as shown on the plans. The reflective intensity of the bands shall meet the requirements of Type IIIA or TYPE IIIB, flexible reflective sheeting. The delineator base shall be attached to the pavement as shown on the plans. The contractor shall maintain the delineators until they are removed. The flexible delineator shall remain the property of the contractor. The flexible delineators shall be measured by the number installed and accepted by the engineer. All costs for providing, installing, maintaining, and removing the flexible delineators shall be included in the unit price bid for "Flexible Delineators."

704 P01 MAINTAINING ACCESS: The contractor will be responsible for providing access to all residential dwelling and business establishments adjacent to this project. Final details on location of access points and construction procedures shall be worked out with the engineer in the field prior to start of the project.

Cold bituminous pavement has been provided and shall be used for providing an all-weather surface for maintaining access to adjacent establishments. The exact locations and quantities shall be determined in the field. The gradation of the aggregate and the type of grade of bitumen to be used shall be approved by the engineer. The unit price bid for "Cold Bituminous Pavement" will be full compensation for all labor, equipment, and materials (including bitumen) necessary to complete the work as specified. Subsequent removal of this material (where required) will not be paid for separately but shall be included in the price bid for "Cold Bituminous Pavement."

704 P02 MAINTAINING TRAFFIC: Traffic shall be maintained on Main Street and on Highway 6 (Tenth Avenue) from Third Street, SW to south of the Heart River Bridge during construction of this project. One-half of the roadway shall be completed while two-way traffic is carried on the other half. On Highway 6 the contractor shall complete the construction of the west half of the roadway first. To provide sufficient width for two-way traffic on the east side, a minimum of 2 inches of cold bituminous pavement shall be placed adjacent to the existing surfacing to provide a total width of approximately 25 feet. Prior to placing the cold bituminous pavement the existing trees shown on the plan and profile sheets will have to be removed. Some replacing of the subgrade will be required and the existing street lighting system shall be revised as shown on the electrical layout sheets. The cost of the reshaping the subgrade shall be included in the price bid for "Cold Bituminous Pavement." When the first half of the roadway is completed, the traffic shall be moved to the new pavement and the other half constructed.

There is an existing temporary bituminous surfaced access road located south of the existing structure that connects First Street, SW to Highway 6. The contractor will be required to complete Third Street, SW from 12th Avenue, SW to Highway 6 at least to the extent that it will accommodate two lanes of traffic on a minimum of 3 inches of hot bituminous pavement before the temporary access road can be removed.

704 P03 TRAFFIC CONTROL: When the surfacing is placed on the second half of the roadways, the vertical panels will have to be removed. Until this concrete has hardened sufficiently to allow the placement of delineator drums, the contractor shall place tubular markers on the concrete placed on the first half. These tubular markers shall have weighted bases. When the second half surfacing is sufficiently hard, the tubular markers shall be removed and weighted delineator drums installed. These drums shall be placed entirely on the new concrete with the edge of the drum on the edge of the new concrete. A sufficient number of tubular markers have been provided for one days surfacing production. The markers shall be moved to the next days operation and moving them will be considered incidental to the price bid for tubular markers. A sufficient number of delineator drums have been provided to do Main Street and Highway 6 (Tenth Avenue).

708 P01 LOOSE ROCK RIPRAP: The loose rock riprap to be placed in the north ditch on Main Street shall have a minimum depth of 2 feet. A non woven geotextile fabric with a minimum weight of 8 ounces per square yard shall be placed under the riprap. Some grading in the ditch to accommodate the riprap will be required. The cost of the necessary grading and for the furnishing and installing of the geotextile fabric shall be included in the price bid for "Riprap, Loose Rock."

724 P03 WATER SERVICE LINES: The following material shall be used for the installation of the one inch copper water service lines at approximately Station 34+61 Rt., 35+11 Rt., and 35+61 Rt.

Copper Water Pipe: The one inch copper water pipe shall conform to A.S.T.M. B88, Type K.

Corporation Stop With Bend: The corporation stops with bend shall be Mueller No. H-15020 or equal.

Curb Stop: Curb stops shall be Mueller No. H-15164 for copper water pipe or equal.

Curb Box: Curb box shall be Mueller No. H-10304 (two inch diameter) for one inch copper water pipe or equal. the length of the curb box extended shall be 8 feet.

The city of Mandan will make the required taps on the watermain. The contractor shall pay the city $15 for each tap. The contractor shall provide all materials required for the tap and install the new one inch copper line from the new corporation stops to the location of the new curb stops. An approved adaptor shall be installed to join the new copper lines to the existing lines. The existing corporation cocks shall be shut off at the main and the old lines cut. The existing curb stops and boxes shall be removed and disposed of. The unit price bid for "Water Service Line - 1 Inch Copper" will be full compensation for all labor, equipment, and material necessary to complete the work as specified.

Questions pertaining to the city of Mandan specifications should be directed to the city engineer. The address is 205 Second Avenue, NW, 58554. The telephone number is (701)667-3225.

724 P04 PIPE, DUCTILE IRON: The ductile iron pipe used on this project shall be manufactured in accordance with the American National Standards Institute (A.N.S.I.) Specifications A21.51. The pipe shall be Class 50. The pipe shall be coated and lined in accordance with A.N.S.I. A21.4. Pipe joints shall be the mechanical or slip-on type gasket joint. The ductile iron pipe shall be installed with a polyethylene encasement conforming to A.N.S.I. A21.5, using method A for installation. The fittings required to complete the installation as shown will not be paid for separately, but shall be measured and paid for at the unit price bid for "Pipe, Ductile Iron - 12 inch." The ductile iron pipe from the lift station (339) to manhole #40 is not included in the quantities as a pay item. See "Pumping Equipment" special provision.

724 P05 SHUT OFF EXISTING CORPORATION: At approximately Sta. 16+97-182' Lt., 20+52-375' Lt. and 22+54-19' Lt. the contractor shall excavate down the existing watermain and close the existing corporation stops. Care shall be taken so no leakage occurs after the stops have been closed. The resulting holes shall be backfilled and properly compacted. 6 inches of cold bituminous pavement shall be used for patching as required on Second Street. This material shall be measured and paid for at the contract price.

748 010 CURB RAMPS: Curb ramps shall be placed at all intersections of the sidewalk and street. The type of curb ramp to be used at each intersection will be determined by the engineer in the field.

752 P01 SAFETY FENCE: A temporary safety fence shall be installed (and maintained) by the contractor at locations designated by the engineer as needed for pedestrian control. The safety fence shall be orange in color, four feet high, and constructed of high density polyethylene and shall be installed in accordance with manufacturer's recommendations. Tensor Corporation fence Product No. UX 4050 or equal can be used. The quantity of fencing shown is advisory only and the actual amount needed shall be determined in the field as required for the construction sequencing.

The price bid for "Safety Fence" shall be full compensation for all labor, equipment, and materials necessary to complete the work as required.

752 P02 CHAIN LINK FENCE: The chain link fence installed on this project shall be 8 feet high. The line posts shall be installed in the header curb as shown on the curb and gutter detail sheet. Where the fence is to be installed outside the header curb (see plan and profile sheets) the concrete bases shall be as shown on Std. D-752-2. Fence terminals shall be installed at each end. These terminals have been included in the quantities and shall be paid for at the unit price bid for "Fence, Chain Link."

754 030 IN-PLACE SIGNS: The district shall inspect the in-place signs and supports for condition to determine if there are any additional signs or supports that can be reset or changed to new sign and supports. The district shall inform the contractor of any changes prior to the time the contractor orders materials.

754 050 SIGN SUPPORTS: The sign support "Steel Galvanized Posts - Square Tube Perforated" were designed using a minimum yield strength of 42,000 psi and the design requirements of the "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals." The wind speed of 75 mph was used. The contractor may choose other types of square telescoping steel post in lieu of the ones specified but the contractor must provide equivalent strength posts and meet the FHWA yielding support requirements.

GENERAL NOTES

762 P01 TEMPORARY PAVEMENT MARKINGS: When the first half of the roadway is being graded and surfaced, paint and beads shall be used for temporary marking on the bituminous surfacing on the other half of the roadway. When the surfacing on the first half is completed, raised pavement markers shall be used for temporary pavement marking. The centerline markers shall be placed in pairs 3 inches apart spaced at 5 feet along the centerline. The edge line shall be a single raised pavement markers spaced at 5 feet and located one foot inside the new pavement edge.

The raised pavement markers shall be Stimsonite No. 66, Flex-)-Lite RCM construction marker or equal. The raised pavement markers shall be cleaned when necessary to retain reflectivity as specified in Section 704.03 W. At completion of the project, the markers shall be removed in accordance with the manufacturer's recommendations and when removed, shall leave no unsightly marks on the pavement.

770 001 OVERHEAD LINES CLEARANCE: Minimum horizontal and vertical clearance between light and/or signal standards and power lines shall be as shown for the following power line voltages:

Power Line Voltage	Horizontal Clearance	Vertical Clearance
0-15,000	5'	6'
15,000-50,000	5'	7'
50,000 Plus	5'+0.033' per KV Over 50 KV	7'+0.033' per KV Over 50 KV

770 P01 CONDUIT BENDS AND DOWN CONDUIT: Station 12+11-32' Lt. and 12+23-23.3' Rt. The contractor shall install the conduit bends and down conduit at these locations as shown on the plans. The conduit bends and down conduit will not be paid separately but shall be included in the price bid for other items.

770 P02 FEEDER CIRCUIT: Sta. 23+53-182' Lt. The contractor shall install the conduit on the existing pole. The conduit shall have a weather head and meter trim installed with it. The cost of the weather head, meter trim, and installation shall be incidental to the price bid for the conduit. The utility company shall make the service connection.

770 P03 GROUNDING: Sta. 2+07-23' Lt., 3+40-2.3' Rt., 1+50-24' Lt., 6+00-13' Rt., 1+50-20' Rt., 3+80-20' Rt, 7+32-22' Rt., 22+30-41' Lt., and 37+45-43' Lt., 3+60-51' Rt., 6+00-4' Rt. The contractor shall furnish and install the ground rod and make the necessary connections grounding the new lighting standard. Sta. 7+38-53' Rt. & 2+10-23' Lt. The contractor shall furnish and install the ground rod and make the necessary connections grounding the new light standard at the wood pole. The cost for furnish, installing, and connecting the ground rod shall be incidental price bid for other items.

770 P04 CONDUIT BODY AND CONDUIT: Sta. 7+38-53' Rt., 2+10-23' Lt., 29+76-400' Lt. The contractor shall furnish the conduit body and conduit as shown in the plans at the locations shown. The existing circuits shall be disconnected at the feed point. The existing conduit shall be cut and the feed wire to the luminaire cut to make the necessary connection to the new conductors. If sufficient conductor is not in place to reconnect the luminaire the contractor shall furnish the necessary NO. 12 AWG wire. The cost of furnishing, material, equipment, and labor incidental to the price bid for other items.

770 P05 BREAKAWAY LIGHT STANDARDS: The breakaway light standards shall be of the davit type and designed for the mast arm lengths shown in the plans and shall be galvanized. The bases shall be of the breakaway type. The shaft length shall be 41 foot from the top of the foundation to the bottom of the luminaire as shown in the plans.

770 P06 LIGHT STANDARDS: The light standards shall be of the davit type and designed for the mast arm length shown in the plans and shall be galvanized. The base shall be of the anchor type. Mounting height shall be as noted in the plans.

770 P07 LUMINAIRES: The high pressure sodium vapor luminaires shall be internal ballast constant wattage, 120x240 voltage. the luminaires for light standards 1-28 shall be operated on 240 volts. The luminaires on the First Street, SW, Second Street, SW and Third Street, SW shall be operated on 120 volts.

770 P08 LEGEND--LIGHTING:

100-watt sodium vapor luminaire

200-watt sodium vapor luminaire

250-watt sodium vapor luminaire

770 P09 REMOVE WOOD POLE LIGHT STANDARDS: The contractor shall remove the existing light standards as shown on the plans. The contractor shall arrange to have power disconnected at the feed point. The light standard shall have the circuits disconnected and the luminaire and mast arm removed. The underground conductors are deemed not salvageable and may be abandoned. The removed light standard luminaires and mast arms shall become the property of the city and shall be delivered to the city maintenance yard. The cost of equipment, labor, and delivering the removed equipment shall be incidental to price bid for "Remove Wood Pole Light Standards."

770 P10 MAIN STREET WOOD POLE LIGHTING SYSTEM: The contractor shall not remove the wood pole light system along Main Street until the new lighting system is installed and operational.

770 P11 TEMPORARY LIGHTING SYSTEM: The contractor shall install the temporary lighting system from Third Street to Seventh Street prior to diversion of traffic to the east half of the roadway. The wood pole system shall be de-energized at the feed point and the conductors installed, the wood pole and luminaire relocated and the wire spliced to provide continuity. The lighting system shall be re-energized at the end of each days work and shall be entirely operational. The cost of materials, equipment, and labor shall be included in the price bid for "Temporary Lighting System."

770 P12 The contractor shall install the permanent lighting on the west side of the roadway prior to moving traffic to the west half of the roadway. This circuit of the lighting shall be energized.

772 006 SIGNAL TESTING AND INITIAL OPERATION: The signal head shall be hooded with a material that will allow the signal heads, when lighted, to be seen dimly by personnel testing the signals. The hood shall remain in place until the signal is authorized to be operated.

772 100 PAINT: The traffic signal system components shall be painted in accordance with the following:

Transformer base - green
Mast arm - green
Signal head mounting hardware - yellow
Shaft - green
Signal housing - yellow
Pedestrian pushbutton post - yellow

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	10

SUMMARY OF QUANTITIES

SPEC	CODE	ITEM DESCRIPTION	UNIT	RRS PORTION	F PORTION	TOTAL
103	0100	Contract Bond	L. Sum	1		1
107	0100	Railway Protection Insurance	L. Sum	1		1
201	0370	Removal of Trees - 10 Inches	Ea.		3	3
201	0380	Removal of Trees - 18 Inches	Ea.	1	11	12
201	0390	Removal of Trees - 30 Inches	Ea.	1	14	15
202	0105	Removal of Structure	L. Sum	1		1
202	0112	Removal of Concrete	Sq. Yd.	873	711	1,584
202	0130	Removal of Curb and Gutter	L. Ft.	2,600	44	2,644
202	0153	Saw Bituminous Surfacing (Full Depth)	L. Ft.	360	180	540
202	0292	Removal of Existing Retaining Wall	L. Sum	1		1
203	0101	Common Excavation - Type A	Cu. Yd.	20,828	10,128	30,956
203	0140	Borrow	Cu. Yd.	37,024		37,024
216	0100	Water	"M" Gal.	880	200	1,080
302	0120	Aggregate Base Course Cl. 5	Ton	13,459	8,550	22,009
401	0152	SS-1h or CSS-1h Emulsified Asphalt	Gal.	641	10	651
402	0110	Cold Bituminous Pavement	Ton	100	400	500
406	0170	Hot Bituminous Pavement - Cl. 25	Ton	2,654	40	2,694
406	0310	85-100 Asphalt Cement	Ton	173	3	176
550	0112	8 In. Non-reinforced Concrete Pavement - Cl. AE	Sq. Yd.	8,363	9,359	17,722
550	0174	8 In. Non-reinforced Concrete Pavement - High Early Strength	Sq. Yd.	800	1,000	1,800
550	0215	Concrete Bridge Approach Slab	Sq. Yd.		189	189
550	0230	Doweled Expansion Joint Assembly	L. Ft.	367	369	736
550	0240	Doweled Contraction Joint Assembly	L. Ft.	937	1,189	2,126
550	0809	Preformed Compression Joint Seal 9/16 In.	L. Ft.	5,804	6,835	12,639
550	0958	Longitudinal Joint Silicone Seal	L. Ft.	1,594	2,195	3,789

FHWA REGION	STATE	FED. AID PROJ NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	11

SUMMARY OF QUANTITIES

SPEC	CODE	ITEM DESCRIPTION	UNIT	RRS PORTION	F PORTION	TOTAL
550	0961	Expansion Joint Silicone Seal	L. Ft.	367	369	736
702	0100	Mobilization	L. Sum	1		1
704	0100	Flagging	M. Hr.	500	500	1,000
704	1000	Traffic Control Signs	Unit	1,058	368	1,426
704	1052	Type III Barricade	Ea.	18	5	23
704	1060	Delineator Drums	Ea.	69	117	186
704	1067	Tubular Markers	Ea.		36	36
704	1072	Flexible Delineators	Ea.	36	146	182
704	1080	Vertical Panels	Ea.	5	90	95
706	0300	Field Laboratory - Type C	Ea.	1		1
708	1020	Riprap, Loose Rock	Cu. Yd.	45		45
708	2240	Seeding Type B, Class II	Acre	4		4
708	3020	Topsoil for Seeding	Cu. Yd.	800	400	1,200
708	4000	Sodding	Sq. Yd.	16,762	4,528	21,290
714	0115	Pipe, Concrete Reinforced 12 In. - Cl. III - Storm Drain	L. Ft.	592	46	638
714	0210	Pipe, Concrete Reinforced 15 In. - Cl. III - Storm Drain	L. Ft.	845	246	1,091
714	0315	Pipe, Concrete Reinforced 18 In. - Cl. III - Storm Drain	L. Ft.	52	268	320
714	0405	Pipe, Concrete Reinforced 21 In. - Class III - Storm Drain	L.Ft.		1,516	1,516
714	0620	Pipe, Concrete Reinforced 24 In. Class III - Storm Drain	L. Ft.		308	308
714	3005	End Section, Concrete Reinforced 15 In.	Ea.	2		2
714	9720	Underdrain, Pipe, PVC, Perforated - 4 In.	L. Ft.	262	200	462
722	0100	Manhole - 48 In.	Ea.	4	3	7
722	0110	Manhole - 60 In.	Ea.	2	5	7

FHWA REGION	STATE	FED. AID PROJ NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	12

SUMMARY OF QUANTITIES

SPEC	CODE	ITEM DESCRIPTION	UNIT	RRS PORTION	F PORTION	TOTAL
722	1100	Manhole Riser - 48 In.	L. Ft.	17	27	44
722	1110	Manhole Riser - 60 In.	L. Ft.	12	41	53
722	3500	Inlet, Type I	Ea.	7	8	15
722	3510	Inlet, Type 2	Ea.	8	2	10
722	4000	Inlet, Catch Basin - Type A	Ea.		1	1
722	4010	Inlet, Catch Basin - 6 In. Beehive	Ea.	2		2
722	6240	Adjust Utility Appurtenance	Ea.	11	13	24
724	0200	Fittings, Cast Iron	Lbs.	1,150		1,150
724	0420	Hydrant, Relocate	Ea.	2	1	3
724	0610	Water Service Line - 1 In. Copper	L. Ft.		40	40
724	0850	Watermain, 12 In. PVC	L. Ft.	20		20
724	1144	Pipe, Ductile Iron - 12 In.	L. Ft.		120	120
724	7052	Shut Off Existing Corporation	Ea.	3		3
748	0140	Curb and Gutter, Type I	L. Ft.	6,112	4,253	10,365
748	0500	Curb, Header, Type I	L. Ft.	297		297
748	0520	Curb, Type I	L. Ft.	160		160
750	0100	Sidewalk, Concrete	Sq. Yd.	1,658	1,815	3,473
750	1010	Driveway, Concrete - High Early Strength	Sq. Yd.	298	386	684
752	0102	Fence, Barbed Wire, 3-Strand Wood Post	L. Ft.	380		380
752	0320	Fence, Barbed Wire, 4-Strand Steel Post	L. Ft.	622		622
752	0600	Fence, Chain Link	L. Ft.	320		320
752	0910	Safety Fence	L. Ft.	400	400	800
752	0995	Fence Terminal - Wood Posts	Ea.	2		2
752	3150	Corner Assembly, Barbed Wire - Wood Post	Ea.	2		2
752	3160	Corner Assembly, Barbed Wire - Steel Post	Ea.	2		2

FHWA REGION	STATE	FED. AID PROJ NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	13

SUMMARY OF QUANTITIES

SPEC	CODE	ITEM DESCRIPTION	UNIT	RRS PORTION	F PORTION	TOTAL
754	0116	Flat Sheet for Signs - Type 2 Refl. Sheeting	Sq. Ft.	89	26	115
754	0117	Flat Sheet for Signs - Type 3A Reflective Sheeting	Sq. Ft.	31	52	83
754	0209	Steel Galvanized Posts - Square Tube Perforated	Lb.	964	549	1,513
754	0592	Reset Sign Panel	Ea.	18	20	38
754	0593	Reset Sign Support	Ea.	19	14	33
762	0102	Pavement Marking Painted Line	L. Ft.	5,169	692	5,861
762	0128	Plastic Pavement Marking Film Message	Sq. Ft.	165		165
762	0129	Plastic Pavement Marking Film Line	Sq. Ft.	1,604	396	2,000
762	0132	Temporary Stripe - Solid Line, Type NR	L. Ft.	3,000	7,350	10,350
764	0131	W-Beam Guardrail	L. Ft.		129	129
764	0151	Remove Beam Guardrail and Posts	L. Ft.		182	182
764	1060	Reset W-Beam Guardrail - Flared End Treatment and Transition	Ea.		2	2
764	2081	Remove End Treatment and Transition	Ea.		2	2
770	0020	Concrete Foundation - Highway Lighting	Ea.	20	18	38
770	0060	Concrete Foundation - Feed Point - Type B	Ea.	2		2
770	0210	Cable Trench - Type I	L. Ft.	2,944	4,063	7,007
770	0330	2 In. Diameter Rigid Conduit	L. Ft.	1,387	1,038	2,425
770	0335	2 In. Diameter Rigid Conduit - Bridge Mounted	L. Ft.		274	274
770	0503	Underground Conductor No. 2 - Type RHW	L. Ft.	192	1,396	1,588
770	0504	Underground Conductor No. 4 - Type RHW	L. Ft.		2,082	2,082

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	14

SUMMARY OF QUANTITIES

SPEC	CODE	ITEM DESCRIPTION	UNIT	RRS PORTION	F PORTION	TOTAL
770	0505	Underground Conductor No. 6 - Type RHW	L. Ft.	8,914	8,918	17,832
770	0506	Underground Conductor No. 8 - Type RHW	L. Ft.	1,977		1,977
770	0605	Underground Conductor No. 6 - Type THW	L. Ft.	4,904	5,445	10,349
770	0735	Feed Point - Type II - Pad Mounted	Ea.	1		1
770	1066	Light Standard 6 Ft. M.A. - 30 Ft. M.H.	Ea.	3	1	4
770	1076	Light Standard 6 Ft. M.A. - 40 Ft. M.H.	Ea.	11	10	21
770	1086	Lt. Std. 6 Ft. M.A. 50 Ft. Mt. Ht.	Ea.		1	1
770	1097	Lt. Std. 6 Ft. M.A. 45.5 Ft. Pole	Ea.	1		1
770	1176	Light Standard 10 Ft. M.A. - 40 Ft. M.H.	Ea.	4		4
770	1226	Light Standard 12 Ft. M.A. - 40 Ft. M.H.	Ea.	3	3	6
770	1232	Lt. Std. 12 Ft. M.A. 50 Ft. MT. Ht.	Ea.		1	1
770	1678	Lt. Std. 6 Ft. M.A. 42 Ft. Pole - Breakaway	Ea.		2	2
770	4115	H.P. Sodium Vapor Luminaire-100 Watt	Ea.	8	1	9
770	4130	H.P. Sodium Vapor Luminaire - 200 Watt	Ea.	8	15	23
770	4140	H.P. Sodium Vapor Luminaire - 250 Watt	Ea.	8	2	10
770	4501	Temporary Lighting System	Ea.		1	1
770	4573	Remove Wood Pole Light Standard	Ea.	17	11	28
770	4590	Remove Feed Point	Ea.	1		1
772	0020	Concrete Foundation - Traffic Signals	Ea.	5		5
772	0100	Pull Box	Ea.	7		7
772	0200	1 In. Diameter Rigid Conduit	L. Ft.	487		487
772	0240	2 In. Diameter Rigid Conduit	L. Ft.	718		718
772	0270	3 In. Diameter Rigid Conduit	L. Ft.	202		202
772	0290	4 In. Diameter Rigid Conduit	L. Ft.	61		61
772	0300	Underground Conductor No. 6 - Type RHW	L. Ft.	364		364
772	0310	Underground Conductor No. 6 - Type THW	L. Ft.	182		182

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	15

SUMMARY OF QUANTITIES

SPEC	CODE	ITEM DESCRIPTION	UNIT	RRS PORTION	F PORTION	TOTAL
772	0325	Detector Loop - Polyethylene Conduit Pre-wired	L. Ft.	204		204
772	0330	Loop Lead-in Conductor	L. Ft.	1,919		1,919
772	0350	Preformed Loop Detector	Ea.	7		7
772	0400	No. 12 AWG 2 Conductor Cable	L. Ft.	312		312
772	0403	No. 12 AWG 5 Conductor Cable	L. Ft.	303		303
772	0410	No. 12 AWG 12 Conductor Cable	L. Ft.	885		885
772	0490	Saw Slot	L. Ft.	58		58
772	0551	Feed Point - Combo. Lighting and Signal Pad Mount	Ea.	1		1
772	0619	Type IV Signal Standard - 19 Foot Mast Arm	Ea.	1		1
772	0624	Type IV Signal Standard - 24 Foot Mast Arm	Ea.	1		1
772	0786	Comb. 8 Ft. M.A. Sign. and Light Std. - Type C	Ea.	1		1
772	0952	Combo 25 Ft. M.A. Signal and Light Standard - Type C	Ea.	1		1
772	1810	1-Way 3 Sec Head W/12 In. Lenses - Post Mounted	Ea.	4		4
772	1812	1-Way 3 Sec. Head W/12 In. Lenses - Mast Arm Mounted	Ea.	5		5
772	1832	1-Way 5 Sec. Head W/12 In. Lenses - Mast Arm Mounted	Ea.	1		1
772	2000	1-Way, 2 Sec. Hd. Pedestrian Signal - Post Mounted	Ea.	2		2
772	2145	Flashing Beacon - Mast Arm Mounted	Ea.		2	2
772	2200	Pedestrian Pushbutton Post	Ea.	1		1
772	2505	Volume Density Controller W/Ped. Timing	Ea.	1		1
772	3125	Remove Traffic Signal System	Ea.	1		1
920	0100	Pumping Equipment	L. Sum		1	1
920	0200	Pump House	L. Sum		1	1

FHWA REGION	STATE	FED. AID PROJ NO	SHEET NO
8	N.D.	F-RRS-1-006(005)066	16

BASIS OF ESTIMATE

Description	Unit	Quantity/S.Y./In.
Hot Bit. Surf. - Cl. 25 @ 2.0 Ton/C.Y.	Ton	0.05556
85-100 Asphalt Cement @ 6.5% of Hot Bituminous Pavement	Ton	0.00361
Aggregate Base Course - Cl. 5 @ 1.5 Ton/C.Y. + 25%	Ton	0.05208
Water for Aggregate Base @ 20 Gal./Ton of Aggregate Base	M. Gal.	0.00104
SS-1h or CSS-1h Emulsified Asph. for Tack Coat @ 0.05 Gal. S.Y.	Gal.	0.05/S.Y.

BASIS OF ESTIMATE (GRADING)

WATER: 10 Gals./C.Y. of estimated embankment quantities. Additional water has been included in the quantities and shall be used as a dust palliative as directed by the engineer.

TOPSOIL: See Note 203-P02.

SODDING: The entire area behind the curb and gutter or sidewalk (except surfaced and seeded areas) shall be sodded. The exact limits shall be determined in the field.

SEEDING: The area disturbed by the removal of the approaches to the existing structure and the borrow areas located south of the Heart River and east and west of Highway 6 shall be seeded.

SPECIAL PROVISIONS

SP-140 Pumping Equipment

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	17

STANDARD NO.

LIST OF STANDARD DRAWINGS

D-706-1 Type C Field Laboratory

D-714-1 Reinforced Concrete Pipe Culverts and End Sections

D-722-1 Inlet - Type 1

D-722-1A Inlet - Catch Basin

D-722-2 Inlet - Type 2

D-722-5 Manhole Details

D-724-1 Water Works

D-752-1 Standard Barbed Wire Fence

D-752-2 Chain Link Fence

D-754-1 Construction Sign Details

D-754-10 Construction Sign and Barricade Location Details

D-754-11 Construction Sign and Barricade Location Details

D-754-2 Construction Sign Details

D-754-23 Assembly Details

D-754-24 Mounting Details Perforated Tube

D-754-26 Sign Punching, Stringer, and Support Location Details for Regulatory, Warning, and Guide Signs

D-754-27 Sign Punching, Stringer, and Support Location Details for Regulatory, Warning, and Guide Signs

D-754-29 Sign Punching, Stringer, and Support Location Details for Regulatory, Warning, and Guide Signs

D-754-3 Construction Sign Details

D-754-4 Construction Sign Details

D-754-41 Sign Punching, Stringer, and Support Location Details for Regulatory, Warning, and Guide Signs

D-754-5 Barricade Details

D-754-5A Construction Sign and Barricade Assembly Details

D-754-57 Sign Punching, Stringer, and Support Location Details - Route Marker Signs

D-754-58 Sign Punching, Stringer, and Support Location Details - Route Marker Signs

D-754-76 Street Name Sign Assembly Details

D-754-80 Light Standard, Signal Standard, and Span Wire Mounted Sign Assembly Detail

D-764-1 Beam Guardrail - General Details

D-764-2 Beam Guardrail - Flared End Treatment and Transition

D-764-3 W-Beam Guardrail at Bridge Ends (General Layout and Details Flared Guardrail Section)

D-764-7 Guardrail at Bridge Ends (50 mph Design Length of Need Tables)

D-770-1 Concrete Foundations (Traffic Signals and Highway Lighting)

D-770-2 Feed Point (Roadway Lighting)

D-770-4 Lighting and Signal Details

D-770-5 Light Standard Details

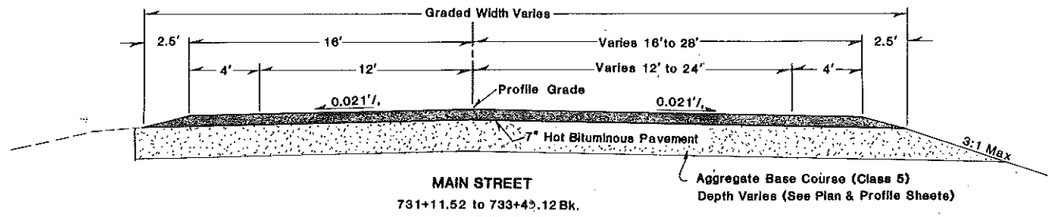
D-772-2 Traffic Signal Standards

D-772-3 Traffic Signal Standards (Mast Arm Type)

D-772-4 Traffic Signal Head Mounting

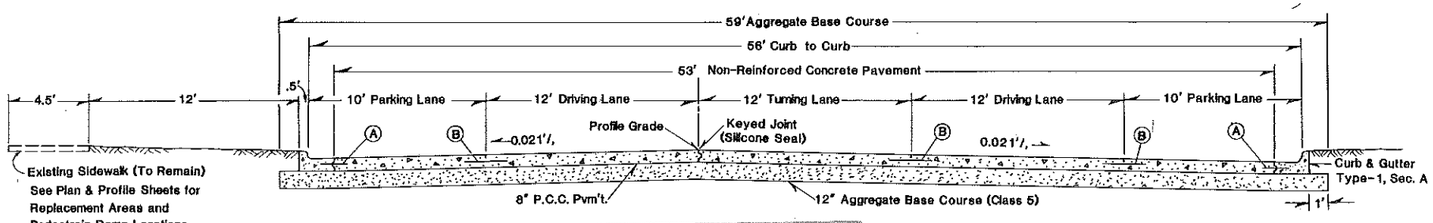
D-772-5 Loop Detector Details

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N. D.	F-FRS-1-006(005)066	18



MAIN STREET
731+11.52 to 733+48.12 Bk.
=733+48.76 Ahd.

Aggregate Base Course (Class 5)
Depth Varies (See Plan & Profile Sheets)



Ⓐ No. 3 x 1'-6" Tie Bar at 4'-0" C-C.

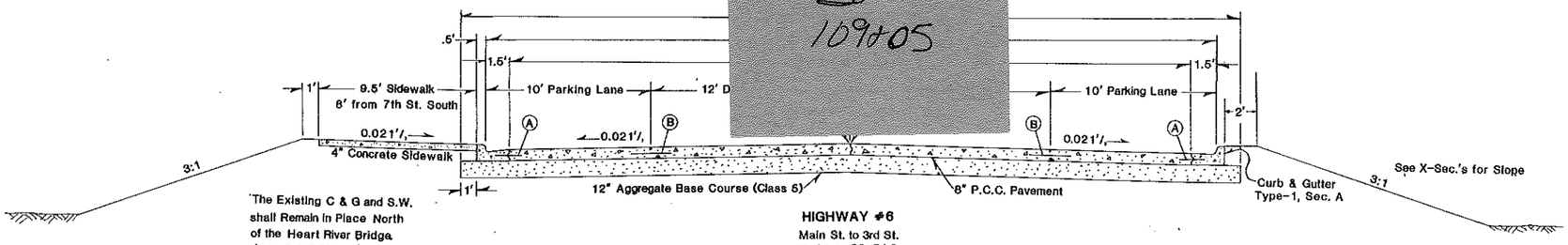
Ⓑ No. 4 x 2'-6" Tie Bar at 4'-0" C-C.

NOTE:
The depth of the aggregate base varies in subcut areas.
See plan and profile sheets for locations of subcut.

Sta. 102+51

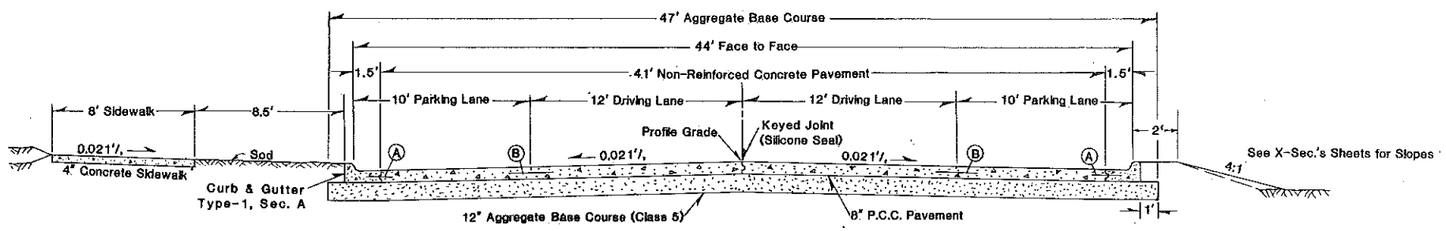
109+05

CURB - TYPE 1
741+43.45 to 10+72 Rt.
See Detail Sheet for Curb



The Existing C & G and S.W. shall Remain in Place North of the Heart River Bridge. (See P & P Sheets)

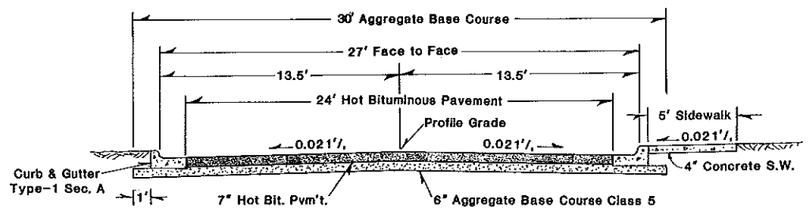
HIGHWAY #6
Main St. to 3rd St.
10+00 to 22+51.9
7th St. to Heart River Bridge
37+66.37 to 45+29



HIGHWAY #6
3rd St. to 7th St.
22+51.9 to 37+66.37

TYPICAL SECTIONS

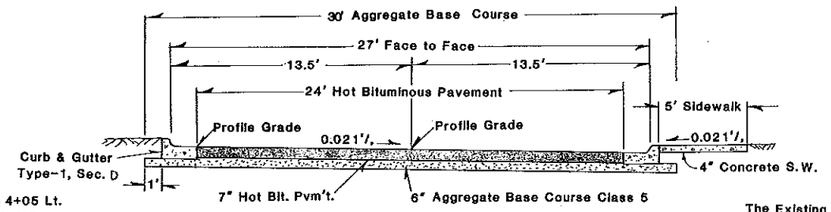
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RES-1-006(005)066	19



1st STREET S.W.
1+80.3 to 4+00

NOTE:
The surfacing on the cul-de-sacs on 1ST. Street and 2ND Street shall be the same as shown above

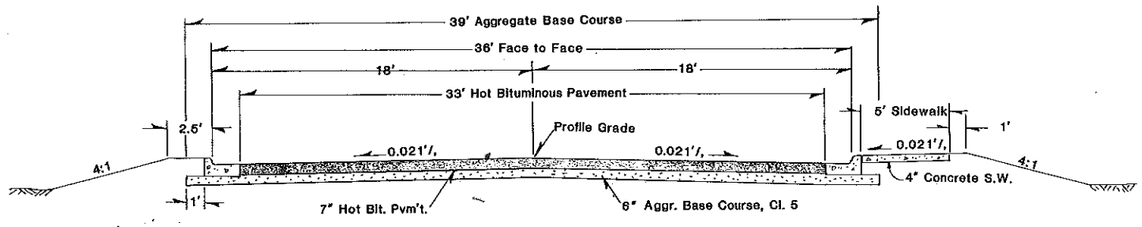
NOTE:
Depth of aggregate base varies in subcut areas.
See plan and profile sheets for locations of subcut.



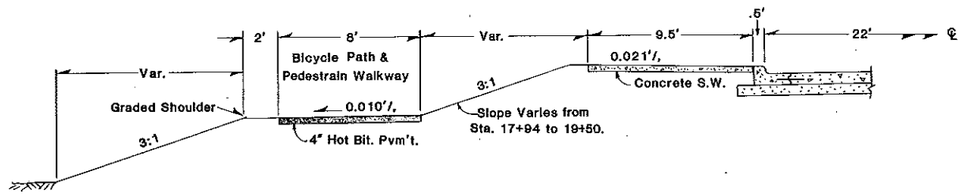
Sta. 3+95 to 4+05 Lt.
Transition C & G From
Type-1, Sec. A to
Type-1, Sec. D.

1st STREET S.W.
4+00 to 7+59.8

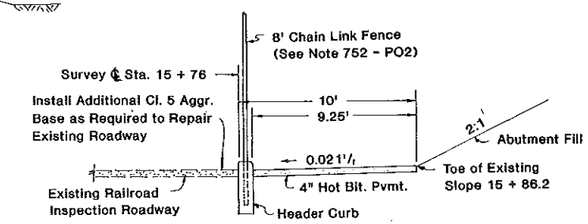
The Existing Curb & Gutter and Sidewalk shall Remain in Place on the South Side of the Street from Sta. 5+61 to 8th Ave. S.W.



3rd STREET S.W.
0+39.8 to 7+78.7



BICYCLE PATH & PEDESTRIAN WALKWAY
(See Plan & Profile Sheets for Location)

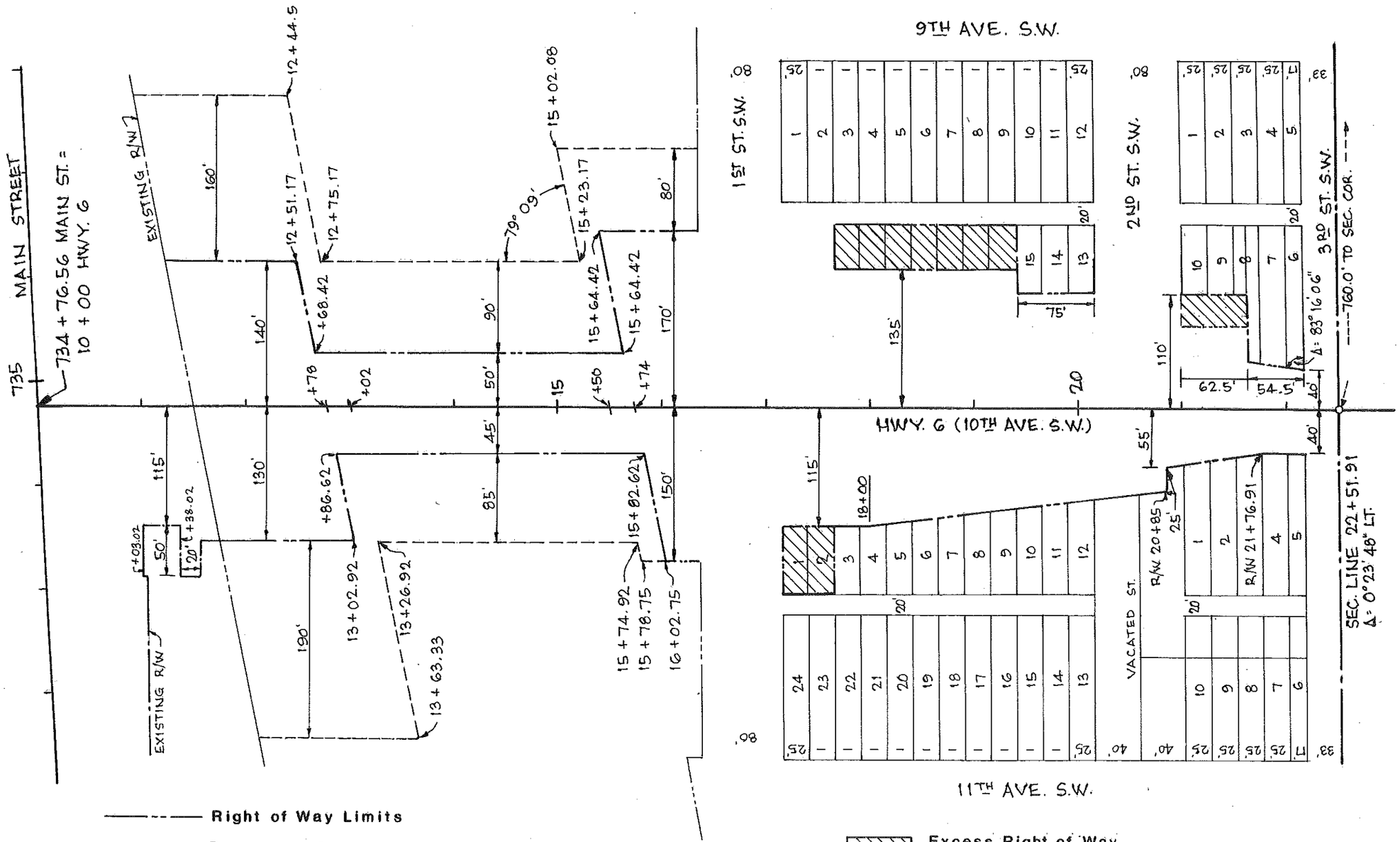


BICYCLE PATH AND PEDESTRIAN WALKWAY UNDER STRUCTURE - EAST & WEST

TYPICAL SECTIONS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	20

RIGHT OF WAY AND EASEMENT LAYOUT
MAIN STREET TO 3RD STREET



——— Right of Way Limits

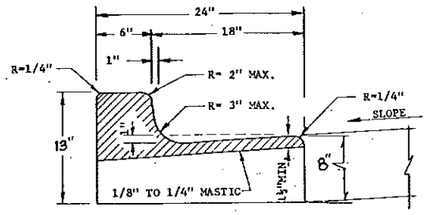
– – – – Temporary Construction Easement

Excess Right of Way To Be Sold To Others

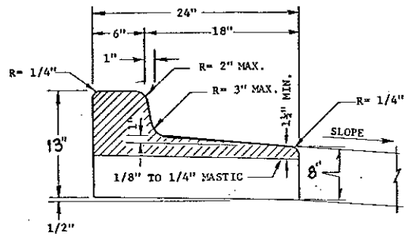
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.		21

F-RRS-1-006(005)066

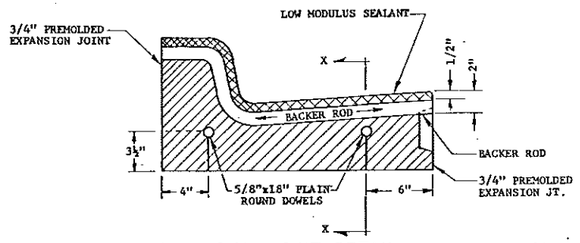
CURB & GUTTER DETAIL



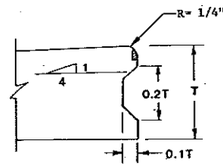
CURB & GUTTER TYPE I (SEC. A)



CURB & GUTTER TYPE I (SEC. D)



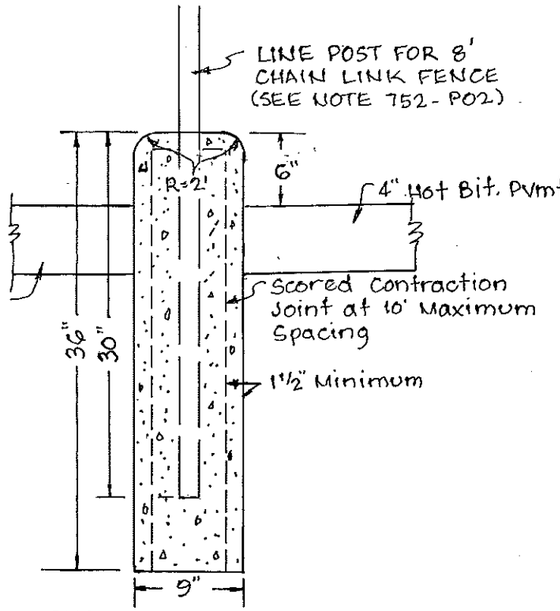
EXPANSION JOINT DETAIL



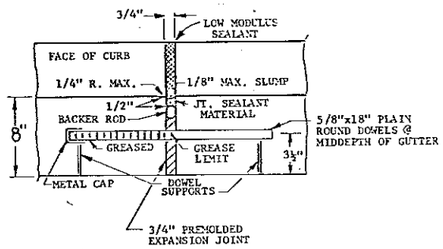
T=Thickness of Pavement
Unless Otherwise Noted on Plans.

KEYWAY DETAIL FOR CURB & GUTTER
(TO BE USED WITH P.C.C. PAVEMENT AND DRIVES.)

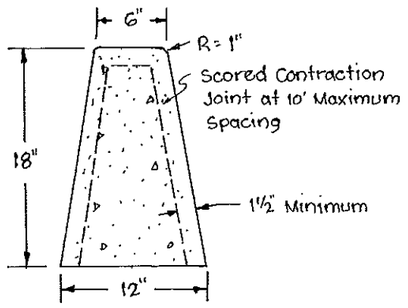
Existing Gravel Roadway



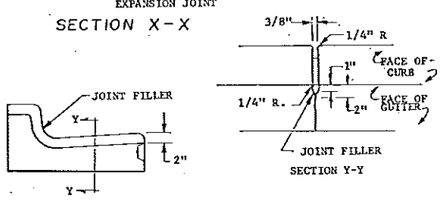
CURB, HEADER - TYPE I
STA. 15+76 RT. & LT.



SECTION X-X

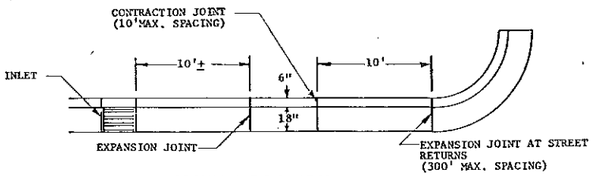


CURB - TYPE I
TO BE USED ON MAIN STREET
STA. 741+43.45 TO 10+72 RT.



SECTION Y-Y

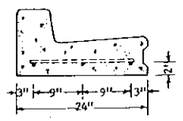
SCORED CONTRACTION JOINT DETAIL
(10' MAX. SPACING)



JOINT LOCATION DETAIL
HOT BITUMINOUS PAVEMENT

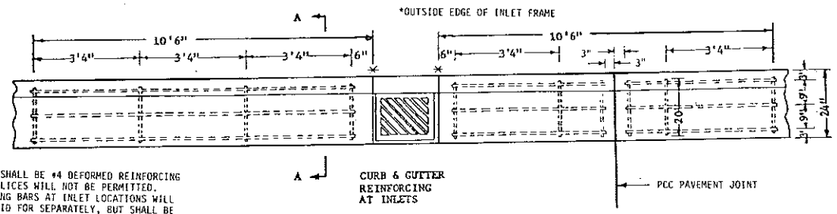
NOTES:

1. CURB AND GUTTER TYPE I (SEC. A) TO BE USED UNLESS OTHERWISE SPECIFIED.
2. CONTRACTION JOINTS: USE 1/8"-1/4" ASPHALTIC MASTIC BOARD EMBEDDED 1½" INTO THE GUTTER AND THROUGH THE CURB, OR SCORE THE CURB AND GUTTER 2" AS SHOWN IN THE DETAIL.
3. EXPANSION JOINTS - EXPANSION JOINT MATERIAL SHALL BE 3/4" PREMOLDED CONFORMING TO SECTION 826.02 B OF THE STANDARD SPECIFICATIONS. THE OPENING FOR THE BACKER ROD AND JOINT SEALANT SHALL BE FORMED BY A PRE-CUT PIECE OF WOOD OR OTHER MATERIAL APPROVED BY THE ENGINEER. DOWEL SUPPORTS ARE NOT REQUIRED ON THE SECOND POUR AT A COLD JOINT. THE METAL CAP AND GREASED DOWEL SHALL BE ON THE SECOND FOUR.
4. JOINT SPACING - FOR HOT BITUMINOUS PAVEMENTS THE JOINT SPACING OF THE CURB AND GUTTER SHALL BE AS SHOWN IN THE DETAIL. THE CURB AND GUTTER JOINTS SHALL MATCH THE PAVEMENT JOINT ON PCC PAVEMENTS.
5. JOINT SEALING - ALL CONTRACTION AND EXPANSION JOINTS SHALL BE SEALED AS SHOWN IN THE DETAILS, OR AS APPROVED BY THE ENGINEER. THE JOINT SEALANT SHALL BE LOW MODULUS SILICONE OR POLYURETHANE WITH THE FOLLOWING MINIMUM PROPERTIES:
   TENSILE STRENGTH AT BREAK (ASTM D-412) 125 psi
   MOVEMENT CAPABILITY ±50% EXPANSION/CONTRACTION
   TT-S-00230C
   THE SEALANT SHALL BE TOOLED AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.
6. THE COST FOR ALL LABOR, EQUIPMENT, AND MATERIAL NECESSARY TO CONSTRUCT CONTRACTION, & EXPANSION JOINTS SHALL BE INCLUDED IN THE PRICE BID FOR CURB AND GUTTER.



SECTION A-A

NOTE: ALL BARS SHALL BE #4 DEFORMED REINFORCING BARS. SPLICES WILL NOT BE PERMITTED. REINFORCING BARS AT INLET LOCATIONS WILL NOT BE PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN THE PRICE BID FOR "CURB AND GUTTER - TYPE I."

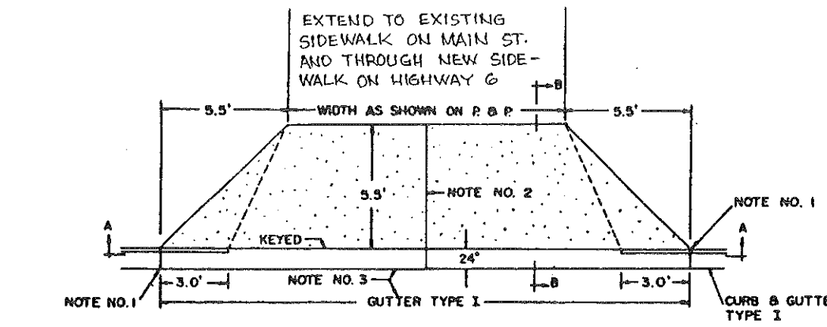


CURB & GUTTER REINFORCING AT INLETS

FHWA REGION NO.	STATE	PROJECT	SHEET NO.
8	N.D.		22

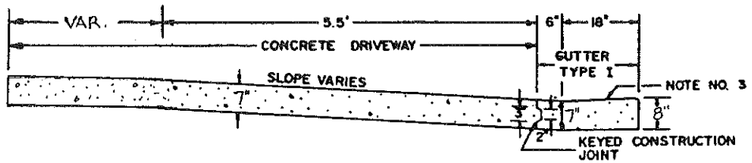
F-RRS-1-006(005)066

CONCRETE DRIVEWAY (URBAN)



DRIVEWAY TYPE 1

SECTION A-A



SECTION B-B

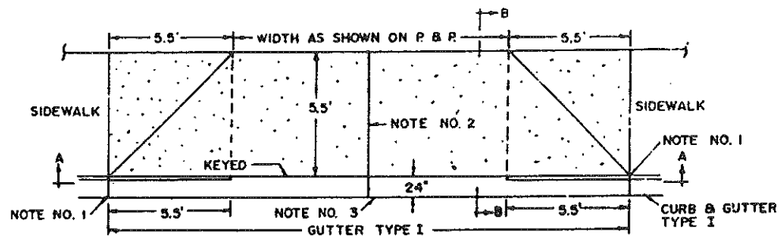
CONCRETE DRIVEWAY DETAILS

NOTE NO. 1 3/4" PREMOLDED EXPANSION JOINT FULL DEPTH AND SAME SHAPE AS CURB AND GUTTER.

NOTE NO. 2 CENTER JOINT SHALL BE USED ON ALL DRIVEWAYS 16' IN WIDTH OR GREATER. JOINTS SHALL BE A KEYED CONSTRUCTION JOINT OR A CONTRACTION JOINT SCORED 1/3 THE DEPTH OF THE CONCRETE. JOINT SHALL BE SEALED IN A MANNER AND WITH A MATERAL APPROVED BY THE ENGINEER.

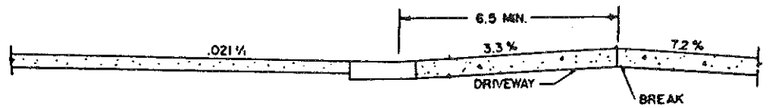
NOTE NO. 3 GUTTER-TYPE I SHALL BE PAID FOR AT THE UNIT PRICE BID FOR "CURB AND GUTTER-TYPE I."

NOTE NO.4 THE CONCRETE DRIVEWAYS SHALL BE CONSTRUCTED WITH HIGH EARLY STRENGTH CONCRETE

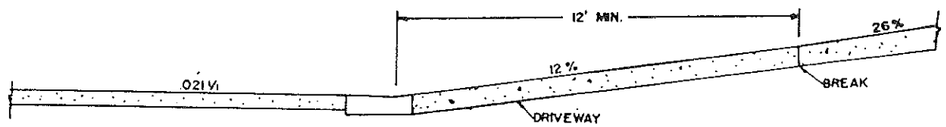


DRIVEWAY TYPE 2

DRIVEWAY QUANTITIES (S.Y.)		
WIDTH	TYPE 1	TYPE 2
10'	9.5	12.8
12'	10.7	14.1
14'	11.9	15.3
16	13.1	16.5
18'	14.4	17.7
20'	15.6	18.9
22'	16.8	20.2
24'	18.0	21.4
26'	19.3'	22.6
28'	20.5	23.8
30'	21.7	25.1



SUMMIT
(MAX. SUMMIT CHANGE 10.5 %)



SAG
(MAX. SAG CHANGE 14 %)

NOTE: ABOVE GRADIENTS ARE MAXIMUM VALUES ONLY. LESSER GRADIENTS ARE DESIRABLE WHERE EXISTING CONDITIONS PERMIT.

7-26-77 REVISIONS	
DATE	CHANGE

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

Submitted _____ Design Engineer

Recommended _____ Asst Chief Engineer Pre-Construction

Approved _____ Chief Engineer

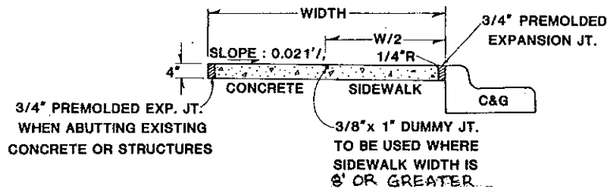
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.		23

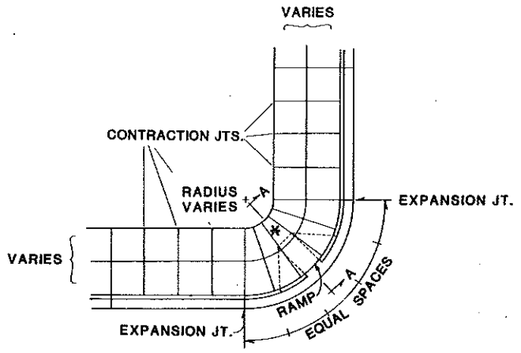
F-RRS-1-006 (005) 066

SIDEWALK & CURB RAMPS

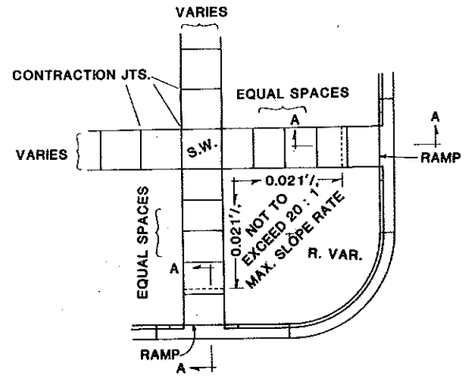
NOTES: 1. METHOD OF PAYMENT: THE CURB RAMP WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE QUANTITIES & PAID FOR AT THE UNIT PRICE BID FOR CONCRETE SIDEWALK AND CURB & GUTTER.

2. THE EXACT LOCATION & TYPE OF RAMP SHALL BE DETERMINED BY THE ENGINEER IN THE FIELD AFTER CONSULTATION WITH THE CITY ENGINEER & CHANGES MADE ACCORDINGLY.

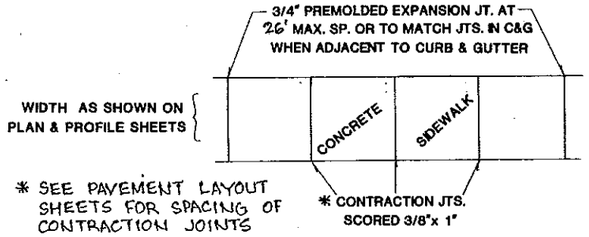




TYPE A

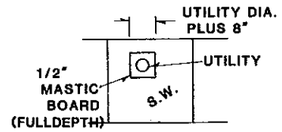


TYPE B

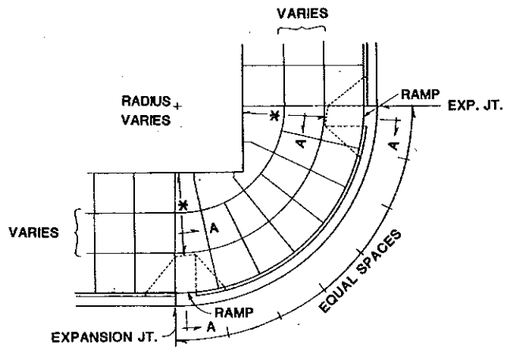


* SEE PAVEMENT LAYOUT SHEETS FOR SPACING OF CONTRACTION JOINTS

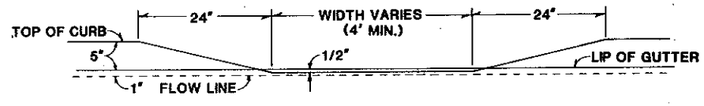
CONCRETE SIDEWALK DETAILS



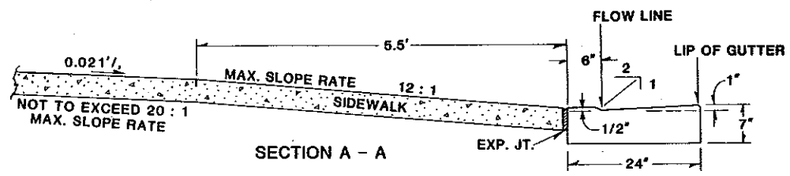
UTILITY BLOCKOUT



TYPE C

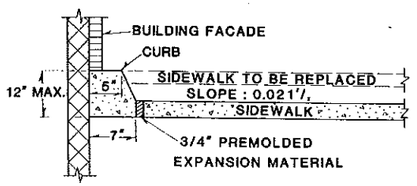


DEPRESSED CURB FOR PEDESTRIAN CROSSING (TYPE B RAMP)

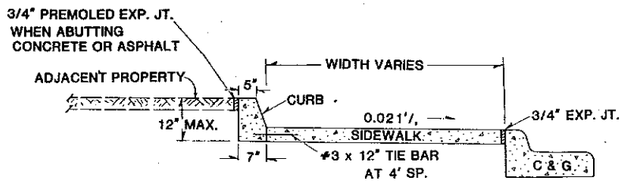


SECTION A – A

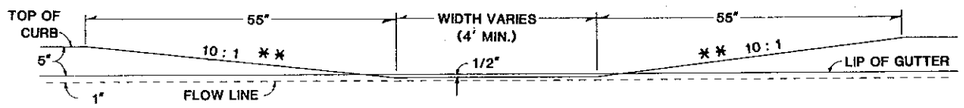
RAMPS SHALL HAVE A TEXTURED NONSKID SURFACE



CURB DETAIL



CURB DETAIL



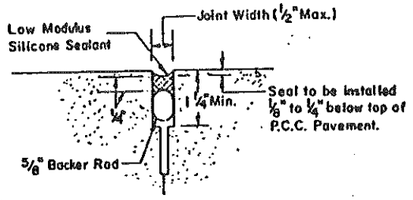
DEPRESSED CURB FOR PEDESTRAIN CROSSING (TYPE A & C RAMPS)

* IF LESS THAN 4' USE 12 : 1 SIDE SLOPE * *

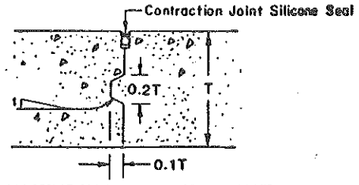
NOTE: 3. AS SHOWN ON THE PLANS OR AT THE DIRECTION OF THE ENGINEER, A CURB SHALL BE CONSTRUCTED WHERE THE EXISTING S.W., ABUTTING A BUILDING OR ADJACENT PROPERTY, IS TO BE LOWERED. THE CURB WILL BE PAID FOR AT THE UNIT PRICE BID FOR CURB-TYPE 1

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	24

JOINT DETAILS

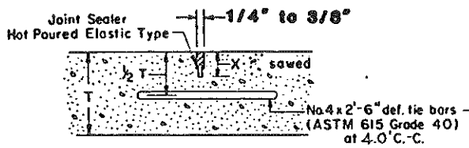


LONGITUDINAL JOINT SILICONE SEAL

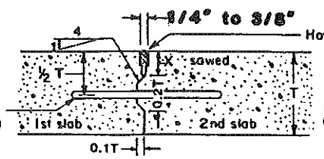


LONGITUDINAL KEYED JOINT
(MID-DEPTH OF PAVEMENT)

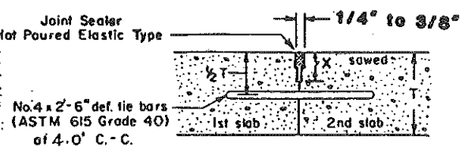
$X = T/3 + \frac{1}{4}"$



SAWED LONGITUDINAL JOINT

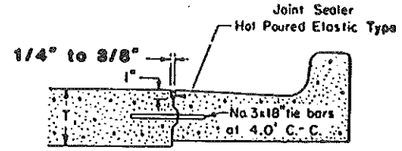


LONGITUDINAL CONSTRUCTION JOINT
(KEYED TIED JOINT)

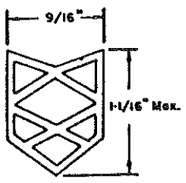


LONGITUDINAL CONSTRUCTION JOINT
(TIED BUTT JOINT)

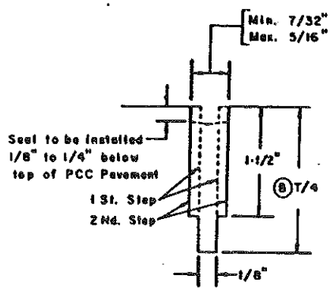
NOTE: The Joint Sealer on Longitudinal Joints shall have a Minimum Depth of 1 inch.



JOINT SEALER AT ALL CURB & GUTTER SECTIONS

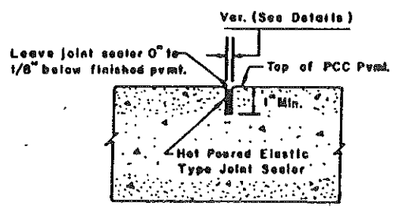


PREFORMED COMPRESSION JOINT SEAL FOR TRANSVERSE CONTRACTION JOINTS



SAWED TRANSVERSE JOINT

NOTE: Ⓑ T/4 = One-Fourth thickness of PCC Pavement



JOINT SEALER DETAIL

Applies to sawed joints

NOTE: Preformed compression joint seals of other shapes may be used. The shape and dimensions must be approved by the Engineer.

NOTE:

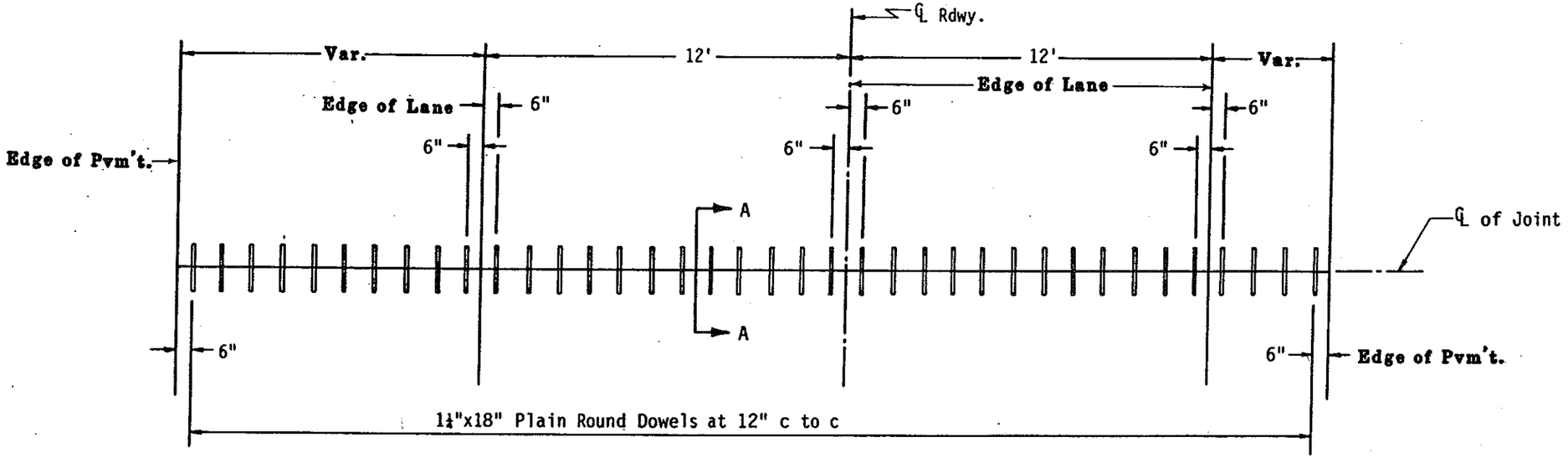
Preformed inserts used to form grooves for transverse joints will not be allowed.

Preformed compression joint seals of other shapes may be used. The shape and dimensions must be approved by the Engineer.

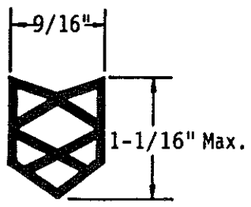
The hot poured elastic type joint filler shall meet the requirements of section 826.02 A.2 of the standard specifications.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	25

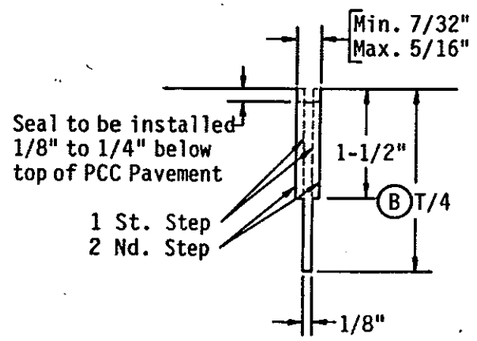
CONTRACTION JOINT DETAILS



CONTRACTION JOINT DOWEL BAR ASSEMBLY



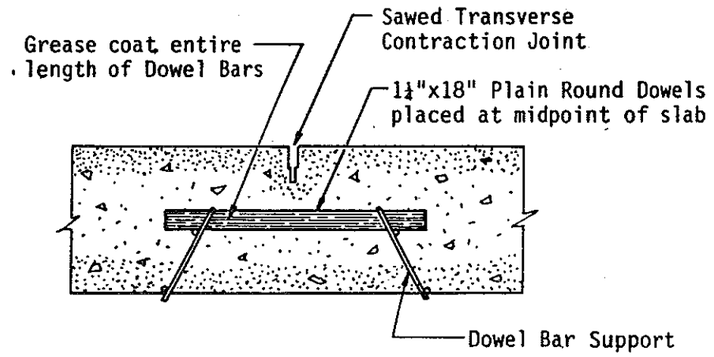
PREFORMED COMPRESSION JOINT SEAL FOR TRANSVERSE CONTRACTION JOINTS



SAWED TRANSVERSE JOINT

Ⓑ T/4= One-Fourth thickness of PCC Pavement

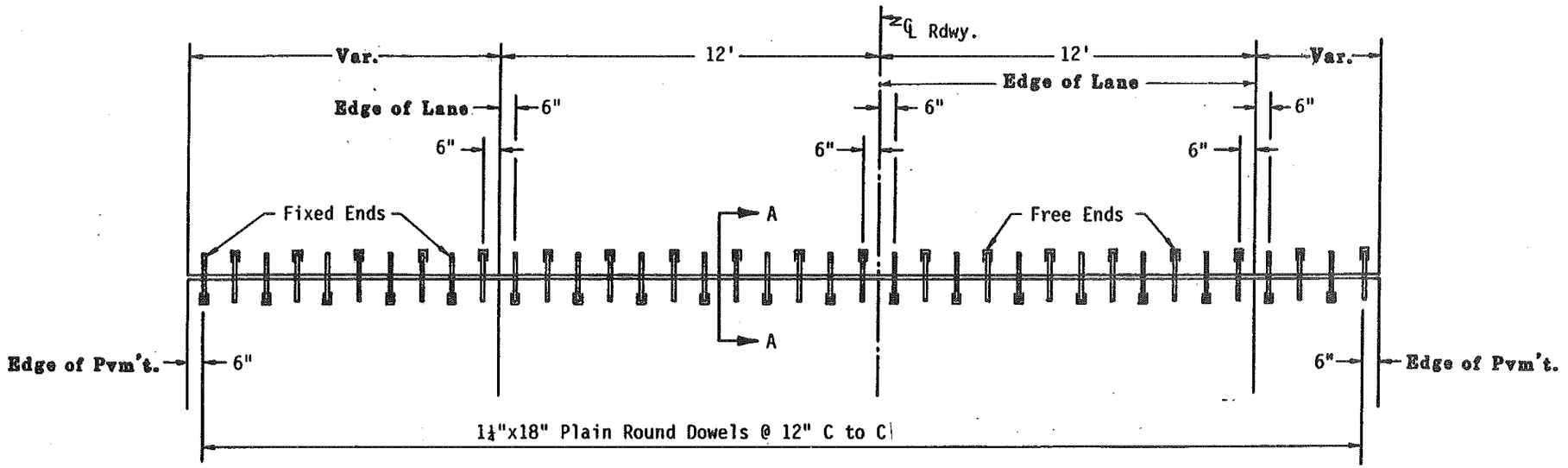
NOTE: Preformed compression joint seals of other shapes may be used. The shape and dimensions must be approved by the Engineer.



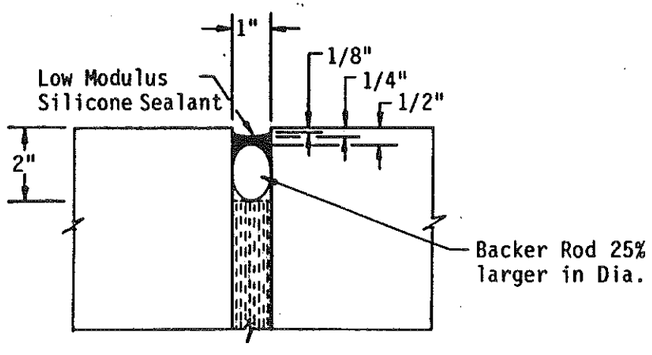
SECTION A-A

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	26

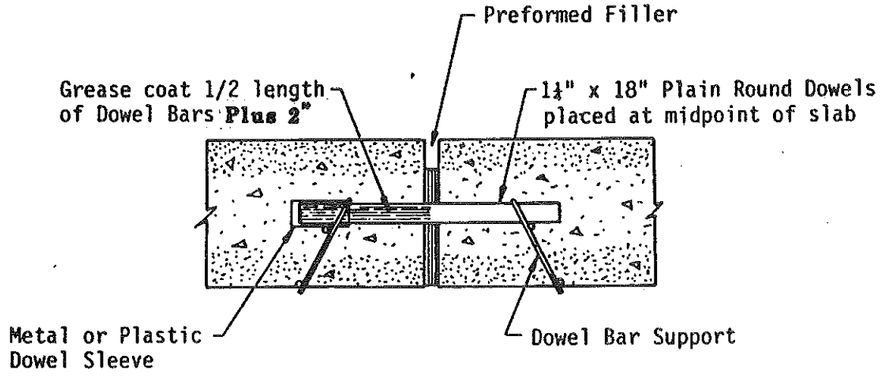
EXPANSION JOINT DETAILS



EXPANSION JOINT DOWEL BAR ASSEMBLY

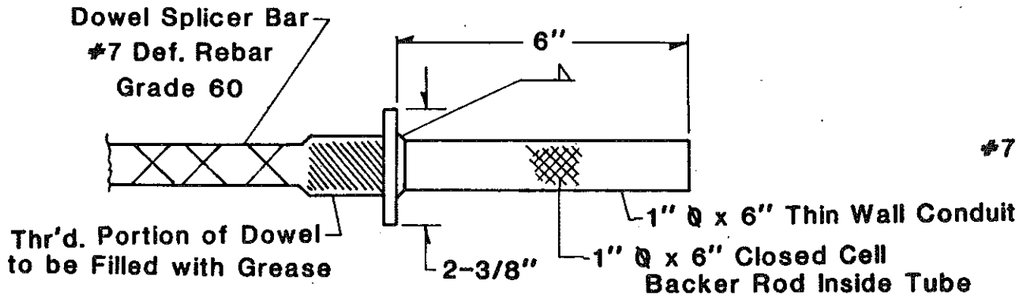


INSTALLATION
(Expansion Joint Seal)

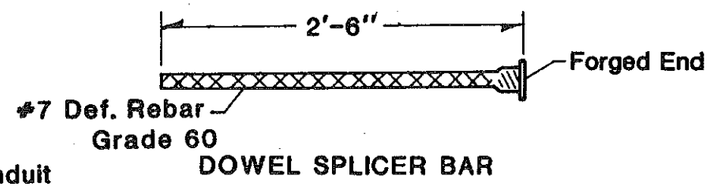


SECTION A-A

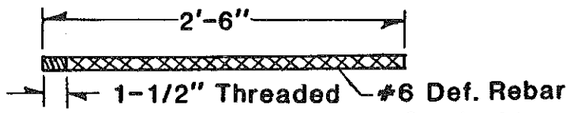
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	27



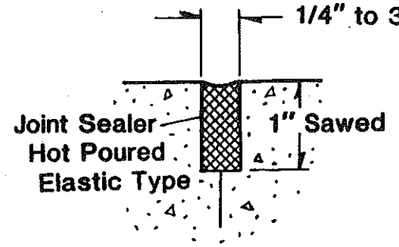
DETAIL "A"



DOWEL SPLICER BAR

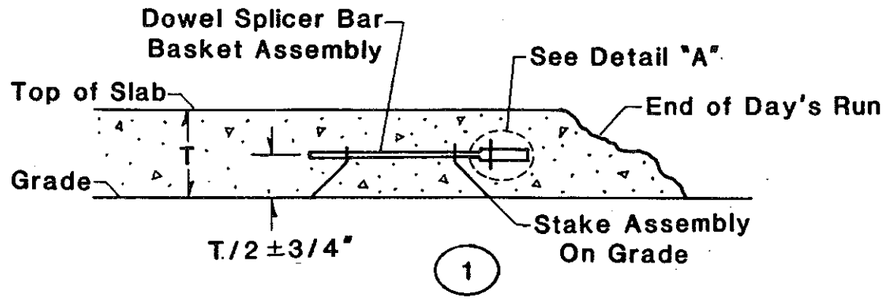


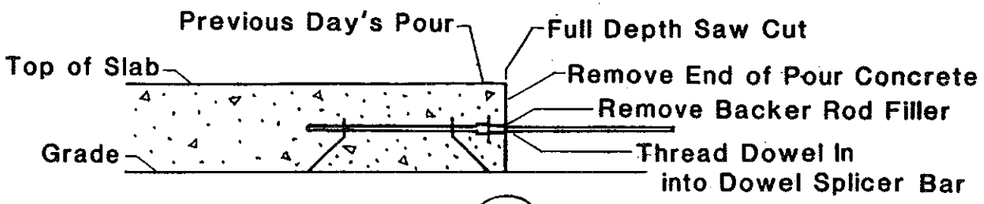
DOWEL IN

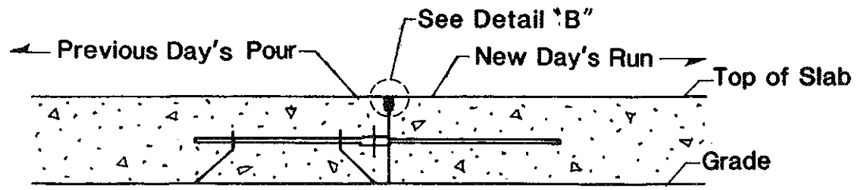


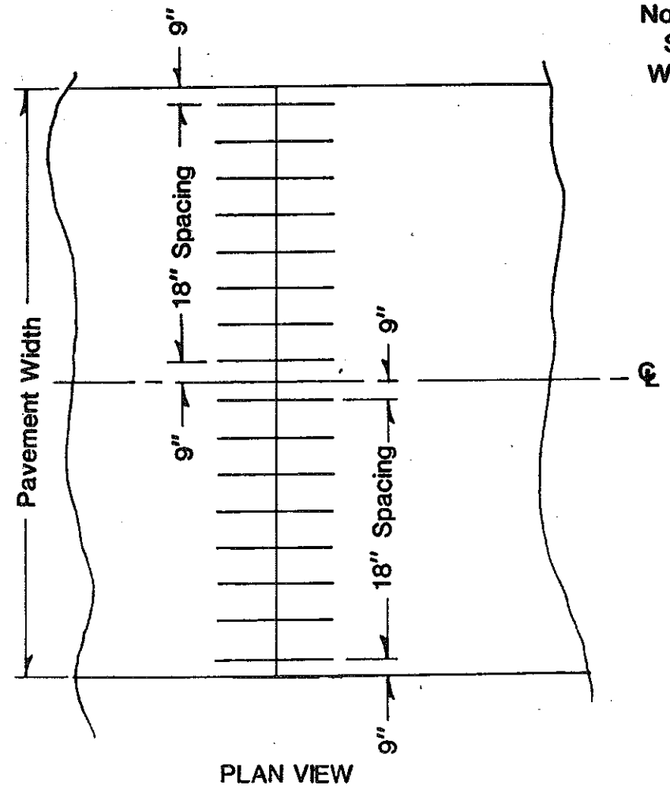
DETAIL "B"

Note: Construction Joints to be Sawed to a Depth of 1" & a Width of 1/4" to 3/8" & Sealed.





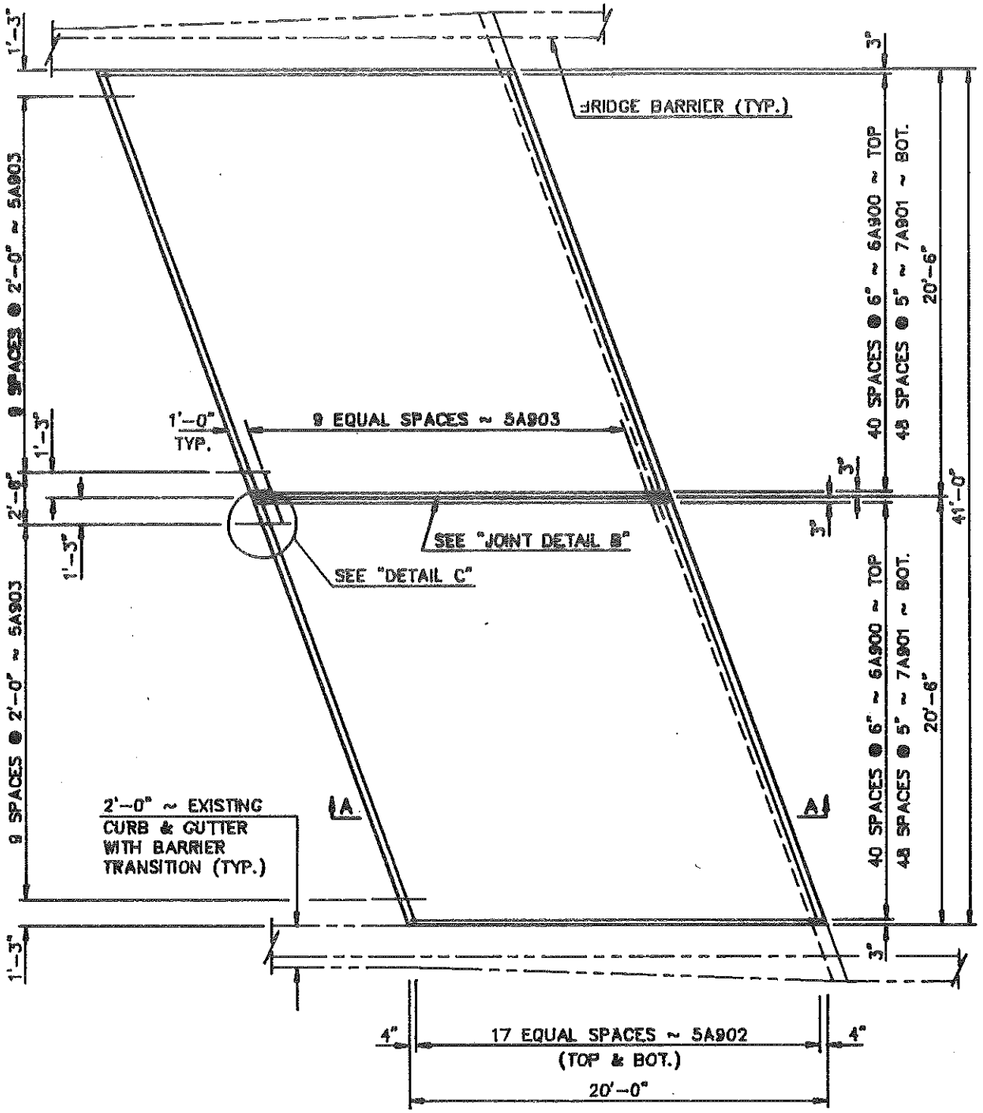




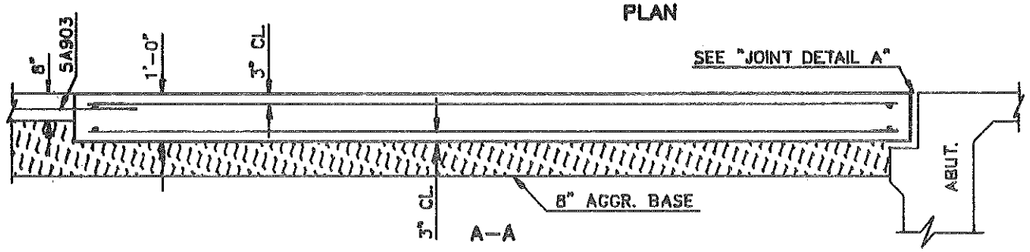
PLAN VIEW

TRANSVERSE CONSTRUCTION JOINT

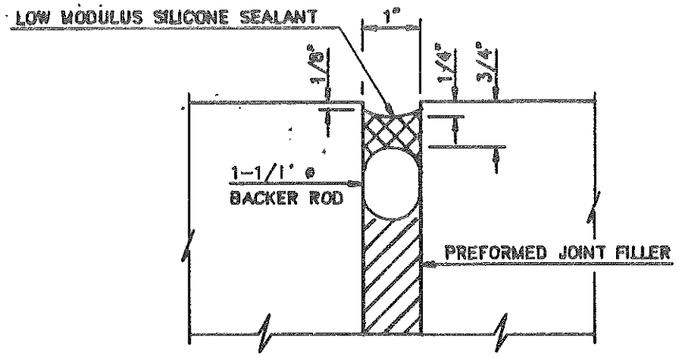
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	28



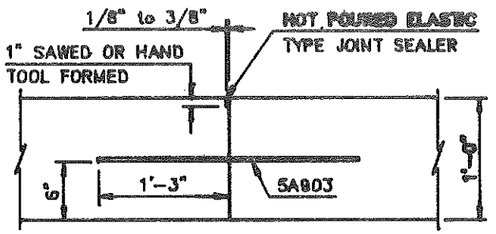
PLAN



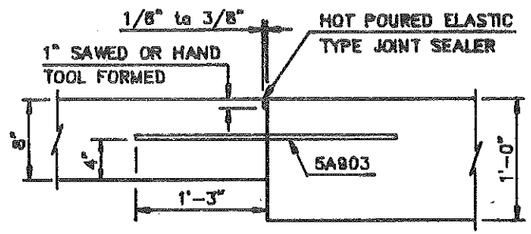
A-A



JOINT DETAIL A



JOINT DETAIL B



DETAIL C

WIDTH = 41'-0"			
SKEW ANGLE = 20°			
BAR LIST			
SIZE	MARK	NO.	LENGTH
8	A900	82	19'-8"
7	A901	98	19'-8"
5	A902	72	21'-6"
5	A903	30	2'-6"

ESTIMATED MATERIAL QUANTITIES	
REINFORCING STEEL (LBS.)	CONCRETE (C.Y.)
8055	30.4

NOTE:

THE ABOVE ESTIMATED MATERIAL QUANTITIES ARE FOR INFORMATIONAL PURPOSES ONLY. ALL MATERIALS INCLUDING CONCRETE, REINFORCING BARS, BACKER ROD, SILICON SEALANT, PREFORMED JOINT FILLER AND LABOR REQUIRED TO BUILD THE APPROACH SLABS AND APPROACH SLAB BARRIERS SHALL BE INCIDENTAL TO THE PAY ITEM, "CONCRETE BRIDGE APPROACH SLAB."

THE CONCRETE SHALL BE CLASS AE-3 AND THE REINFORCING STEEL SHALL BE GRADE 60.

QUANTITIES	
APPROACH SLAB	91.1 S.Y.

HIGHWAY 6 -- HEART RIVER
MANDAN

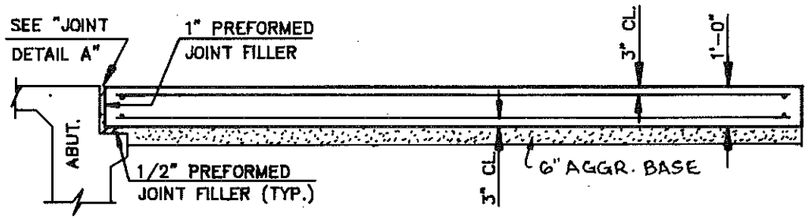
(NORTH END)

APPROACH SLAB

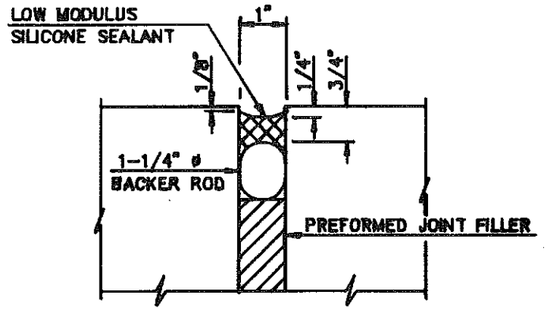
89DLS5

6-066.735-1

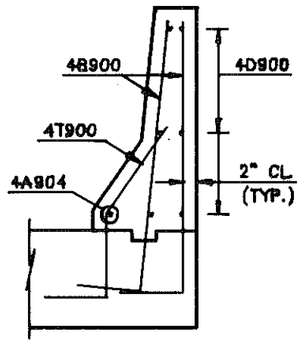
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	29



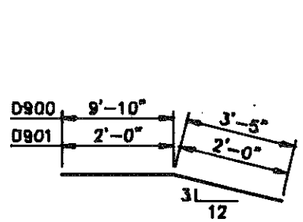
A–A



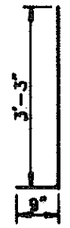
JOINT DETAIL A



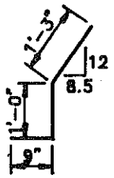
G–G



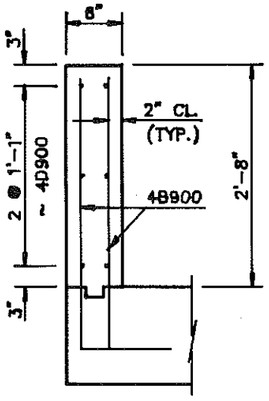
D900 & D901



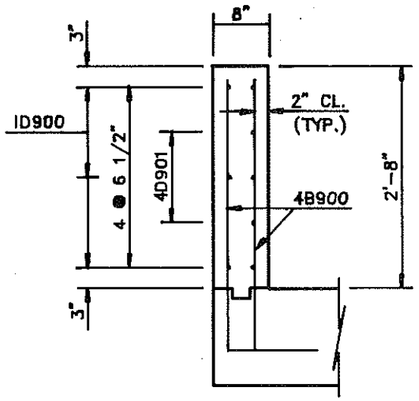
B900



T900



H–H



J–J

SKEW ANGLE = 20 °

BAR LIST – ONE SLAB

SIZE	MARK	NO.	LENGTH
6	A900	94	19'-7"
7	A901	112	19'-7"
5	A902	12	6'-1"
4	A904	2	7'-8"
5	A905	10	3'-0"
5	A906	28	23'-8"
5	A907	58	24'-5"
4	B900	112	4'-0"
4	D900	12	13'-3"
4	D901	4	4'-0"
4	T900	18	3'-0"

ESTIMATED MATERIAL QUANTITIES

REINFORCING STEEL (LBS.)	CONCRETE (C.Y.)
9935	36.1

NOTE:

THE ABOVE ESTIMATED MATERIAL QUANTITIES ARE FOR INFORMATIONAL PURPOSES ONLY. ALL MATERIALS INCLUDING CONCRETE, REINFORCING BARS, BACKER ROD, ELASTIC JOINT SEALER, SILICON SEALANT, PREFORMED JOINT FILLER AND LABOR REQUIRED TO BUILD THE APPROACH SLABS AND APPROACH SLAB BARRIERS SHALL BE INCIDENTAL TO THE PAY ITEM, "CONCRETE BRIDGE APPROACH SLAB."

THE CONCRETE SHALL BE CLASS AE-3 AND THE REINFORCING STEEL SHALL BE GRADE 60.

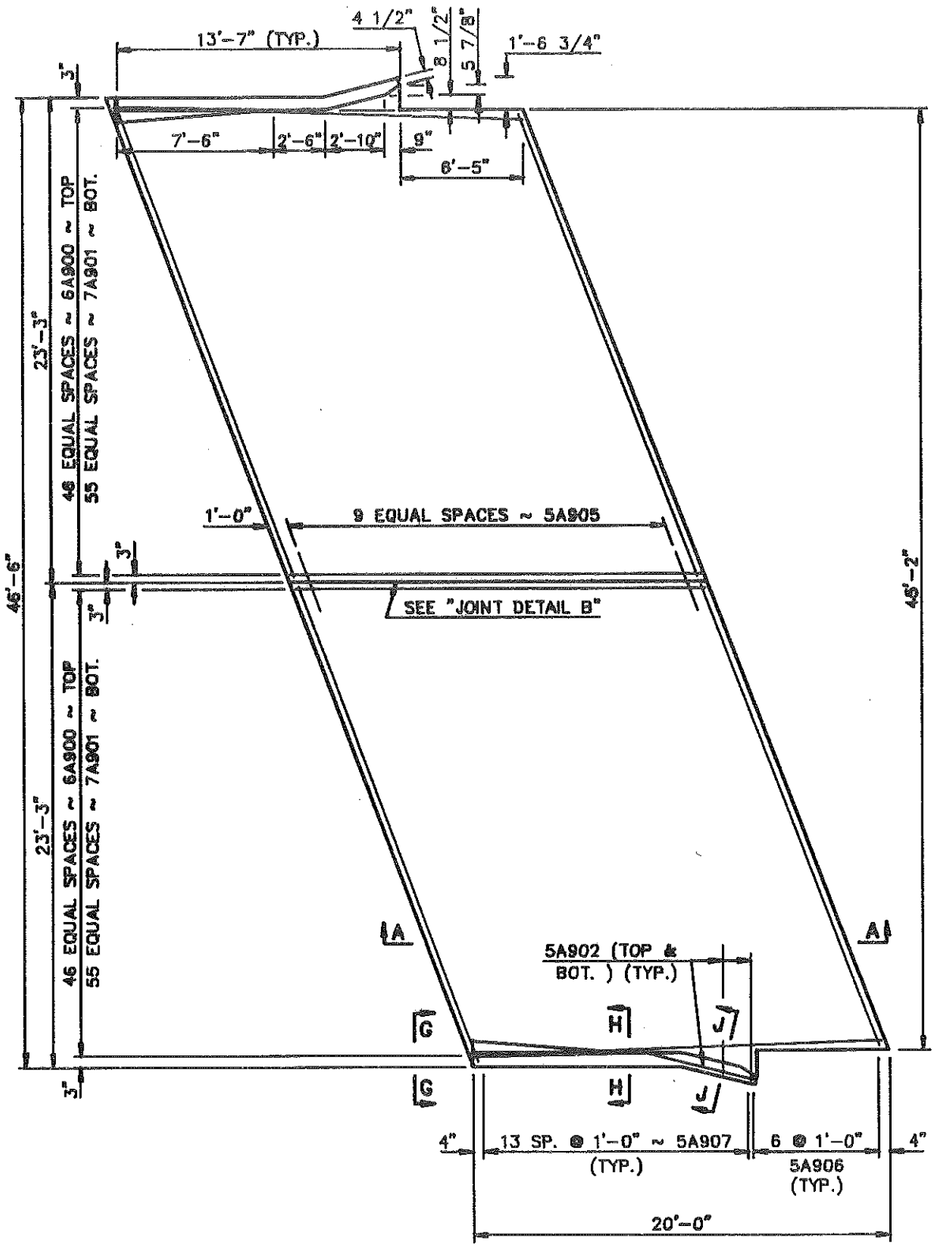
THE EXCAVATION REQUIRED FOR THE INSTALLATION OF THE SOUTH BRIDGE APPROACH SLAB (APPROX. 50 C.Y.) HAS BEEN INCLUDED IN THE QUANTITIES AND SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE FOR "COMMON EXCAVATION-TYPE A."

QUANTITIES	(ONE SLAB)
APPROACH SLAB	97.8 S.Y.

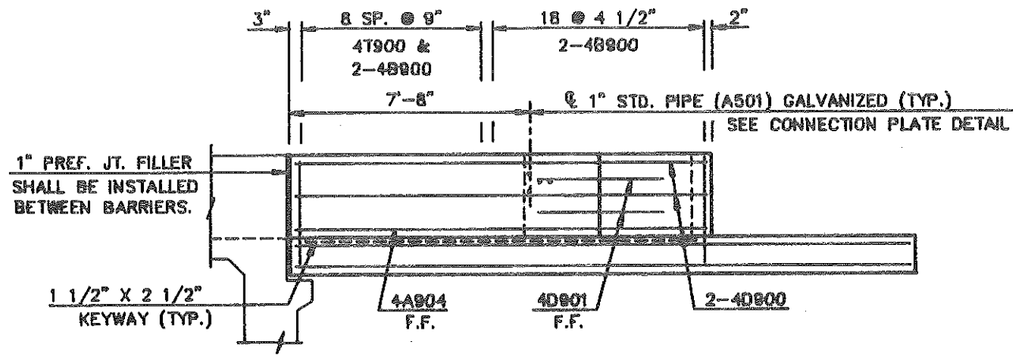
HIGHWAY 6 – HEART RIVER
MANDAN

(SOUTH END)
APPROACH SLAB

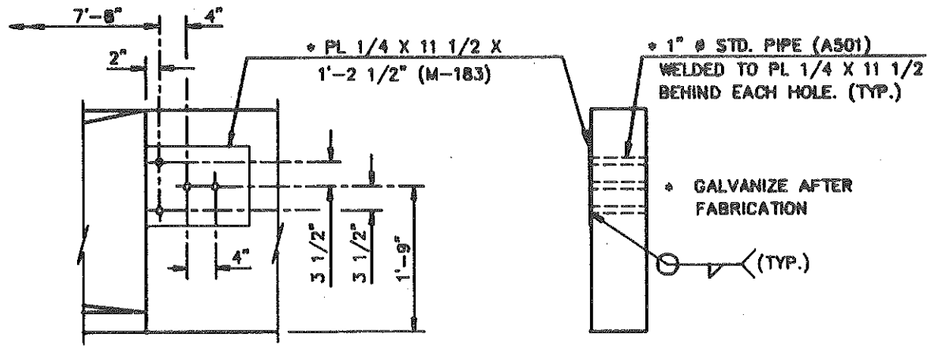
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	30



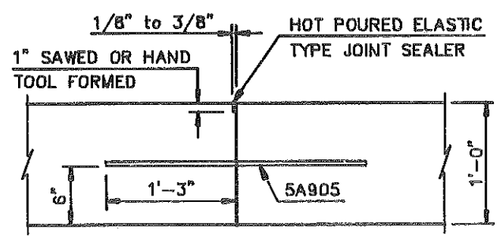
PLAN



ELEVATION



CONNECTION PLATE DETAILS



JOINT DETAIL B

NOTE:

SEE DWG. 6-066.735-3 FOR SECTIONS A-A, G-G, H-H & J-J.

QUANTITIES (ONE SLAB)
SEE DWG. 6-066.735-3

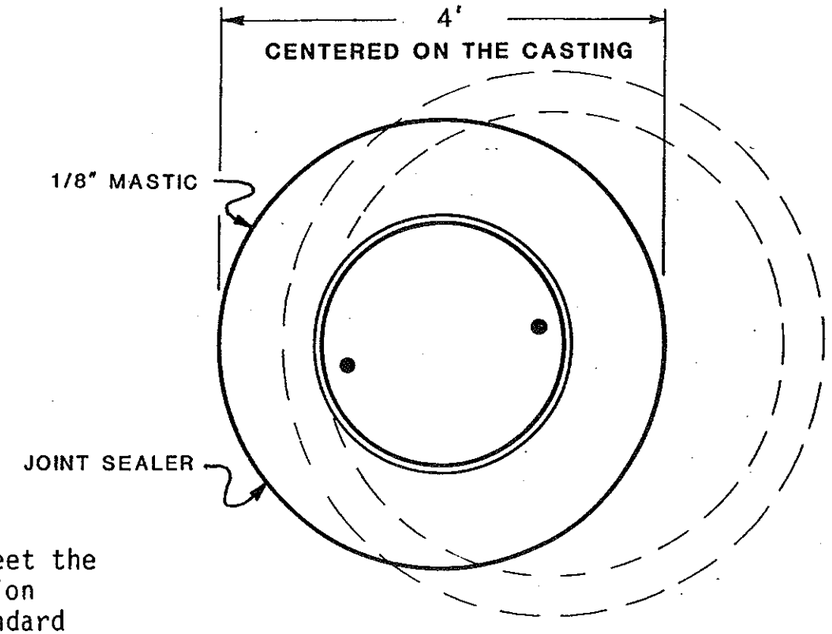
HIGHWAY 6 - HEART RIVER
MANDAN

(SOUTH END)
APPROACH SLAB

89DLS65

6-006.735-2

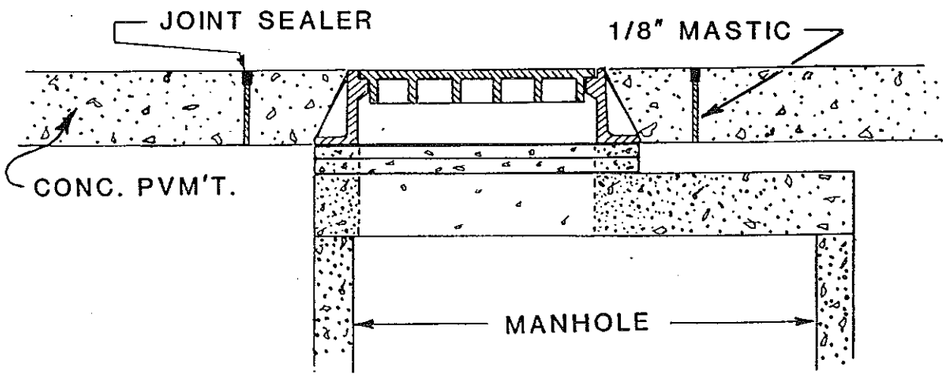
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	31



(Joint Sealer shall meet the requirements of Section 826.02 A2 of the Standard Specifications.)

NOTE:

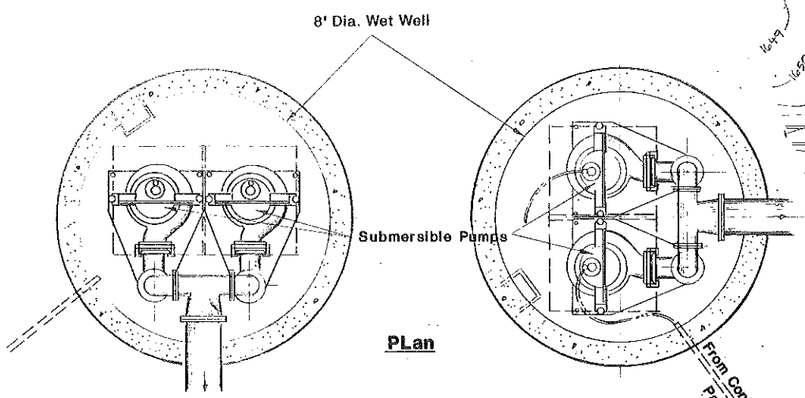
A manhole blockout shall be installed at all locations where a new or existing manhole is located in the new P.C.C. Pavement. The cost of installing the manhole blockout as shown shall be included in the price bid for -48" or Manholes - 60"



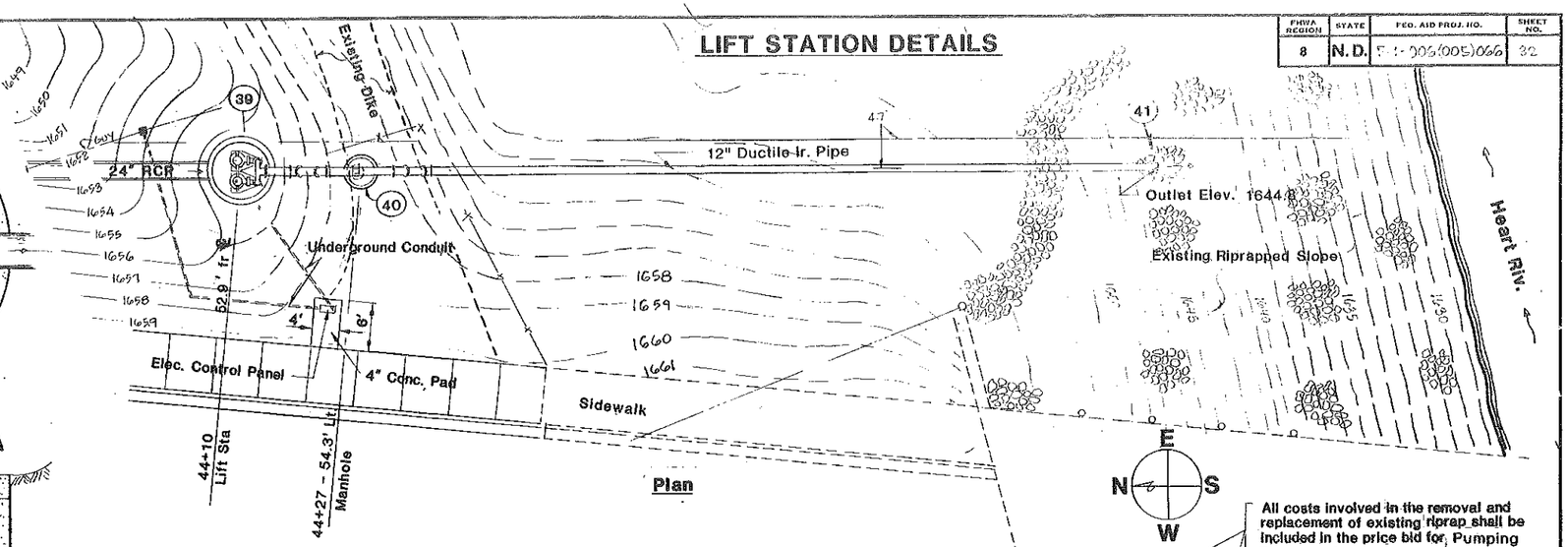
MANHOLE BLOCKOUT DETAILS (ROUND)

LIFT STATION DETAILS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	[illegible]-006(005)066	32

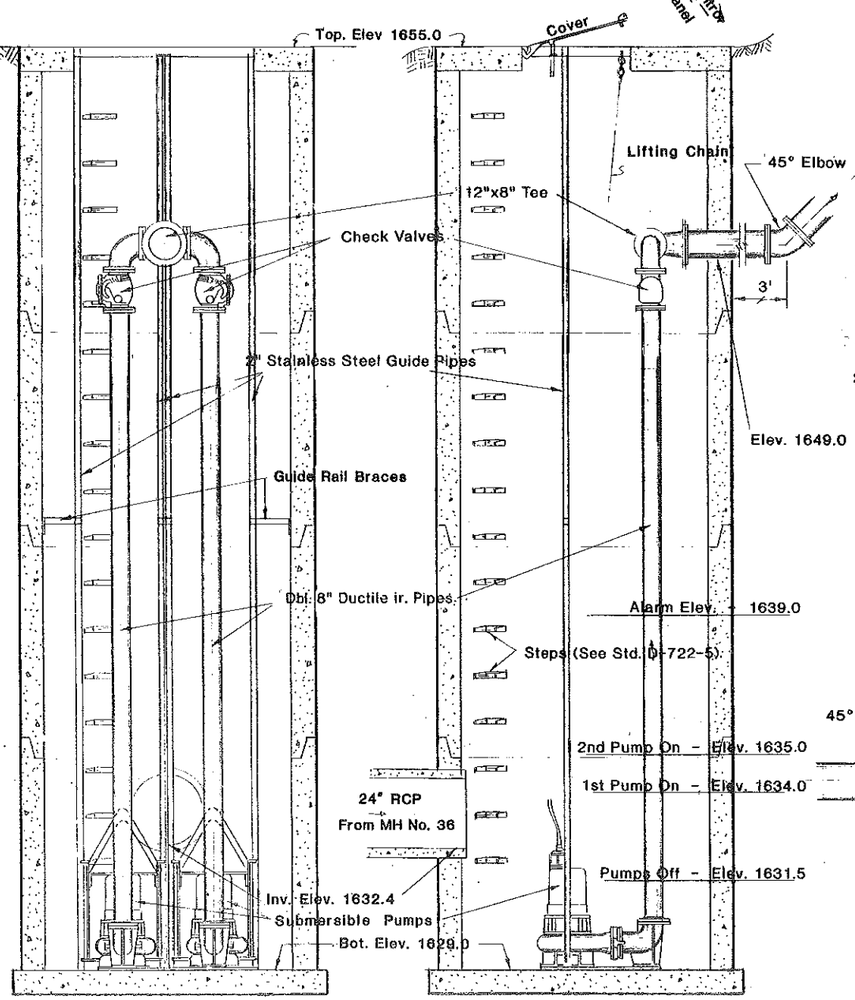


PLan

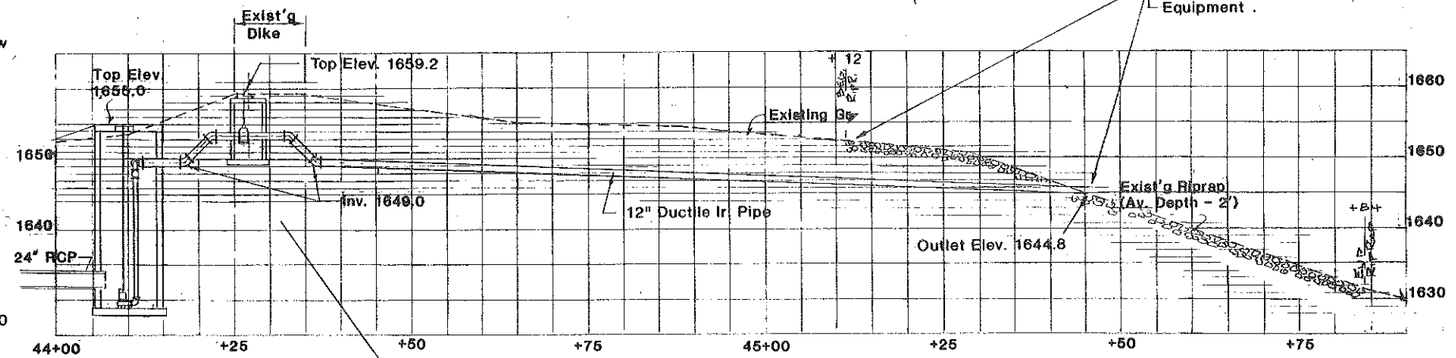


Plan

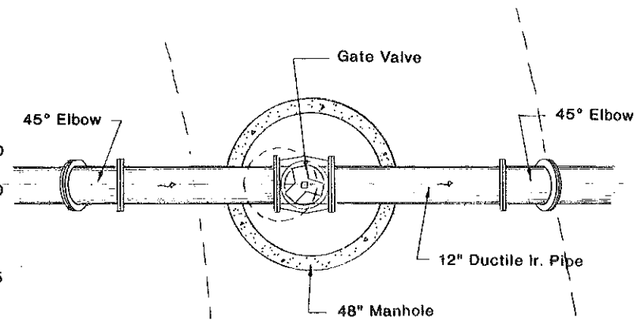
All costs involved in the removal and replacement of existing riprap shall be included in the price bid for Pumping Equipment .



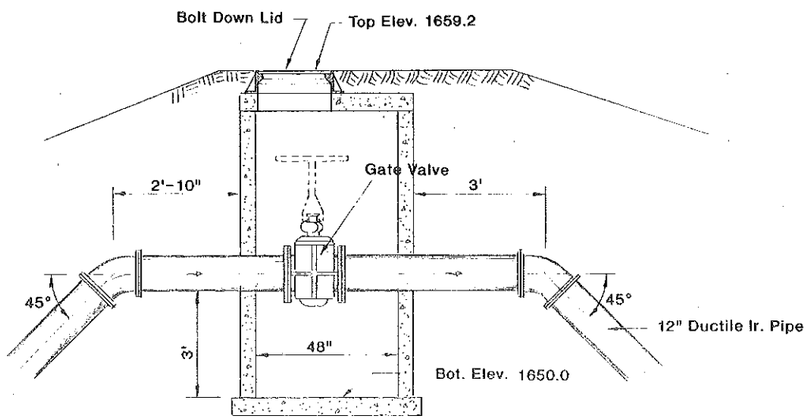
Elevations



Profile



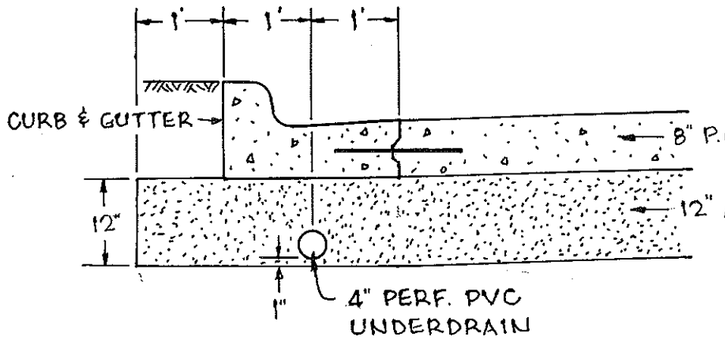
Plan

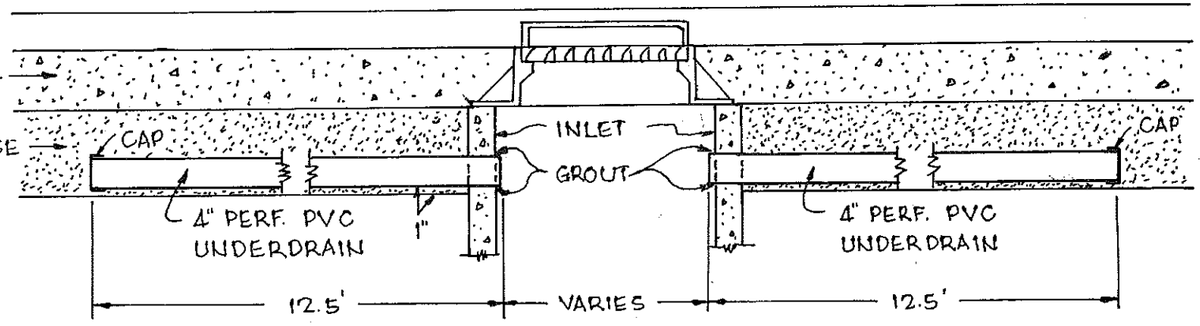


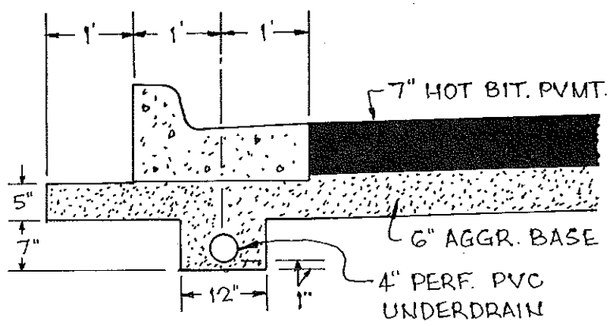
Elevation

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	33

UNDERDRAIN, PIPE, PVC, PERFORATED - 4 INCH







SECTION ON 1ST ST., 2ND ST. & 3RD ST.

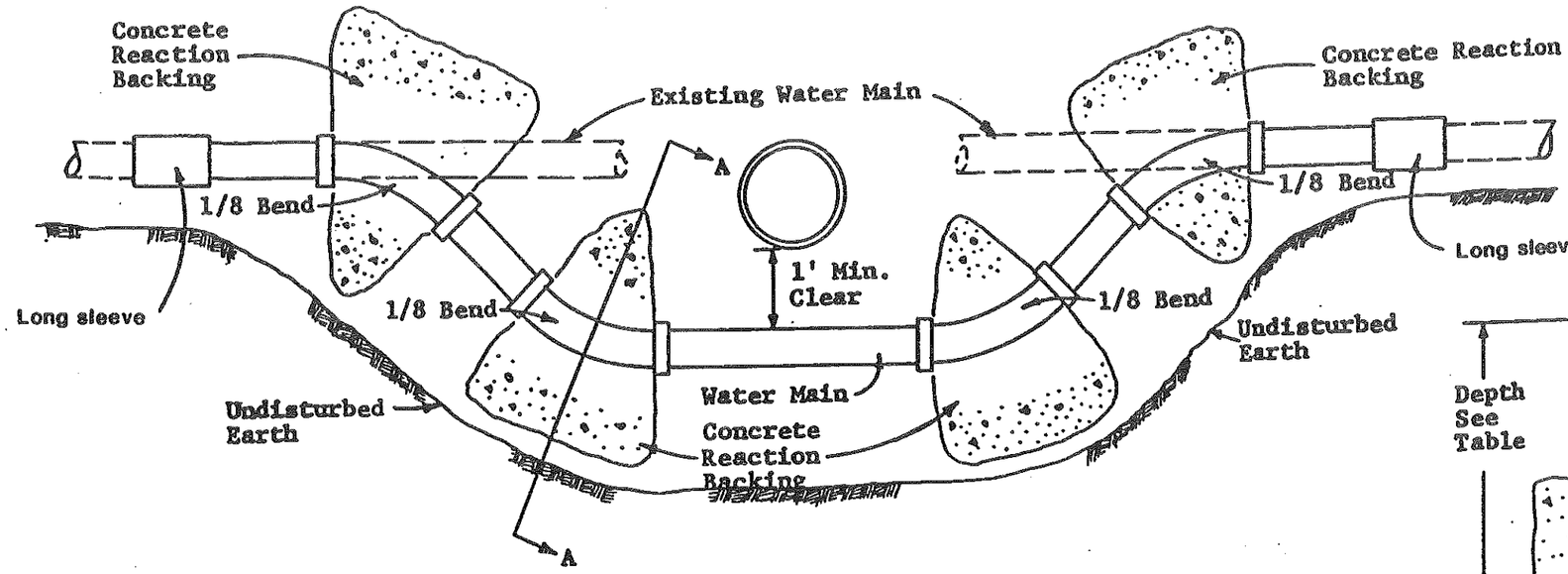
The trench to accomodate the perforated pipe shall be excavated for a dictance of 6" beyond the end of the pipe.

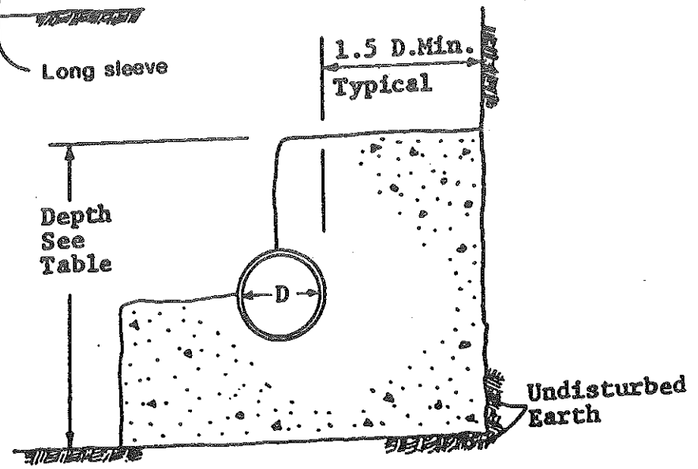
NOTE:

The 4" perforated PVC pipe shall be installed the upstream side of inlets located on a continuous grade and on both sides where the inlet is located in a sag. The contract unit price for "Underdrain, Pipe, PVC, Perforated - 4 Inch" shall be full compensation for all labor, equipment, and materials necessary to complete the work as specified.

512645

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	F-RRS-1-006(005)066	34





Section A-A

NOTES:

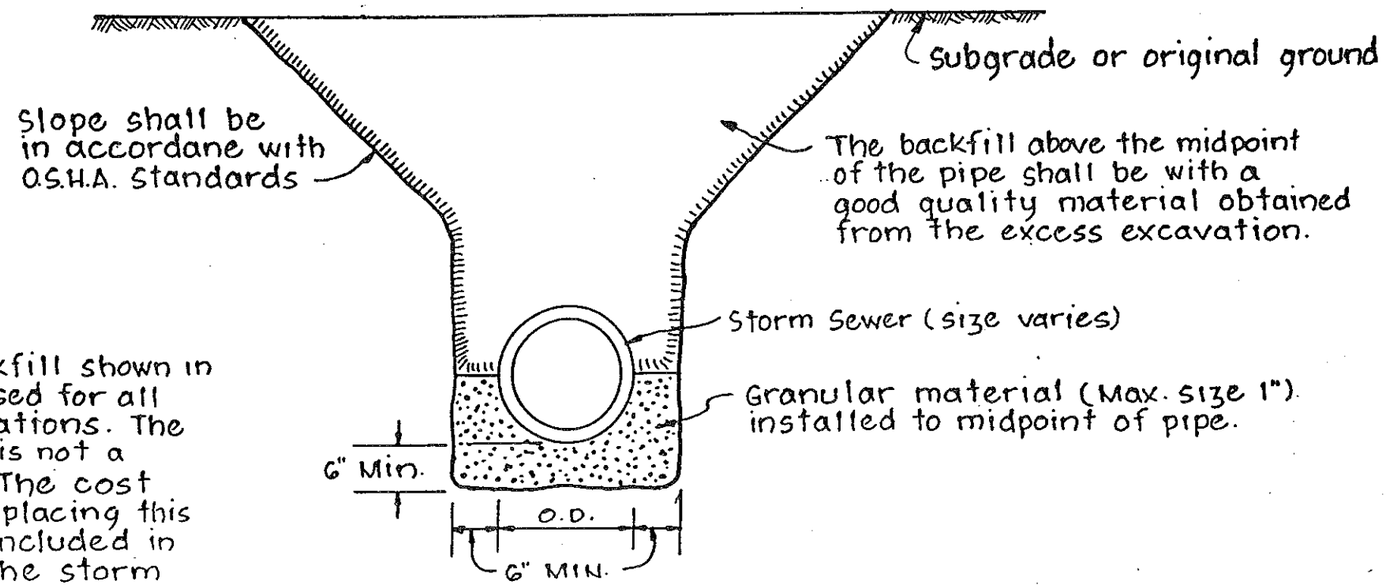
The exact elevation of the existing water main is not known. The lengths of 12" P.V.C. water main shall be adjusted as required for the installation. A length of 20 feet has been assumed for bidding purposes.

See notes 724-P01 and 724-P02 pertaining to the P.V.C. water mains and the cast iron fittings.

Depth of Backing Ratio of Pipe Diam.	
Fitting	Depth
Tee or Plug	3-D
1/4 Bend-90°	3-D
1/8 Bend-45°	3-D
1/16 Bend-22½°	2-D

WATERMAIN INSTALLATION DETAIL

FHWA REGION	STATE	FED AID PROJ. NO	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	35



BEDDING AND BACKFILL DETAIL

The bedding and backfill shown in the detail shall be used for all storm sewer installations. The granular material is not a separate pay item. The cost of furnishing and placing this material shall be included in the price bid for the storm sewer pipe.

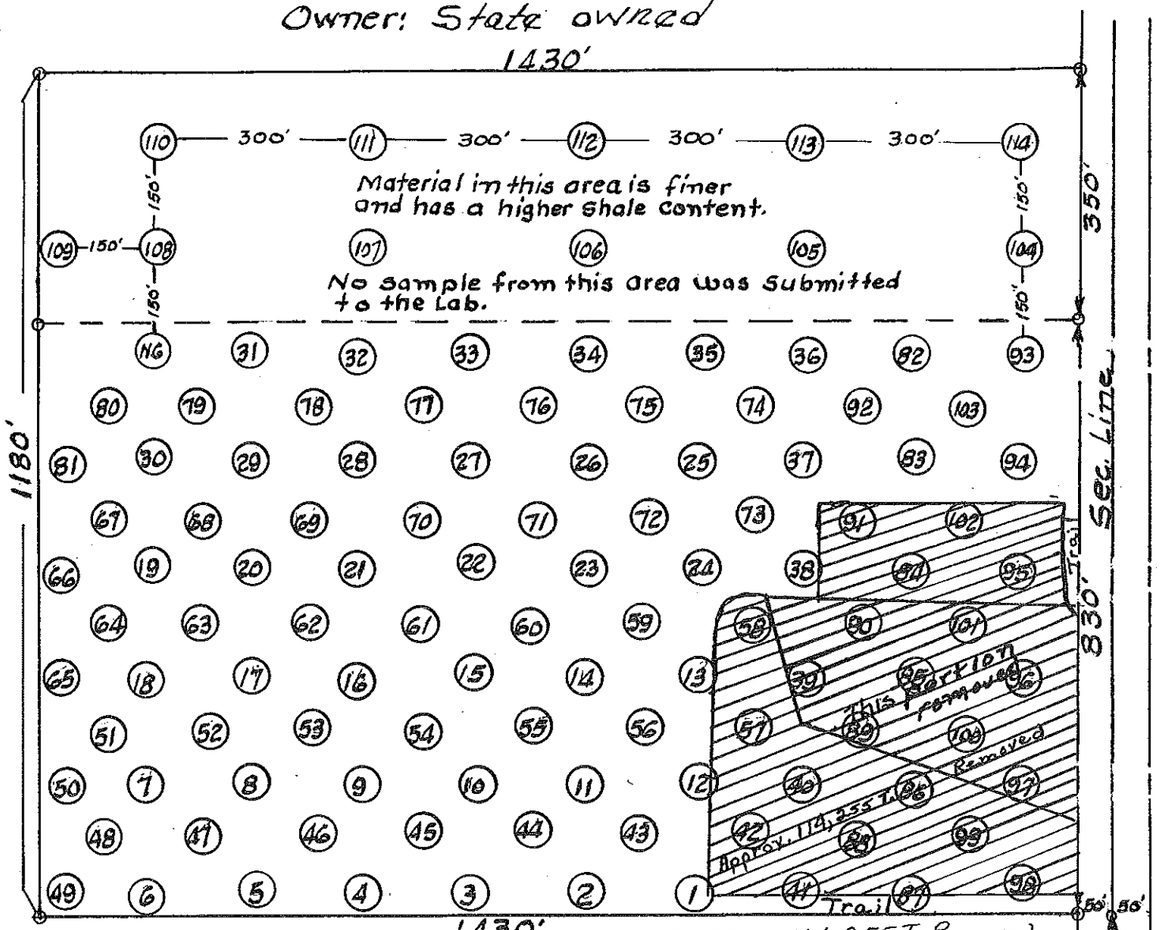
See Std. D-724-1 for trench backfill detail for water main installations.

FORM NO. 218

NORTH DAKOTA STATE HIGHWAY DEPARTMENT
TEST HOLE PLAT

SE¼ Sec. 28, T. 140, R. 77

Owner: State owned



Pit area, 38,737 Ac.

Notes:

In general the material in this deposit lies in layers of sand and gravel therefore, material shall be removed to the full depth shown by test hole and well mixed to produce uniform gradation. Pit operation shall be started on the east end and worked in a westerly direction. Pit operation shall be conducted in a manner not to strip more area than what is needed at any one time.

It is agreed that after the sand and gravel has been removed the top soil or stripping shall be replaced in open pit and smoothed, leaving the pit sides as flat as possible

PIT ANALYSIS BY TEST HOLES

Test Hole No.	Depth of Stripping (Ft.)	Depth of Gravel (Ft.)	% Retained on 1½" Screen	% Retained on 1" Screen	% Retained on ¾" Screen	% Retained on ¼" Screen	Bottom of Test Hole in
1	1.5	9.0	6	10	15	32	Rock.
2	1.5	10.5	7	10	15	32	Fine Sandy clay
3	1.5	10.0	6	8	14	34	Clay.
4	2.0	2.5 Gr 1.0 S. Clay 5 Gr	5	7	10	26	"
5	2.0	8.0 Gr 3.5 Sand	3	5	7	23	"
6	2.0	8.0 Gr 3.0 Sand	4	7	11	26	Fine Sandy Clay
7	3.0	11.0	4	6	10	25	Fine Sand
8	3.0	2.0 Sand 10.0 Gr	5	7	10	24	"
9	1.5	11.0 Gr 2.5 S.	6	10	13	32	Sand
10	2.5	3.0 S 7.0 Gr	0	5	7	22	Sandy clay.
11	2.5	8.5	5	7	12	31	"
12	2.0	10.5	5	7	14	30	"
13	2.0	10.0	4	6	12	28	Fine Sandy clay
14	1.5	2.5 Gr 1.5 S. 7.5 Gr	4	10	14	31	"
15	2.5	2.5 S 8.5 Gr 1.5 S.	6	10	13	30	Sand
16	4.0	8.0 Gr 2.5 S	6	10	12	30	Gravel
17	2.0	2.0 S 4.0 Gr 1.5 S 3.0 Gr 1.5 S	5	7	12	30	Fine Sand
18	3.0	10.0 Gr 2.0 S	5	10	15	33	Sand + Shale.
19	2.0	1.5 S 8.0 Gr 2.5 S	5	10	14	28	Sand
20	2.0	6.0 Gr 2.0 S 3.5 Gr 1.5 S	4	6	10	25	"
21	3.0	2.0 S 10.0 Gr	3	6	11	27	Gravel
22	3.5	10.5	5	8	15	32	"
23	1.5	13.5	6	8	14	30	"
24	2.0	11.0	7	12	15	33	"
25	3.5	2.5 S 8.0 Gr	6	10	13	32	Gravel
26	1.5	13.5	5	7	12	30	"
27	1.5	12.5 Gr 1.5 S.	7	10	15	32	Sand.
28	2.5	11.5	5	8	14	31	Sand + Shale
29	2.0	2.0 Gr 1.5 S	0	5	10	27	Fine Sand
30	1.5	2.5 Gr 3.0 S. clay 1.0 Gr 4.5 Gr 3.0 P.S. 6.0 Gr	5	10	15	32	Gravel
31	3.5	2.5 S 2.0 Gr 1.5 S 5.0 Gr	0	5	8	23	Sand + Shale.
32	3.0	2.0 S 8.5 Gr	2	4	10	25	"
33	1.5	4.5 S 6.5 Gr.	3	5	8	25	Fine Sand.
34	2.5	2.5 S. 1.5 Gr 6.0 Gr	2	4	8	22	Fine Sandy Clay
35	2.0	2.5 S 9.5 Gr	5	8	15	32	Fine Sand
36	2.0	2.0 S 10.0 Gr	6	10	14	30	Gravel
37	2.0	2.0 S. 3.0 Gr	5	8	12	30	Sand
38	2.0	4.0 S 8.0 Gr	7	10	16	35	Fine Sand.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	36

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	37

PIT ANALYSIS BY TEST HOLES

Test Hole No.	Depth of Stripping (Ft.)	Depth of Gravel (Ft.)	% Retained on 1½" Screen	% Retained on 1" Screen	% Retained on ¾" Screen	% Retained on ¼" Screen	Bottom of Test Hole in
39	1.5	2.0S 9.6Gr	5	8	13	34	Fine Sand
40	2.0	9.0Gr 1.5S	4	6	12	30	Gravel
41	1.0	1.5Gr 3.0S 6.0Gr	5	8	12	31	Sandy clay
42	1.5	10.5	6	10	14	30	"
43	1.5	11.5	6	10	15	33	"
44	2.0	10.0	5	8	12	30	"
45	2.0	11.5	5	8	12	30	"
46	1.5	5.0Fgr 6.0Gr 2.0S	4	6	10	25	Clay
47	4.0	3.0S 8.5Gr	5	7	11	26	Sandy clay
48	1.5	2.0S 5.5Gr 3.0S	6	10	15	32	"
49	1.5	6.0S 2.5Gr 3.3S	0	2	5	16	Sand
50	1.5	5.0Fgr 6.5S	0	0	5	20	"
51	2.0	7.5	5	10	15	32	Sandy Shale
52	6.5	7.0	7	11	16	35	Fine Sand
53	2.5	2.0S 3.5Gr	4	7	10	31	Sandy clay
54	2.0	4.0Gr 1.5S 6.0Gr	4	8	12	30	Fine Sand
55	1.5	11.5Gr 2.0S	2	5	10	30	clay
56	2.0	3.0S 10.0Gr	4	6	12	28	Gravel
57	1.5	13.0	6	10	16	35	Clay
58	1.5	11.5	7	11	17	36	Sand
59	2.0	12.0	6	12	17	36	"
60	2.5	2.5S 10.0Gr	5	8	12	30	clay
61	4.0	11.0	5	10	15	33	Sand
62	2.5	12.0	5	8	12	32	"
63	2.0	2.0Gr 2.0S 5.5Gr	5	10	16	33	Fine Sand
64	2.0	10.5	6	8	12	32	"
65	2.0	2.0S 6.0Gr 2.0S	6	8	15	34	Sand
66	1.5	4.0 Fgr 7.0Gr 2.0S	2	2	7	26	"
67	2.0	10.0Gr 1.5S	6	10	16	32	Fine Sandy clay
68	4.0	5.0S 1.0Gr 2.0 S. clay 2.0 Gr	4	7	10	25	Clay
69	2.0	2.0S 4.0Gr 2.5 S. clay 4.0 Gr	2	2	6	26	Fine Sand
70	1.5	2.0S 10.5 Gr	5	8	12	28	"
71	2.5	12.0	5	8	13	34	Sand & Shale
72	2.0	2.0S 11.0Gr	7	12	16	35	Gravel
73	2.5	2.5S 10.0Gr	7	12	17	35	"
74	3.0	12.0	6	10	16	34	Fine Sand.
75	5.0	2.0S 8.0Gr	4	8	15	33	Gravel
76	2.0	11.0	5	7	12	32	Fine Sand.
77	2.0	2.0S 8.5Gr	0	4	7	27	Sand & Shale
78	1.0	4.0 Fgr 2.0S 4.5Gr	0	4	6	20	"

PIT ANALYSIS BY TEST HOLES

Test Hole No.	Depth of Stripping (Ft.)	Depth of Gravel (Ft.)	% Retained on 1½" Screen	% Retained on 1" Screen	% Retained on ¾" Screen	% Retained on ¼" Screen	Bottom of Test Hole in
79	No	Good					
80	3.0	5.0 Fgr 2.0 Gr 4.0 Gr	3	7	12	28	Gravel
81	5.5	2.5Gr 1.5 S. clay 9.0Gr 2.0S	4	7	11	27	Sand & Shale
82	1.5	9.0 1.5S	6	10	16	35	Clay
83	1.5	12.0Gr 3.5S	7	11	16	34	Sand & Shale
84	2.5	9.0Gr	6	10	15	33	Gravel
85	1.5	8.0Gr 3.0S	5	7	14	30	Fine Sand
86	2.0	8.0Gr 2.0S	5	10	16	32	Sand & Shale
87	1.0	2.5Gr 2.0 clay 4.5Gr 1.0S	5	7	11	30	Clay
88	2.0	3.5Gr 1.0 clay 5.5Gr 2.0S	4	6	8	20	Fine Sandy clay
89	5.0	10.5Gr	4	8	12	31	Gravel
90	2.0	11.0	5	10	16	36	Fine Sand
91	2.0	3.0S 11.5Gr	7	11	15	32	Sand
92	2.0	3.0S 9.0Gr	7	12	17	35	Sandy clay
93	6.0	9.0	6	10	15	33	Gravel
94	1.5	13.5	7	10	15	34	Fine Sand
95	1.5	12.5	6	10	15	36	Fine Sandy clay
96	2.0	2.0S 8.0Gr	5	10	13	32	Sand
97	0.5	13.5	5	8	13	30	Fine Sand
98	1.0	5.0Gr 3.0S	2	4	8	22	Clay
99	0.5	8.5Gr 2.0S	6	8	12	32	"
100	1.5	13.0	5	8	12	30	Sand
101	3.0	2.0S 9.5Gr	7	11	16	35	Fine Sand
102	1.5	12.5	6	12	16	36	Sandy clay
103	3.0	12.0	5	8	12	34	Gravel
Totals	225.5	1148.0	483	820	1287	3067	
104	2.5	2.0S 6.5Gr	2	5	10	24	Sandy clay
105	2.0	4.0S 2.5Gr	2	5	8	25	Fine Sand
106	3.0	3.0S 4.0 Gr	0	3	6	24	"
107	1.0	2.0S 8.0Gr	0	4	7	22	Sand & Shale
108	2.0	1.5Gr 1.5S 4.0 Gr	0	4	6	21	Fine Sand
109	2.5	3.5S 1.5Gr	2	2	6	22	"
110	2.5	1.5S 5.0Gr 3.0S 2.0Gr	0	0	3	15	"
111	2.0	3.0S 4.0Gr	2	4	7	22	"
112	2.0	3.5S 3.5Gr	2	5	8	25	"
113	2.5	1.5S 2.0Gr 2.0S 3.0Gr	0	0	3	16	Clay
114	1.5	2.5S 2.5Gr	0	2	4	15	"
Totals	235	87.0	10	34	68	231	

512645

F-1-006(005)066 PROJECT NO

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB-TOTAL
R1-1-30	30"x 30"	STOP		17	0
R1-1-48	48"x 48"	STOP		34	0
R1-2-48	48"x48"& 36"x 30"	YIELD & TO ONCOMING TRAFFIC		45	0
R2-1-48	48"x 60"	SPEED LIMIT		40	0
R2-5c-48	48"x 60"	SPEED ZONE AHEAD		40	0
R4-1-48	48"x 60"	DO NOT PASS		40	0
R4-2-48	48"x 60"	PASS WITH CARE		40	0
R4-7-48	48"x 60"	KEEP RIGHT SYMBOL		40	0
R4-8-48	48"x 60"	KEEP LEFT SYMBOL		40	0
R10-6-48	48"x 72"	STOP HERE ON RED		44	0
R11-2-48	48"x 30"	ROAD CLOSED		26	0
R11-3a-60	60"x 30"	ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		30	0
R11-3b-60	60"x 30"	BRIDGE OUT __MILES AHEAD LOCAL TRAFFIC ONLY		30	0
R11-2a-48	48"x 30"	STREET CLOSED		26	0
R11-3c-48	60"x 30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		30	0
R11-4a-60	60"x 30"	STREET CLOSED TO THRU TRAFFIC		30	0
G20-1-60	60"x 36"	ROAD CONSTRUCTION NEXT __ MILES		34	0
G20-2-60	60"x 24"	END CONSTRUCTION	1	28	28
G20-2a-48	48"x 24"	END ROAD WORK		24	0
G20-4-36	36"x 18"	PILOT CAR FOLLOW ME		10	0
G20-50-72	72"x 36"	ROAD CONSTRUCTION NEXT __ MILES RT & LT ARROWS		38	0
G20-52-72	72"x 24"	ROAD CONSTRUCTION NEXT __ MILES RT or LT ARROW		30	0
G20-54-48	48"x 36"	OVERHEAD BRIDGE PAINTING		30	0
G20-8-48	48"x 36"	TEMPORARY SURFACE NEXT __ MILES		30	0
M1-4-24	24"x 24"	ROUTE MARKER (POST AND INSTALLATION ONLY)		8	0
M3-1-24	24"x 12"	NORTH (MOUNTED ON ROUTE MARKER POST)		6	0
M3-2-24	24"x 12"	EAST (MOUNTED ON ROUTE MARKER POST)		6	0
M3-3-24	24"x 12"	SOUTH (MOUNTED ON ROUTE MARKER POST)		6	0
M3-4-24	24"x 12"	WEST (MOUNTED ON ROUTE MARKER POST)		6	0
M4-8-24	24"x 12"	DETOUR (MOUNTED ON ROUTE MARKER POST)		6	0
M4-10-48	48"x 18"	DETOUR ARROW RIGHT or LEFT		22	0
M5-1-21	21"x 15"	ARROW AHD AND RT or LT(MTD ON ROUTE MKR POST)		6	0
M6-1-21	21"x 15"	ARROW RT or LT (MOUNTED ON ROUTE MARKER POST)		6	0
W1-1-48	48"x 48"	RIGHT or LEFT SHARP CURVE ARROW		34	0
W1-2-48	48"x 48"	RIGHT or LEFT CURVE ARROW		34	0
W1-3-48	48"x 48"	RIGHT or LEFT SHARP REVERSE CURVE ARROW		34	0
W1-4-48	48"x 48"	RIGHT or LEFT REVERSE CURVE ARROW	2	34	68
W1-6-48	48"x 24"	LARGE ARROW		26	0
W3-1a-48	48"x 48"	STOP AHEAD SYMBOL		34	0
W3-2a-48	48"x 48"	YIELD AHEAD SYMBOL		34	0
W3-3-48	48"x 48"	SIGNAL AHEAD SYMBOL		34	0
W4-2-48	48"x 48"	LANE TRANSITION SYMBOL		34	0
W5-1-48	48"x 48"	ROAD NARROWS		34	0
W6-3-48	48"x 48"	TWO WAY TRAFFIC SYMBOL		34	0
W8-1-48	48"x 48"	BUMP		34	0
W8-3a-48	48"x 48"	PAVEMENT ENDS SYMBOL		40	0
W8-3a-24	24"x 18"	PAVEMENT END PLAQUE			
W8-9-48	48"x 48"	LOW SHOULDER		34	0
W8-51-48	48"x 48"	UNEVEN PAVEMENT		34	0
W8-53-48	48"x 48"	TRUCKS ENTERING HIGHWAY		34	0
W8-54-48	48"x 48"	TRUCKS ENTERING AHEAD OR __ FT.		34	0
W8-55-48	48"x 48"	TRUCKS CROSSING AHEAD or __ FT.		34	0
W12-2-48	48"x 48"	LOW CLEARANCE SYMBOL			
W13-1-24	24"x 24"	__ MPH ADVISORY SPEED PLATE		10	0
W13-4-48	48"x 60"	RAMP ARROW		40	0
W14-3-64	64"x 48"	NO PASSING ZONE		27	0
W20-1-48	48"x 48"	ROAD CONSTRUCTION - AHEAD, 1/2 MILE, or FT.	8	34	272
W20-2-48	48"x 48"	DETOUR __ FT.		34	0
W20-3-48	48"x 48"	ROAD or STREET CLOSED AHEAD or __ FT.		34	0
W20-4-48	48"x 48"	ONE LANE ROAD AHEAD or __ FT.		34	0
W20-50-48	48"x 48"	BE PREPARED TO STOP		34	0
W20-51-48	48"x 48"	EQUIPMENT WORKING		34	0
W20-52-54	54"x 12"	NEXT __ MILES		10	0
W20-5-48	48"x 48"	RIGHT or LEFT LANE CLOSED AHEAD or __ FT.		34	0
W20-7a-48	48"x 48"	FLAGGING SYMBOL		34	0
W20-7k-24	24"x 18"	__ FEET		8	0
W20-8-48	48"x 48"	STREET CLOSED		34	0
W21-1a-48	48"x 48"	MEN WORKING SYMBOL		34	0
W21-2-48	48"x 48"	FRESH OIL		34	0
W21-50-48	48"x 48"	BRIDGE PAINTING AHEAD or __ FT.		34	0
W21-51-48	48"x 48"	MATERIAL ON ROADWAY		34	0
W21-5-48	48"x 48"	SHOULDER WORK		34	0
W22-7-48	48"x 48"	SINGLE LANE AHEAD or __ FT.		34	0
W22-8-48	48"x 48"	FRESH OIL LOOSE ROCK		34	0
R1-1a-18	18"x 18"	STOP and SLOW PADDLE Back to Back		8	0
W22-14-18				SPEC&CODE	
		TOTAL UNITS		704-1000	368

TYPE III	8' LONG	BARRICADES	EACH	704-1052	5
TYPE II	2' MIN.	BARRICADES	EACH	704-1051	
TYPE I	6' to 10'	BARRICADES	EACH	704-1050	
18"x 36" MIN.		DELINEATOR DRUMS	EACH	704-1060	117
		TUBULAR MARKERS	EACH	704-1067	36
28" MIN.		TRAFFIC CONES	EACH	704-1065	
8" to 12" x 24"		VERTICAL PANELS	EACH	704-1080	90
		FLEXIBLE DELINEATORS	EACH	704-1072	146

TRAFFIC CONTROL
CONSTRUCTION AREA
DEVICES LIST

(F PORTION)

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	38

512645

RRS-1-006(005)066 PROJECT NO

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB-TOTAL
R1-1-30	30"x 30"	STOP		17	0
R1-1-48	48"x 48"	STOP		34	0
R1-2-48	48"x48"&	YIELD & TO ONCOMING TRAFFIC		45	0
M4-6	24"x 12"	END	2	6	12
M4-8	24"x 12"	DETOUR	2	6	12
R2-5c-48	48"x 60"	SPEED ZONE AHEAD		40	0
R4-1-48	48"x 60"	DO NOT PASS		40	0
R4-2-48	48"x 60"	PASS WITH CARE		40	0
R4-7-48	48"x 60"	KEEP RIGHT SYMBOL		40	0
R4-8-48	48"x 60"	KEEP LEFT SYMBOL		40	0
R10-6-48	48"x 72"	STOP HERE ON RED		44	0
R11-2-48	48"x 30"	ROAD CLOSED	2	26	52
R11-3a-60	60"x 30"	ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		30	0
R11-3b-60	60"x 30"	BRIDGE OUT __ MILES AHEAD LOCAL TRAFFIC ONLY		30	0
R11-2a-48	48"x 30"	STREET CLOSED	3	26	78
R11-3c-48	60"x 30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		30	0
R11-4a-60	60"x 30"	STREET CLOSED TO THRU TRAFFIC	2	30	60
G20-1-60	60"x 36"	ROAD CONSTRUCTION NEXT __ MILES		34	0
G20-2-60	60"x 24"	END CONSTRUCTION	2	28	56
G20-2a-48	48"x 24"	END ROAD WORK		24	0
G20-4-36	36"x 18"	PILOT CAR FOLLOW ME		10	0
G20-50-72	72"x 36"	ROAD CONSTRUCTION NEXT __ MILES RT & LT ARROWS		38	0
G20-52-72	72"x 24"	ROAD CONSTRUCTION NEXT __ MILES RT or LT ARROW		30	0
G20-54-48	48"x 36"	OVERHEAD BRIDGE PAINTING		30	0
G20-8-48	48"x 36"	TEMPORARY SURFACE NEXT __ MILES		30	0
M1-4-24	24"x 24"	ROUTE MARKER (POST AND INSTALLATION ONLY)		8	0
M3-1-24	24"x 12"	NORTH (MOUNTED ON ROUTE MARKER POST)		6	0
M3-2-24	24"x 12"	EAST (MOUNTED ON ROUTE MARKER POST)		6	0
M3-3-24	24"x 12"	SOUTH (MOUNTED ON ROUTE MARKER POST)		6	0
M3-4-24	24"x 12"	WEST (MOUNTED ON ROUTE MARKER POST)		6	0
M4-8-24	24"x 12"	DETOUR (MOUNTED ON ROUTE MARKER POST)		6	0
M4-10-48	48"x 18"	DETOUR ARROW RIGHT or LEFT	8	22	176
M5-1-21	21"x 15"	ARROW AHD AND RT or LT(MTD ON ROUTE MKR POST)		6	0
M6-1-21	21"x 15"	ARROW RT or LT (MOUNTED ON ROUTE MARKER POST)		6	0
W1-1-48	48"x 48"	RIGHT or LEFT SHARP CURVE ARROW		34	0
W1-2-48	48"x 48"	RIGHT or LEFT CURVE ARROW		34	0
W1-3-48	48"x 48"	RIGHT or LEFT SHARP REVERSE CURVE ARROW		34	0
W1-4-48	48"x 48"	RIGHT or LEFT REVERSE CURVE ARROW	2	34	68
W1-6-48	48"x 24"	LARGE ARROW		26	0
W3-1a-48	48"x 48"	STOP AHEAD SYMBOL		34	0
W3-2a-48	48"x 48"	YIELD AHEAD SYMBOL		34	0
W3-3-48	48"x 48"	SIGNAL AHEAD SYMBOL		34	0
W4-2-48	48"x 48"	LANE TRANSITION SYMBOL		34	0
W5-1-48	48"x 48"	ROAD NARROWS		34	0
W6-3-48	48"x 48"	TWO WAY TRAFFIC SYMBOL		34	0
W8-1-48	48"x 48"	BUMP		34	0
W8-3a-48	48"x 48"	PAVEMENT ENDS SYMBOL		40	0
W8-3a-24	24"x 18"	PAVEMENT END PLAQUE			
W8-9-48	48"x 48"	LOW SHOULDER		34	0
W8-51-48	48"x 48"	UNEVEN PAVEMENT		34	0
W8-53-48	48"x 48"	TRUCKS ENTERING HIGHWAY		34	0
W8-54-48	48"x 48"	TRUCKS ENTERING AHEAD OR __ FT.		34	0
W8-55-48	48"x 48"	TRUCKS CROSSING AHEAD or __ FT.		34	0
W12-2-48	48"x 48"	LOW CLEARANCE SYMBOL			
W13-1-24	24"x 24"	__ MPH ADVISORY SPEED PLATE		10	0
W13-4-48	48"x 60"	RAMP ARROW		40	0
W14-3-64	64"x 48"	NO PASSING ZONE		27	0
W20-1-48	48"x 48"	ROAD CONSTRUCTION - AHEAD, 1/2 MILE, or FT.	8	34	272
W20-2-48	48"x 48"	DETOUR __ FT.	3	34	102
W20-3-48	48"x 48"	ROAD or STREET CLOSED AHEAD or __ FT.		34	0
W20-4-48	48"x 48"	ONE LANE ROAD AHEAD or __ FT.		34	0
W20-50-48	48"x 48"	BE PREPARED TO STOP		34	0
W20-51-48	48"x 48"	EQUIPMENT WORKING		34	0
W20-52-54	54"x 12"	NEXT __ MILES		10	0
W20-5-48	48"x 48"	RIGHT or LEFT LANE CLOSED AHEAD or __ FT.		34	0
W20-7a-48	48"x 48"	FLAGGING SYMBOL		34	0
W20-7k-24	24"x 18"	__ FEET		8	0
W20-8-48	48"x 48"	STREET CLOSED	5	34	170
W21-1a-48	48"x 48"	MEN WORKING SYMBOL		34	0
W21-2-48	48"x 48"	FRESH OIL		34	0
W21-50-48	48"x 48"	BRIDGE PAINTING AHEAD or __ FT.		34	0
W21-51-48	48"x 48"	MATERIAL ON ROADWAY		34	0
W21-5-48	48"x 48"	SHOULDER WORK		34	0
W22-7-48	48"x 48"	SINGLE LANE AHEAD or __ FT.		34	0
W22-8-48	48"x 48"	FRESH OIL LOOSE ROCK		34	0
R1-1a-18	18"x 18"	STOP and SLOW PADDLE Back to Back		8	0
W22-14-18				SPEC&CODE	
		TOTAL UNITS		704-1000	1058

TYPE III	8' LONG	BARRICADES	EACH	704-1052	18
TYPE II	2' MIN.	BARRICADES	EACH	704-1051	
TYPE I	6'to 10'	BARRICADES	EACH	704-1050	
18"x 36" MIN.		DELINEATOR DRUMS	EACH	704-1060	69
		FLEXIBLE DELINEATORS	EACH	704-1072	36
28" MIN.		TRAFFIC CONES	EACH	704-1065	
9" to 12" x 24"		VERTICAL PANELS	EACH	704-1080	5
3"x 8"		DELINEATOR	EACH	704-1070	

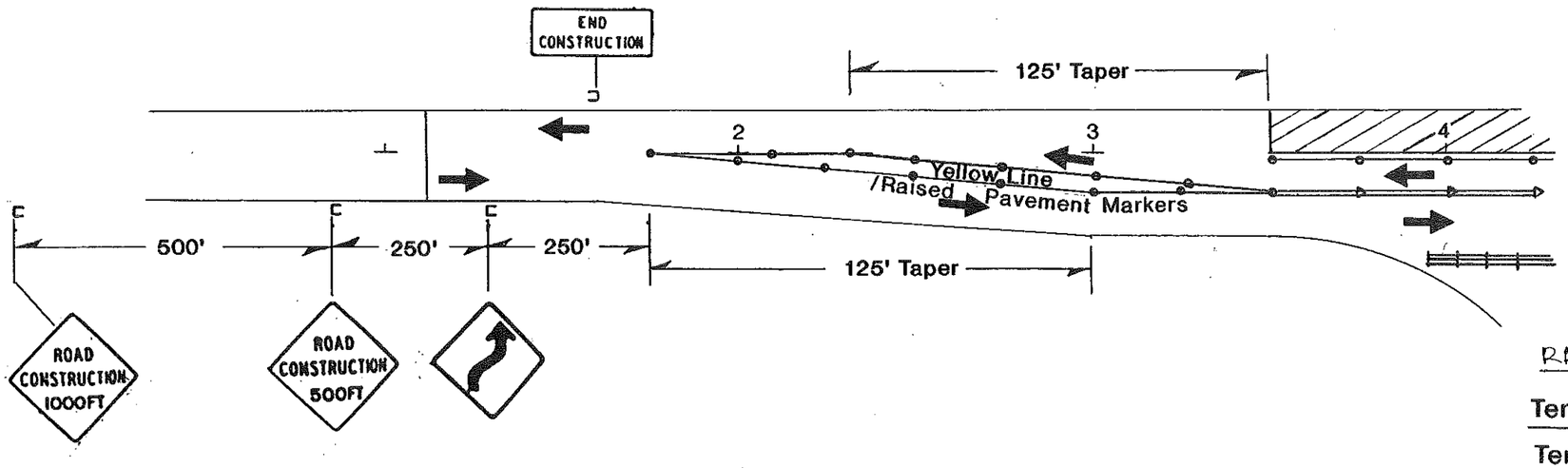
TRAFFIC CONTROL CONSTRUCTION AREA DEVICES LIST

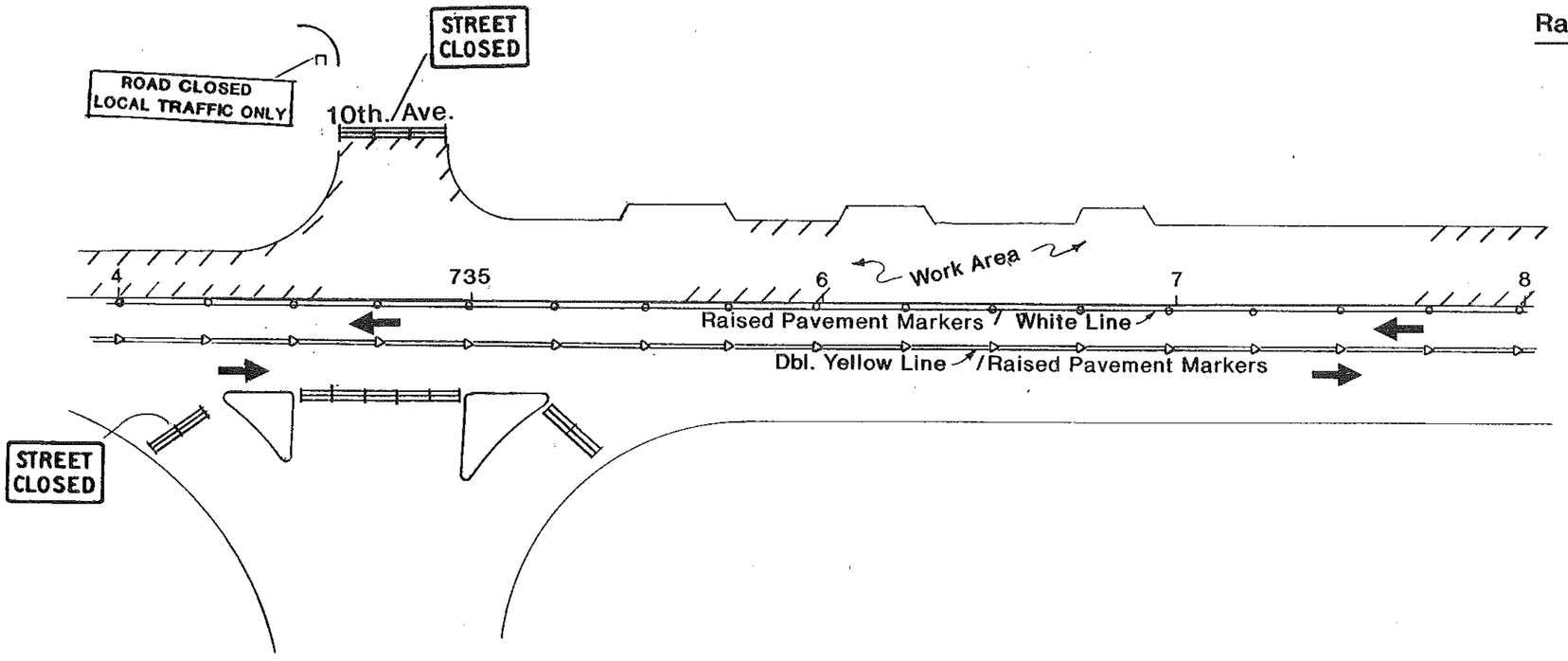
(RRS PORTION)

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	39

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	40

CONSTRUCTION SIGNING





N

RRS PORTION

Temp. Painted Line (White) 1000 L.F.

Temp. Painted Line (Yellow) 2000 L.F.

Raised Pvm't. Markers 600 Ea.

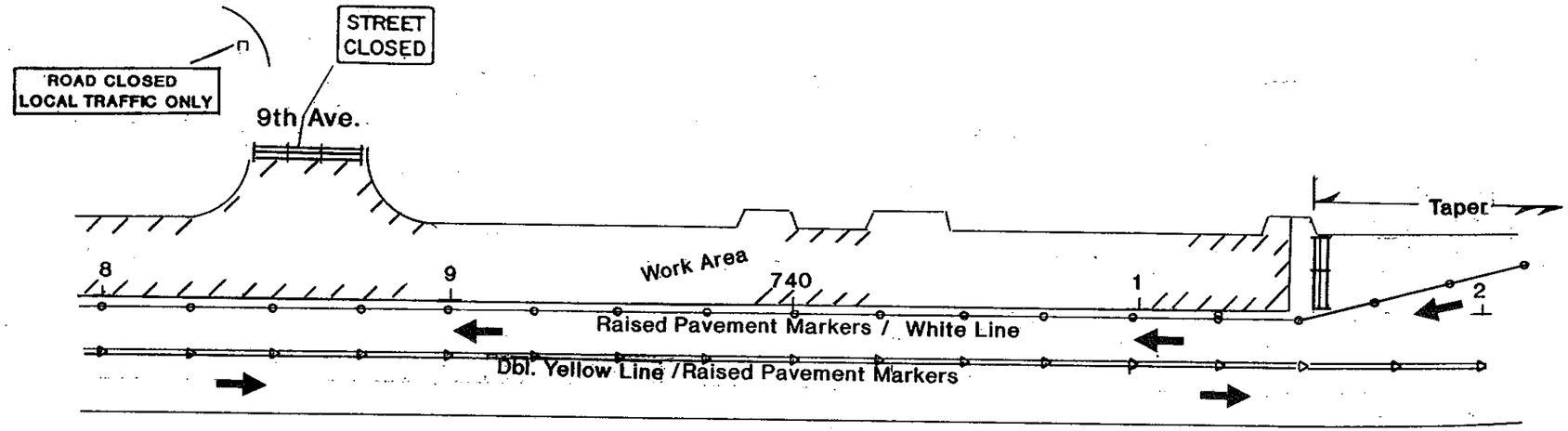
ooo Delineator Drums

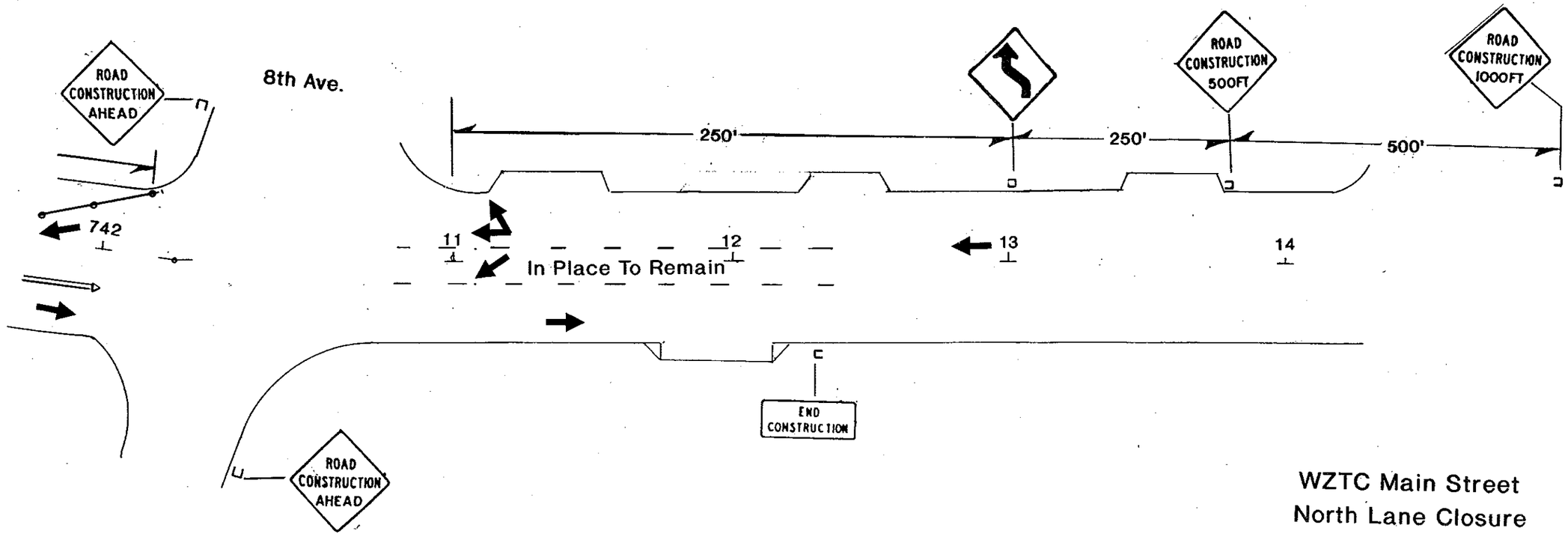
◁◁◁ Flexible Delineators

III Type III Barricade

WZTC Main Street
North Lane Closure

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	41



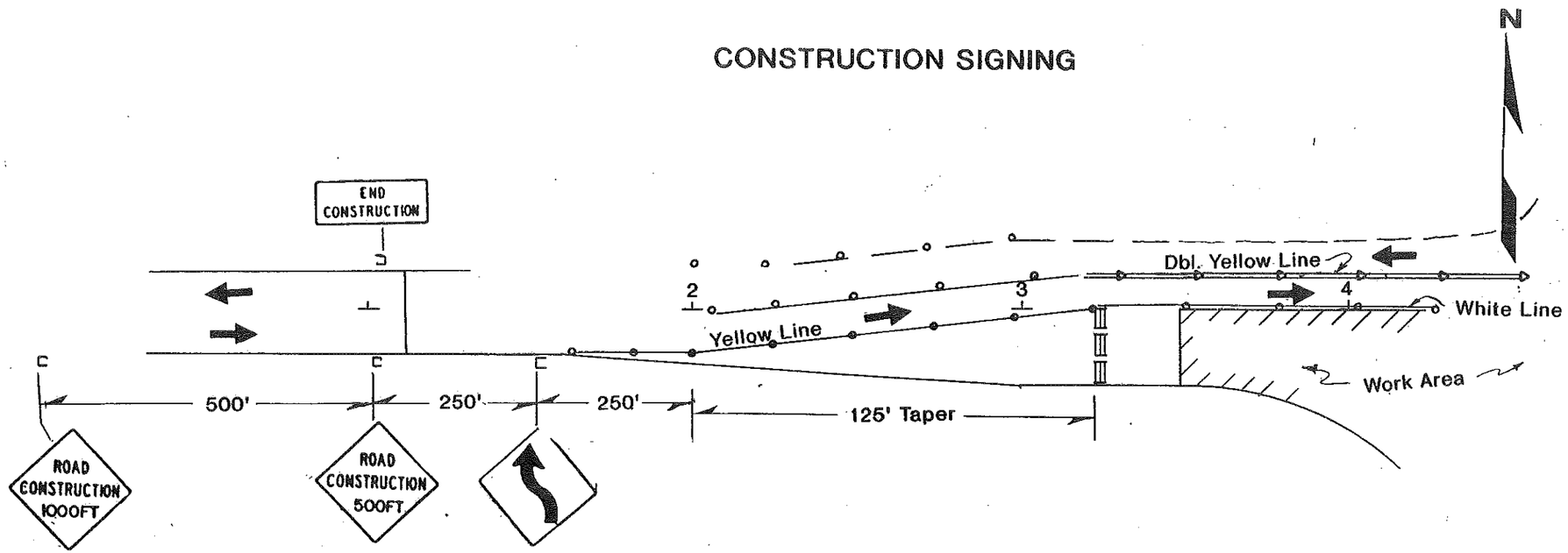


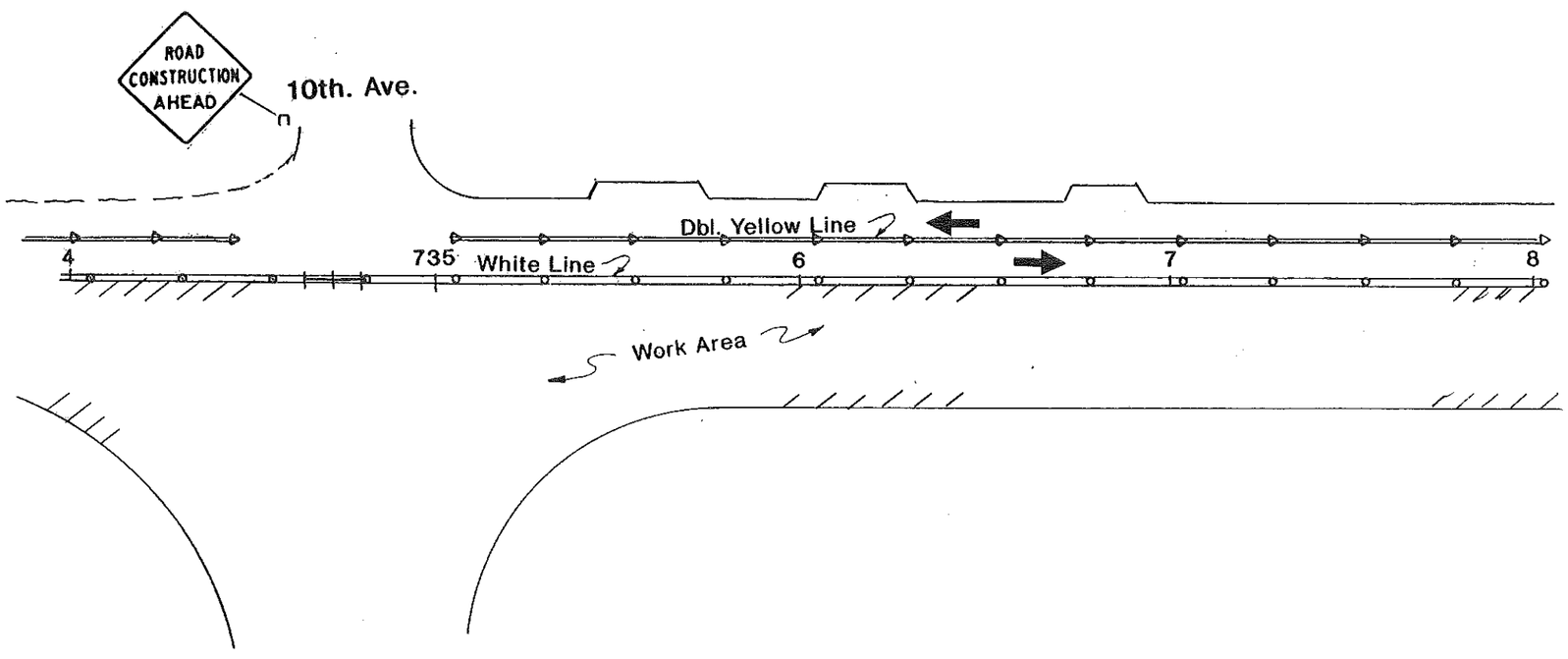
WZTC Main Street
North Lane Closure

524172

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	42

CONSTRUCTION SIGNING





WZTC Main Street
South Lane Closure

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	43

N

ROAD CONSTRUCTION AHEAD

9th Ave.

Dbl. Yellow Line

8 9 740 1 2

White Line

Work Area

Downstream Taper

ROAD CONSTRUCTION AHEAD

8th Ave.

742

11 12 13 14

In Place To Remain

ROAD CONSTRUCTION AHEAD

500'

ROAD CONSTRUCTION 500FT

500'

ROAD CONSTRUCTION 1000FT

END CONSTRUCTION

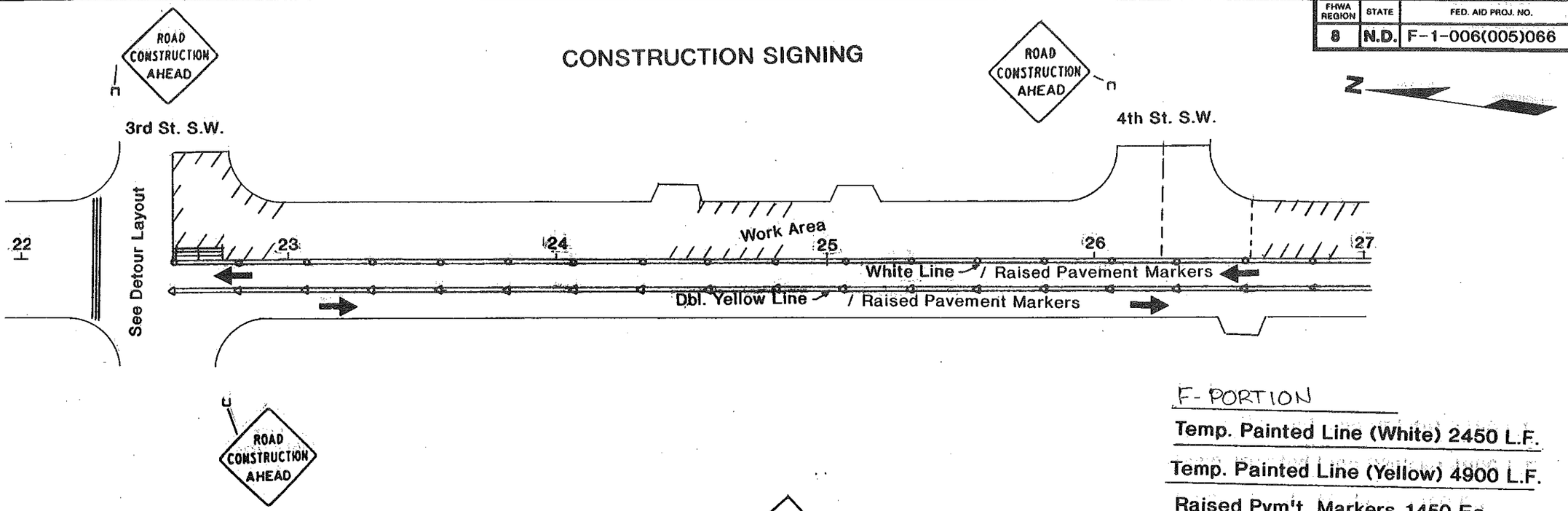
ROAD CONSTRUCTION AHEAD

WZTC Main Street
South Lane Closure

524172

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	44

CONSTRUCTION SIGNING



F- PORTION

Temp. Painted Line (White) 2450 L.F.

Temp. Painted Line (Yellow) 4900 L.F.

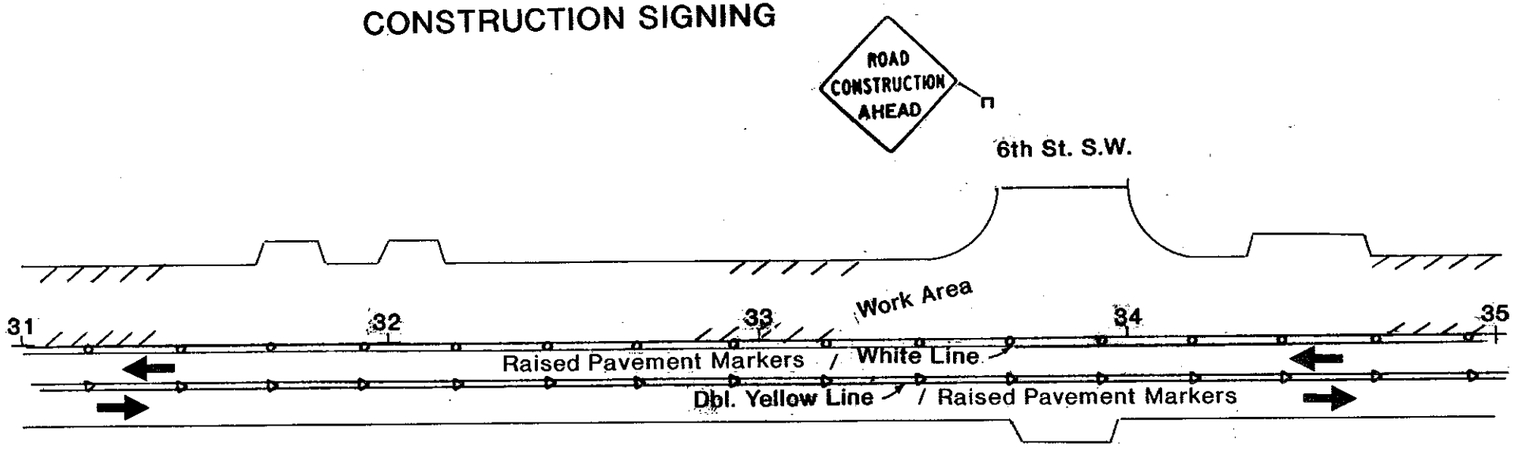
Raised Pvm't. Markers 1450 Ea.

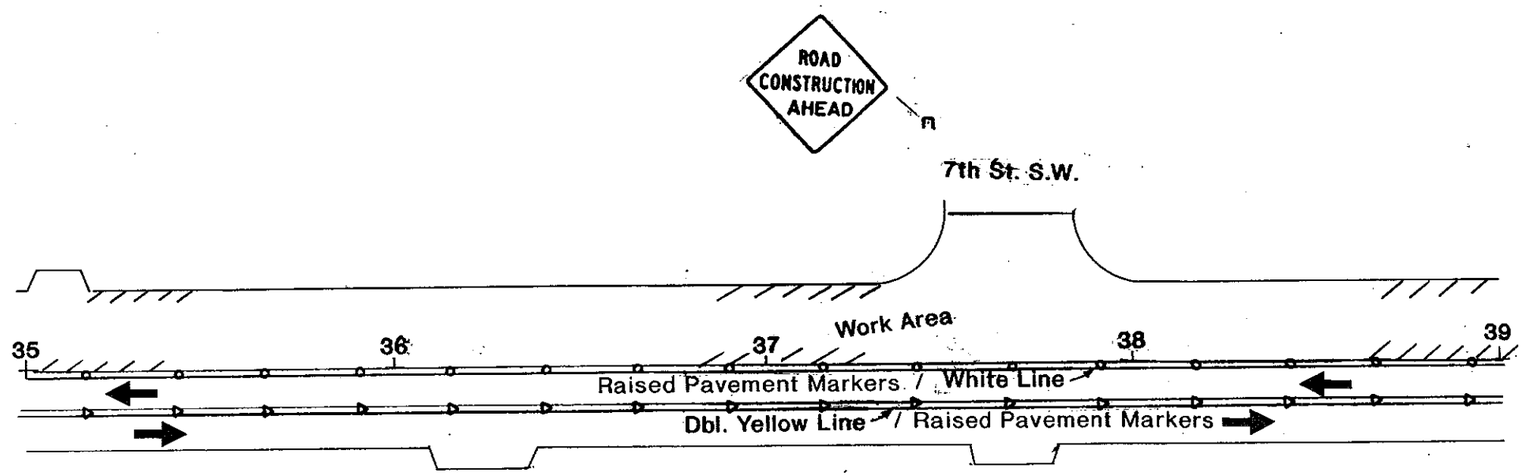
WZTC Hwy. # 6
East Lane Closure

524172

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	45

CONSTRUCTION SIGNING



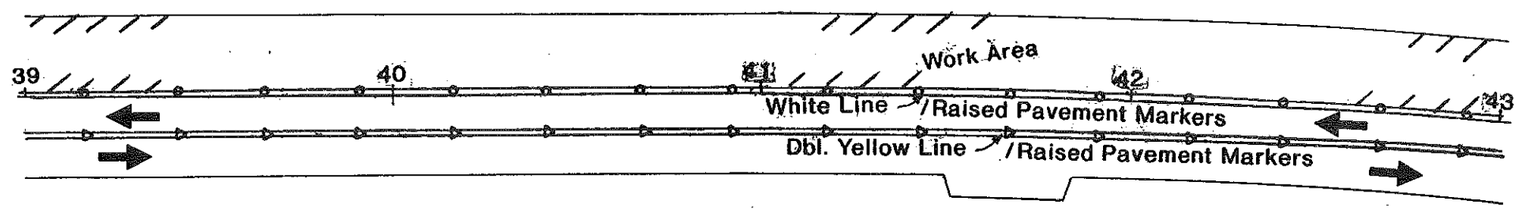


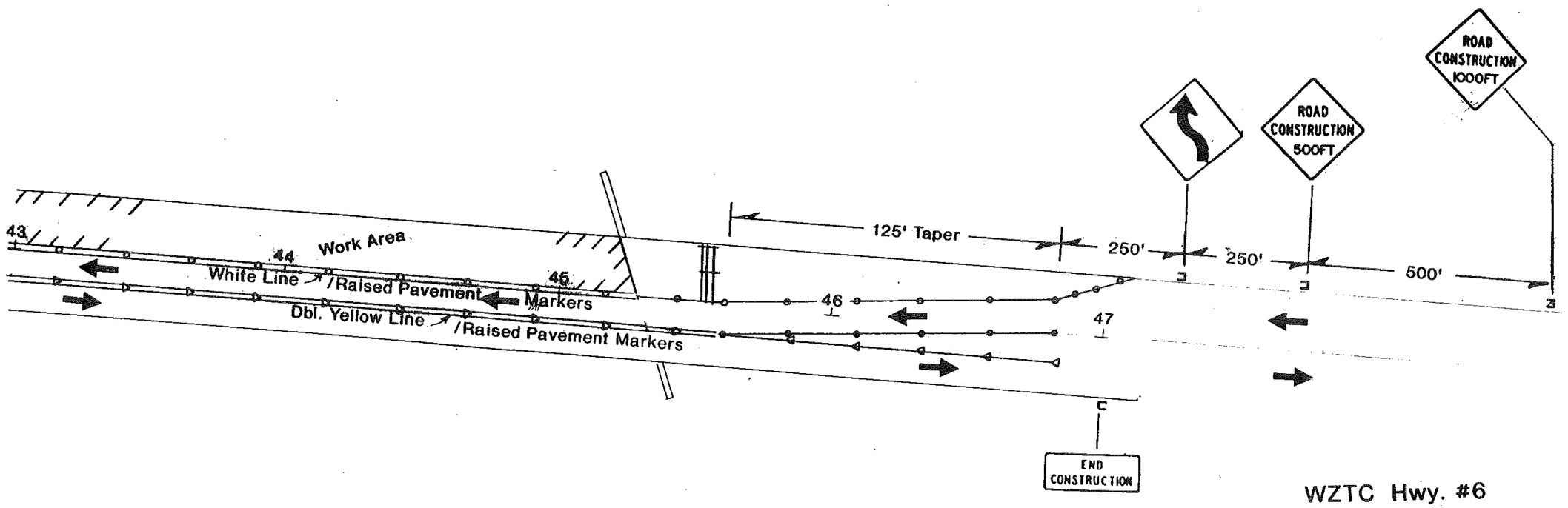
WZTC Hwy. #6
East Lane Closure

524172

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	16

CONSTRUCTION SIGNING



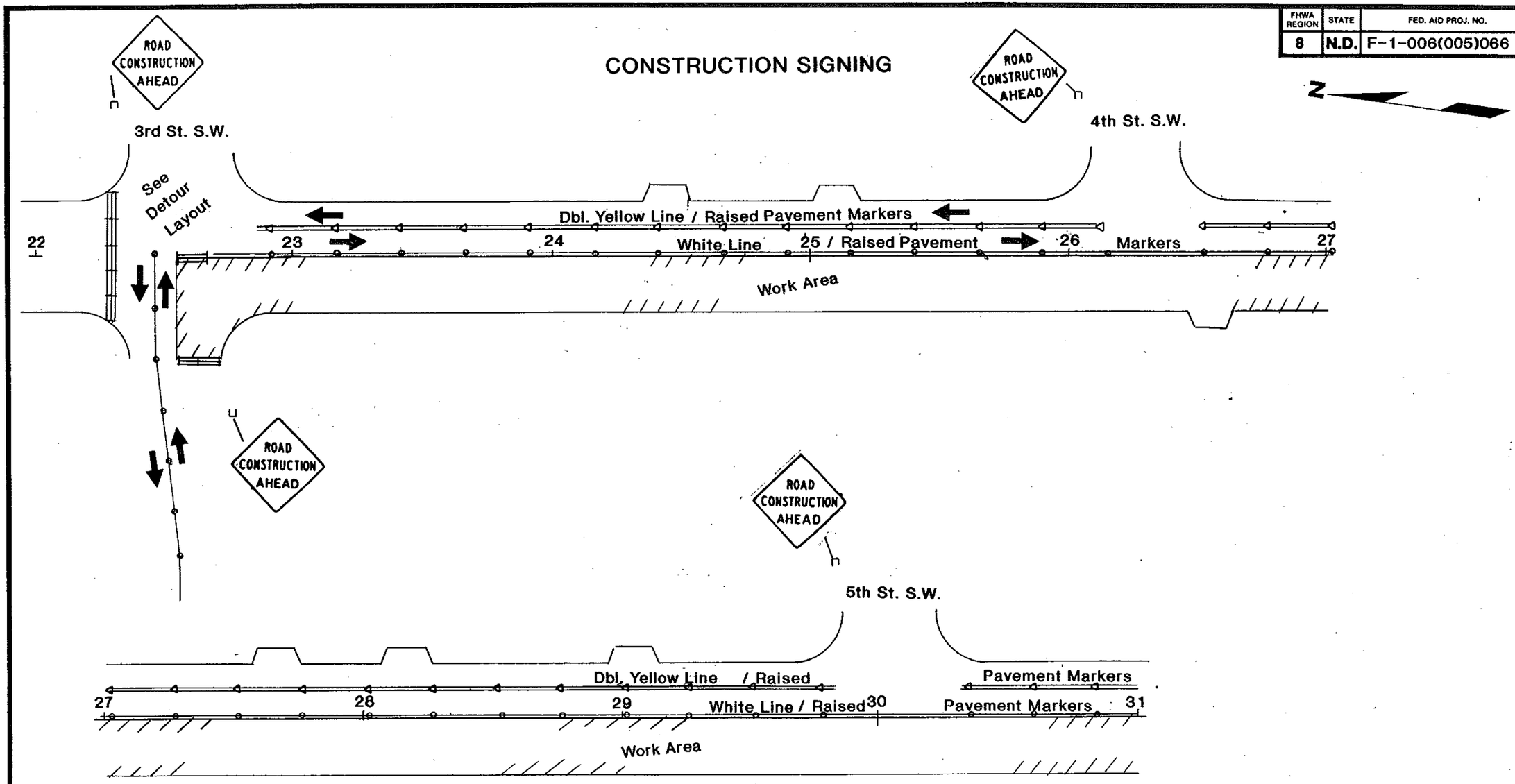


WZTC Hwy. #6
East Lane Closure

524172

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	47

CONSTRUCTION SIGNING

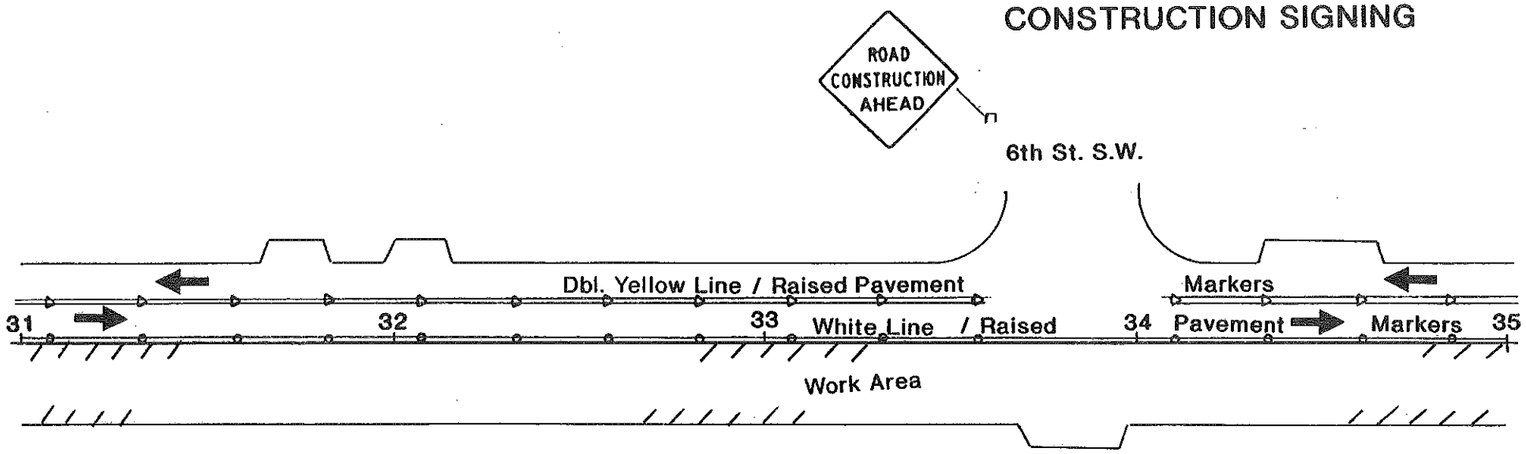


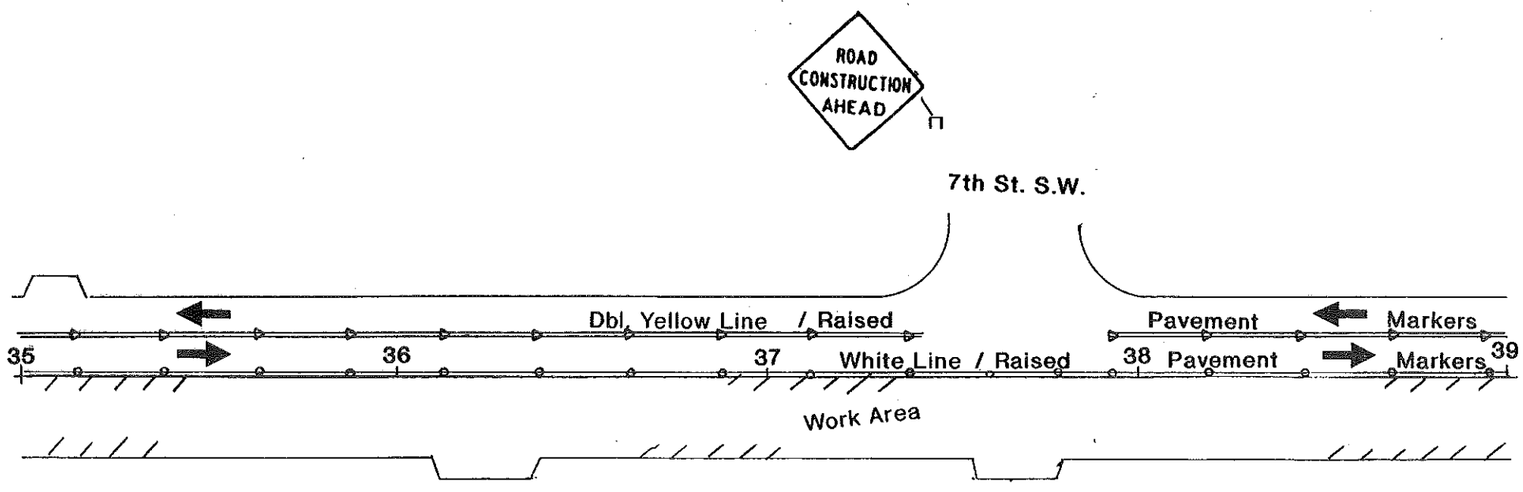
WZTC Hwy. # 6
West Lane Closure

524172

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	48

CONSTRUCTION SIGNING



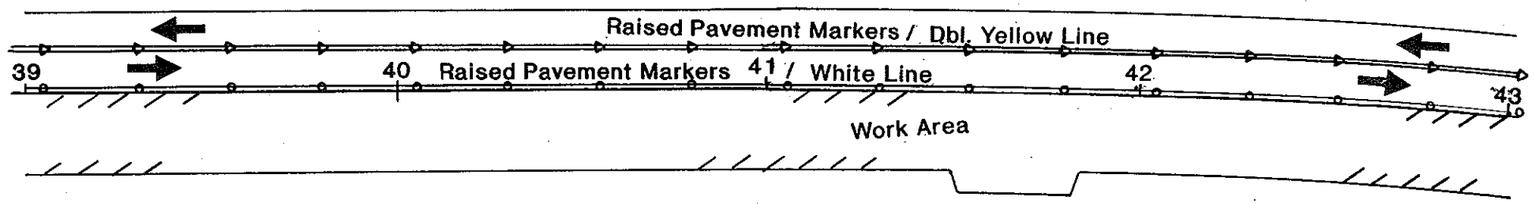


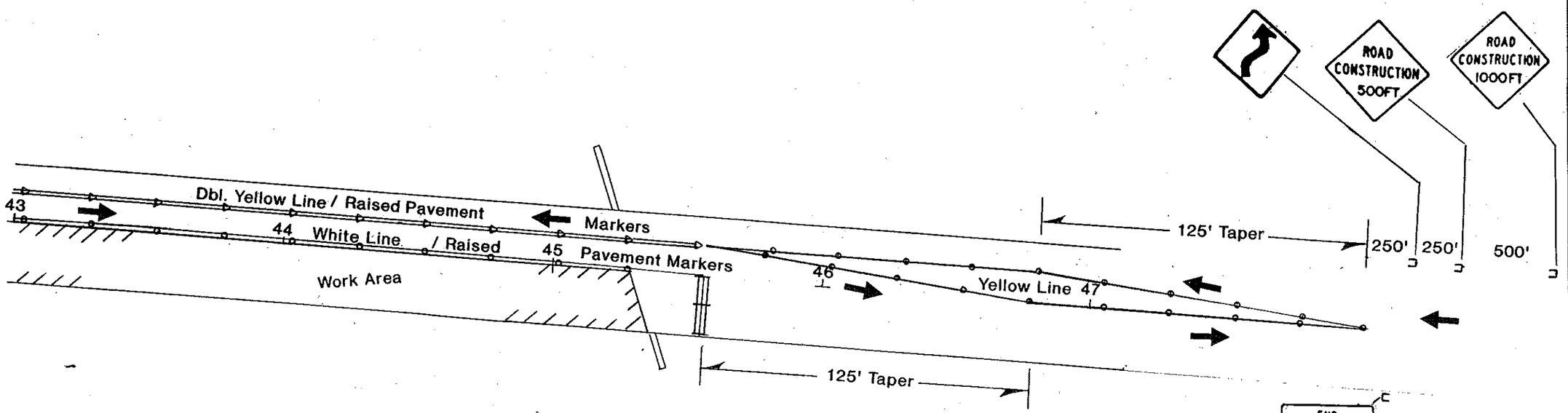
WZTC Hwy. #6
West Lane Closure

524172

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	49

CONSTRUCTION SIGNING

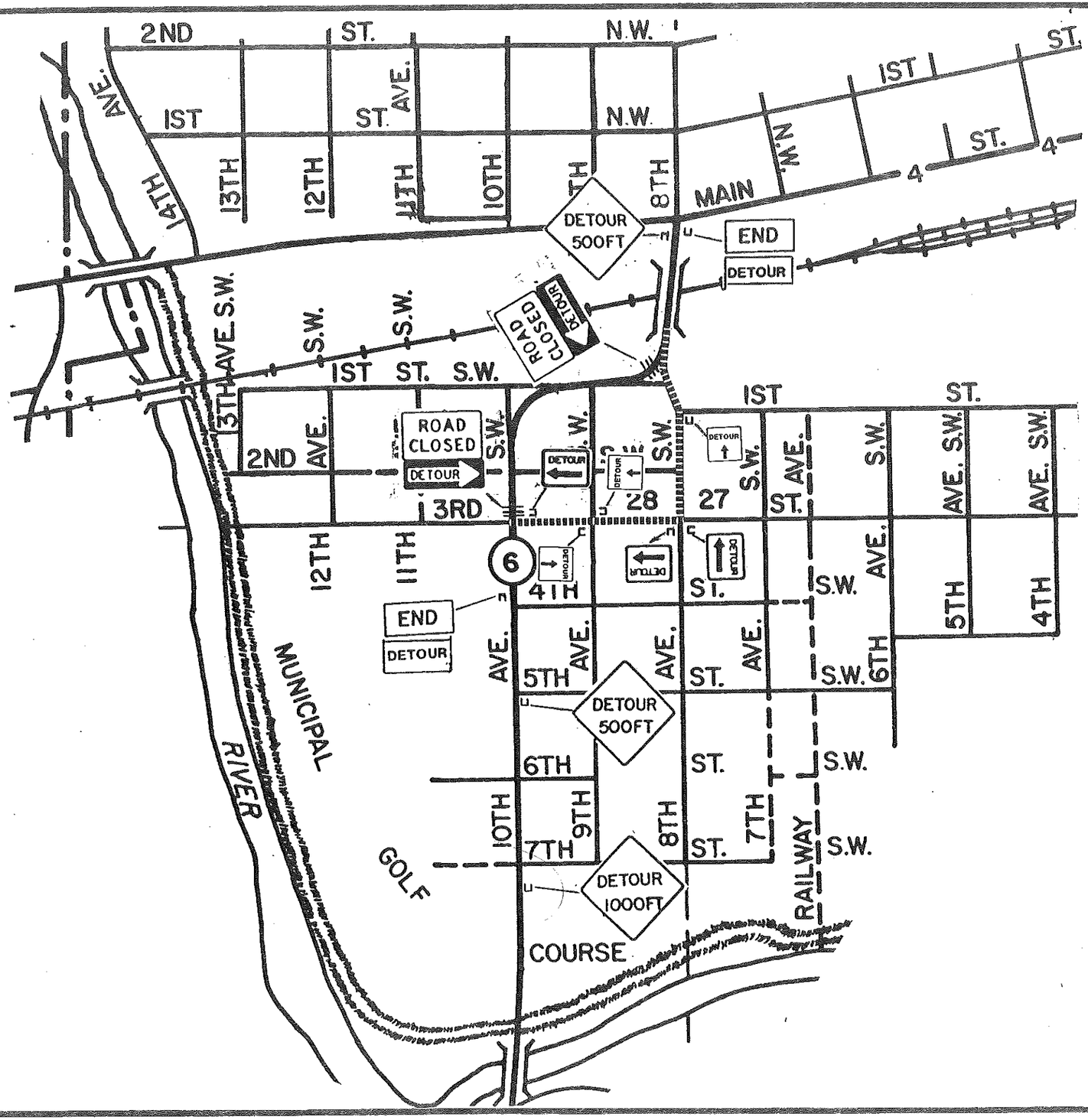




WZTC Hwy. #6
West Lane Closure

524172

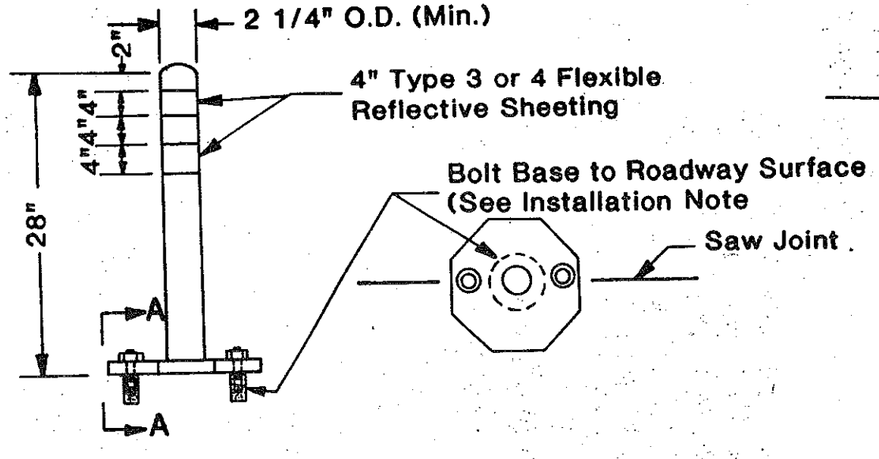
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	50



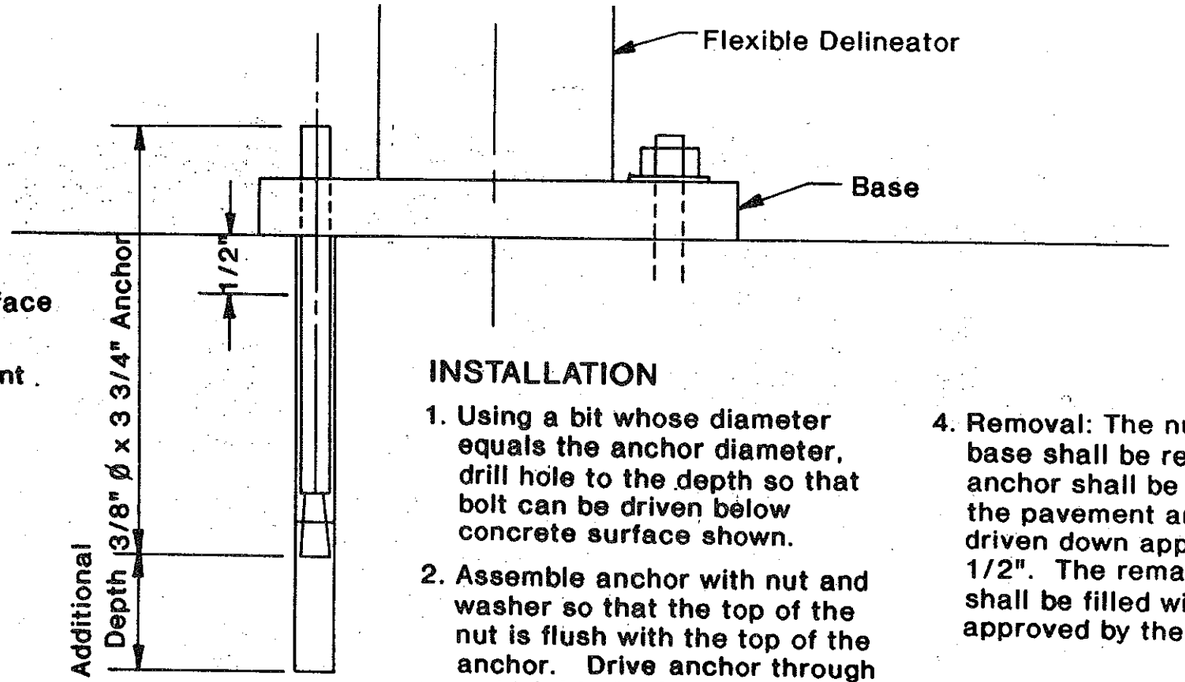
HWY.#6 DETOUR

524172

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	50A



FLEXIBLE DELINEATOR DETAILS



A-A

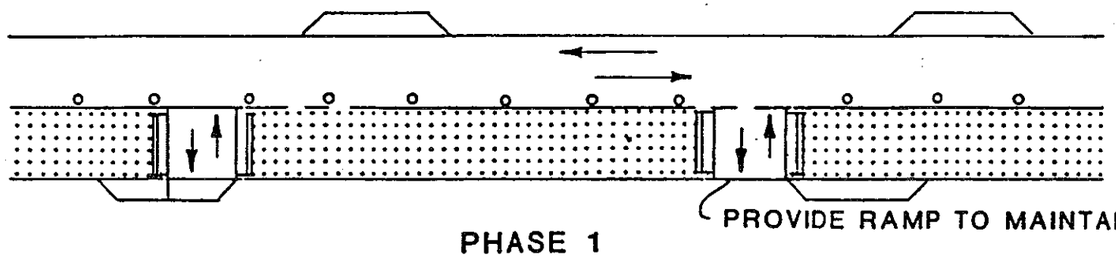
INSTALLATION

1. Using a bit whose diameter equals the anchor diameter, drill hole to the depth so that bolt can be driven below concrete surface shown.
2. Assemble anchor with nut and washer so that the top of the nut is flush with the top of the anchor. Drive anchor through material to be fastened so washer is flush with surface of material.
3. Expand anchor by tightening nut 3 to 5 turns.
4. Removal: The nut washer and base shall be removed. The anchor shall be cut off near the pavement and the anchor driven down approximately 1/2". The remaining hole shall be filled with an epoxy approved by the Engineer.

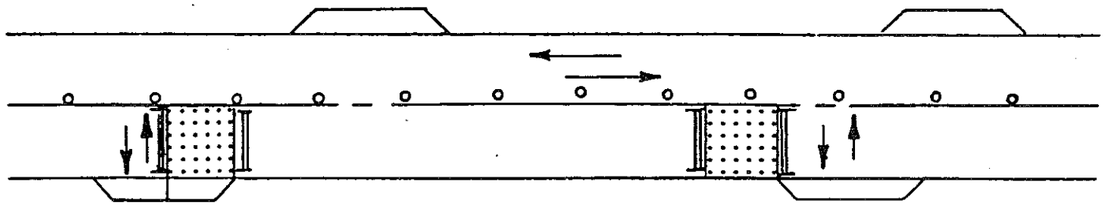
The anchor shall be galvanized steel.

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	51

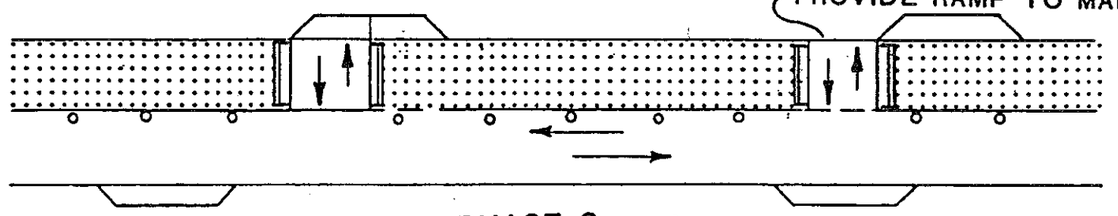
CONSTRUCTION SEQUENCE



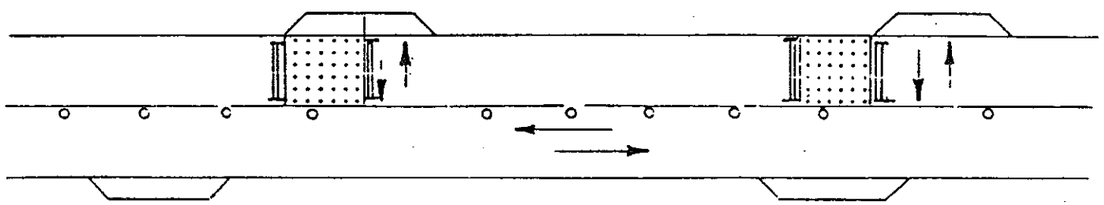
PHASE 1



PHASE 2



PHASE 3



PHASE 4

NOTES:

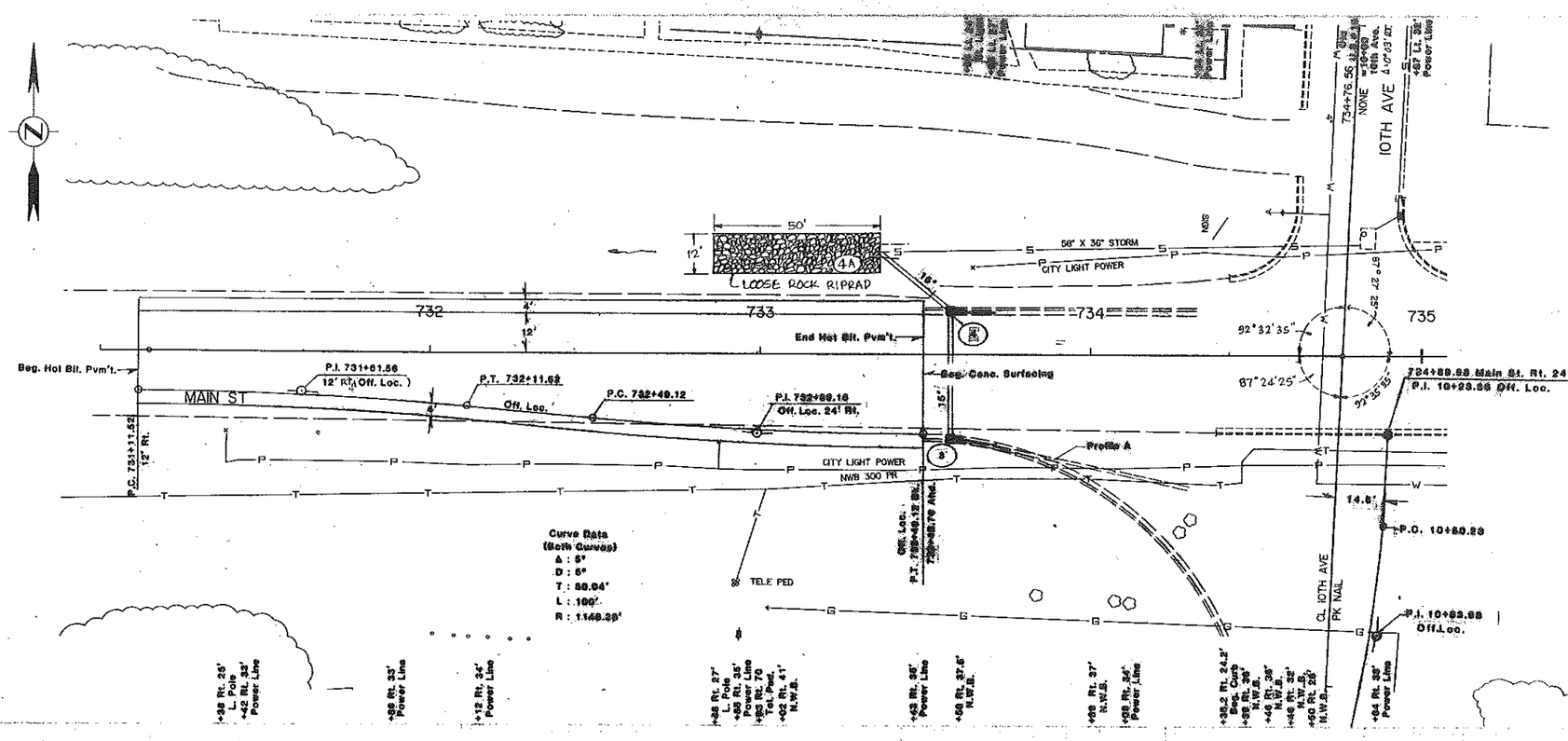
1. See Note 704-P01 (Maintaining Access). Access shall be maintained on an all weather surface at all times.
2. Construction signing, arrow panels, cones, & delineator drums shall be located as shown on Traffic Control Layouts.
3. Sequence shown is a suggestion. Construction sequence & work area length to be determined by the contractor & approved by the Engineer.
4. High Early Strength PCC Pavement & weekend or 24 hour continuous operations may be necesary to provide access.
5. On-street parking shall be prohibited in the construction area.
6. Aggregate base course shall be paid for at unit price bid.

o DELINEATOR DRUM OR VERTICAL PANELS

WORK AREA

TYPE II BARRICADE

DIV/W A REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	52



PIPE, CONC. REINF. 15 IN. CL. III STORM DRAIN

#3 to #4 36 L.F.
#4 to #4A 30 L.F.

INLET - TYPE-2

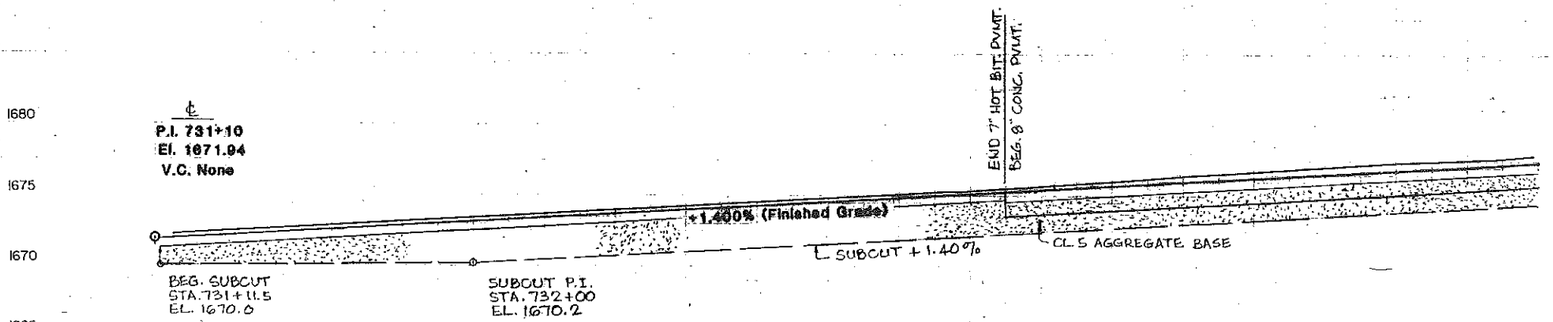
#3 1 Ea.
#4 1 Ea.

RIPRAP, LOOSE ROCK

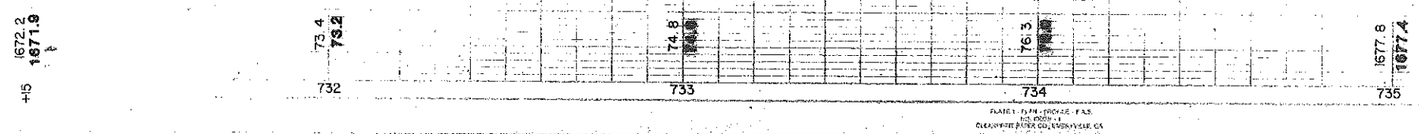
733+87 to 733+37 Lt. 46 C.Y.

UNDERDRAIN, PIPE, PVC, PERFORATED - 4 IN.

Inlet # 3 Ahd. - 12.5 L.F.
Inlet # 4 Ahd. - 12.8 L.F.



Inlet No.	#3	#4
Type	Type 2 - V Grate	Type 2 - V Grate
Station	733+87 Rt.	733+87 Lt.
Grate	1674.71	1674.97
Base	1671.99	1671.04
Invert	1671.87	1671.23
Outlet	1671.28	1668.99 @ 733+92± - 29'± Lt.
"W"	8.0'	9.00'



BENCH MARK

No.	Location	Decription	Elevation
#1	Hyd. N.W. Cor. 10th & Main	9+58 Rt. 24.8'	1679.73

Main Street

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	[illegible]	13

REMOVAL OF CURB & GUTTER

734+38 to 736+00 Rt. 162 L.F.
734+42 to 736+00 Lt. 140 L.F.

CURB & GUTTER, TYPE-1

733+48.76 to 736+00 Rt. 437.5 L.F.
(Incl. islands)
733+48.76 to 736+00 Lt. 246.1 L.F.

SIDEWALK, CONCRETE

733+48.76 to 736+00 Rt. 108 S.Y.
(Incl. islands)
735+00 Lt. N.E. Quad. 27.3 S.Y.

DRIVEWAY, CONCRETE H.E.S.

735+69 Lt. (22') – 33 S.Y.

PIPE, CONC. REINF. CL. III STORM DRAIN

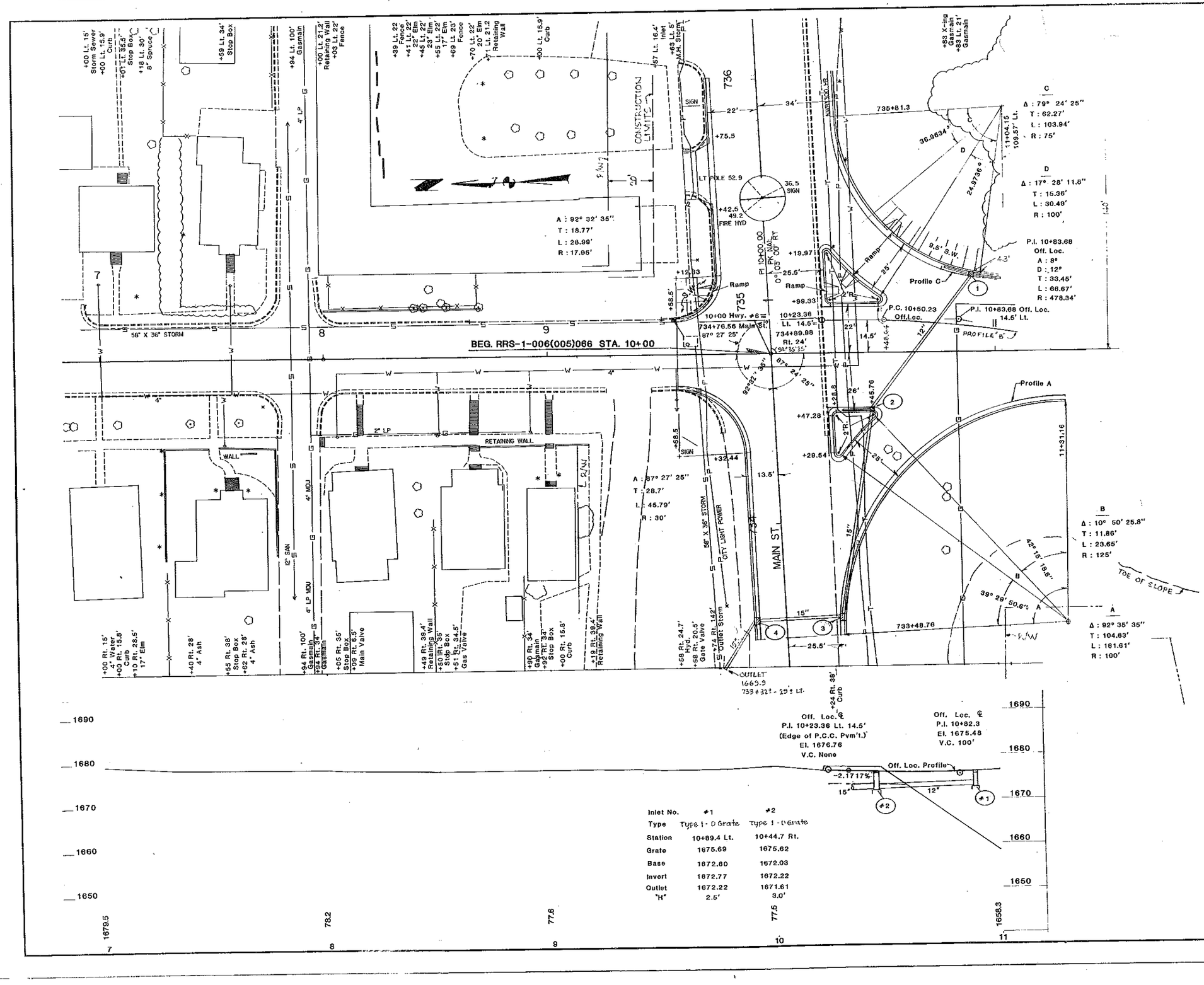
#1 to #2 12" x 74 L.F.
#2 to #3 16" x 92 L.F.

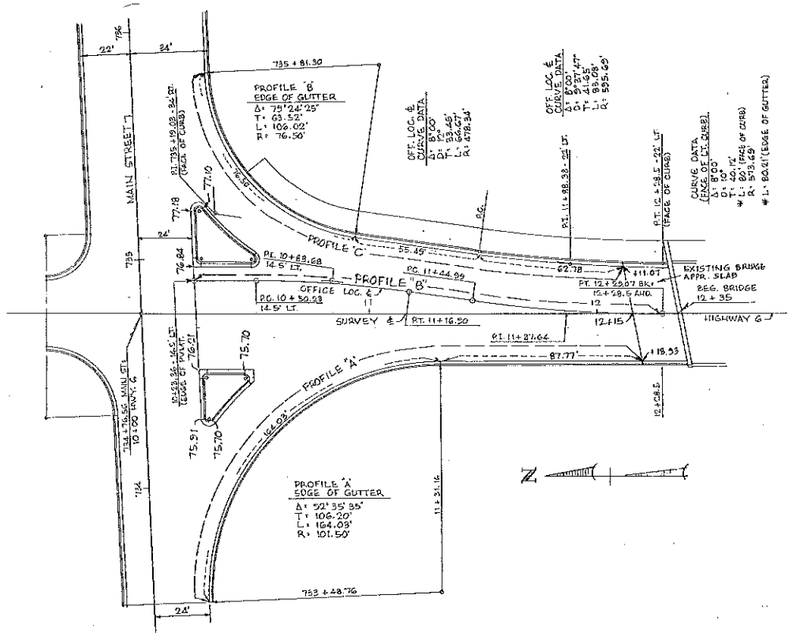
INLET - TYPE 1

#1 1 Ea.
#2 1 Ea.

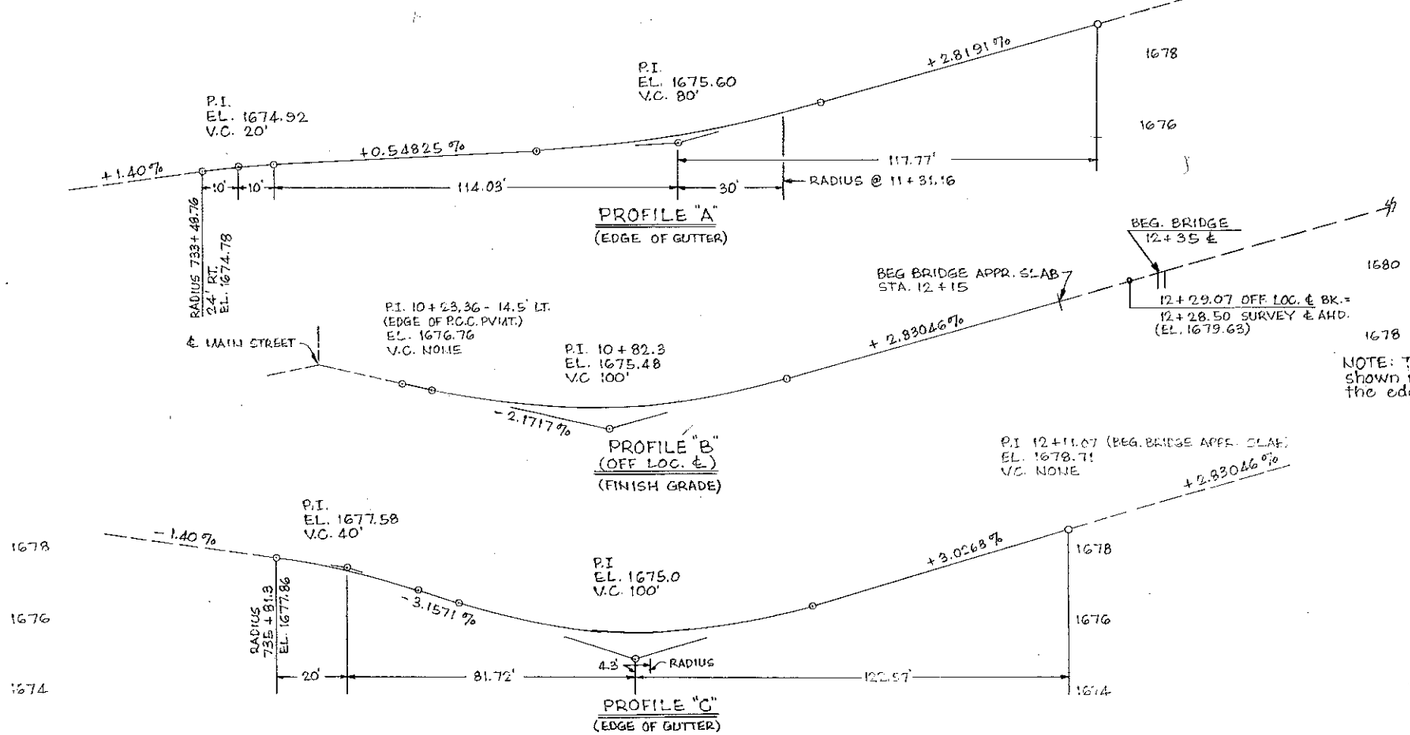
UNDERDRAIN, PIPE, PVC. PERFORATED - 4 IN.

Inlet #1 Bk. – 12.5 L.F.
Inlet #1 Ahd. – 12.5 L.F.
Inlet #2 Bk. – 12.5 L.F.





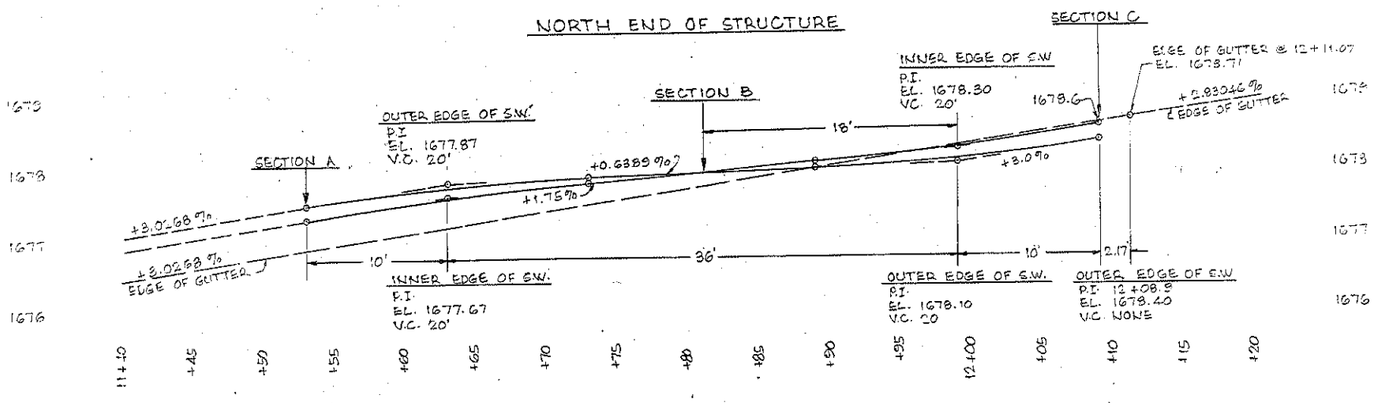
P.I. 12 + 18.93 (BEG. BRIDGE APPR. SLAB)
EL. 1678.92
V.C. NONE
+2.83046 %



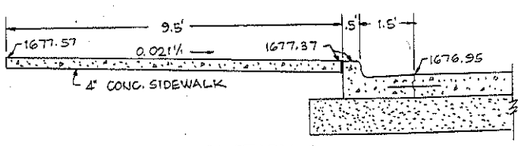
NOTE: The elevations and distances shown in profiles "A" and "C" are on the edge of the gutter.

INTERSECTION GRADIENTS

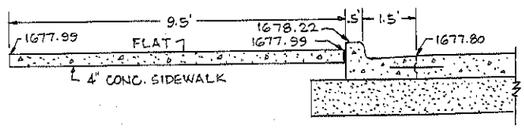
NORTH END OF STRUCTURE



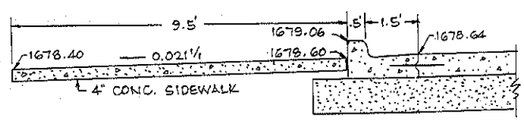
NOTE: The gradients shown above are based on distances measured on edge of gutter.



SECTION A

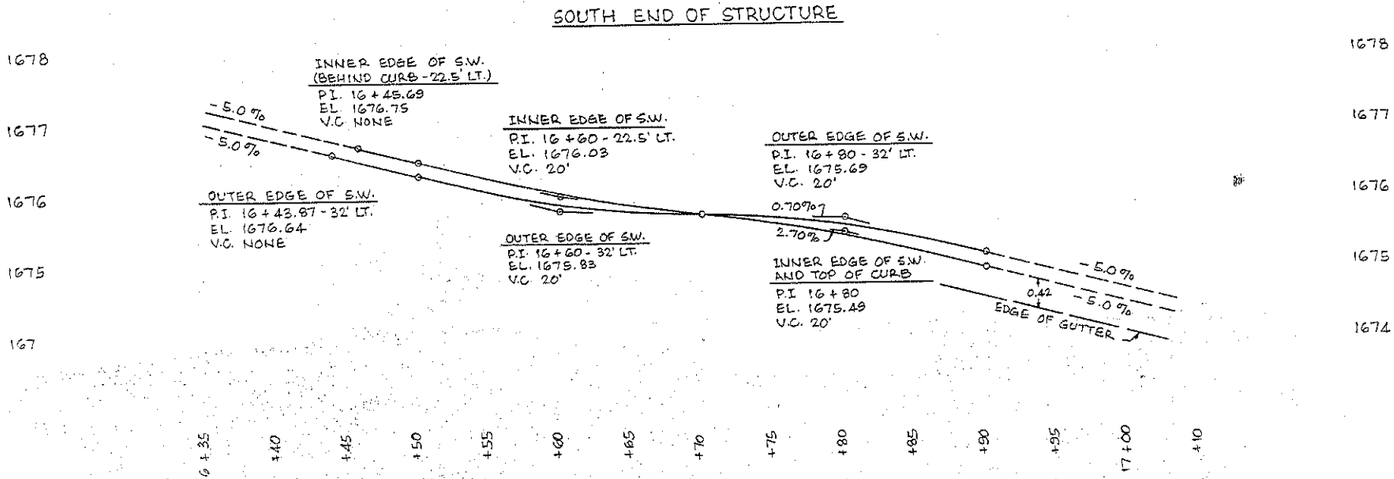


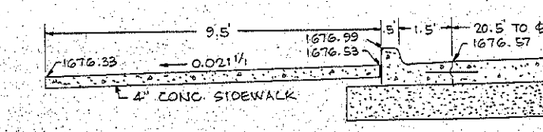
SECTION B



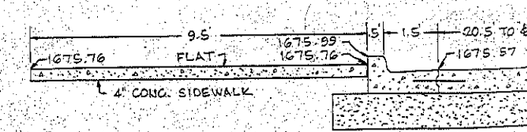
SECTION C

SOUTH END OF STRUCTURE

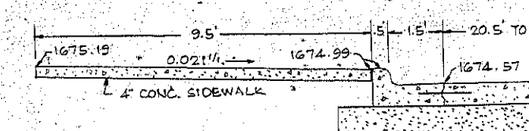




SECTION @ 16+50

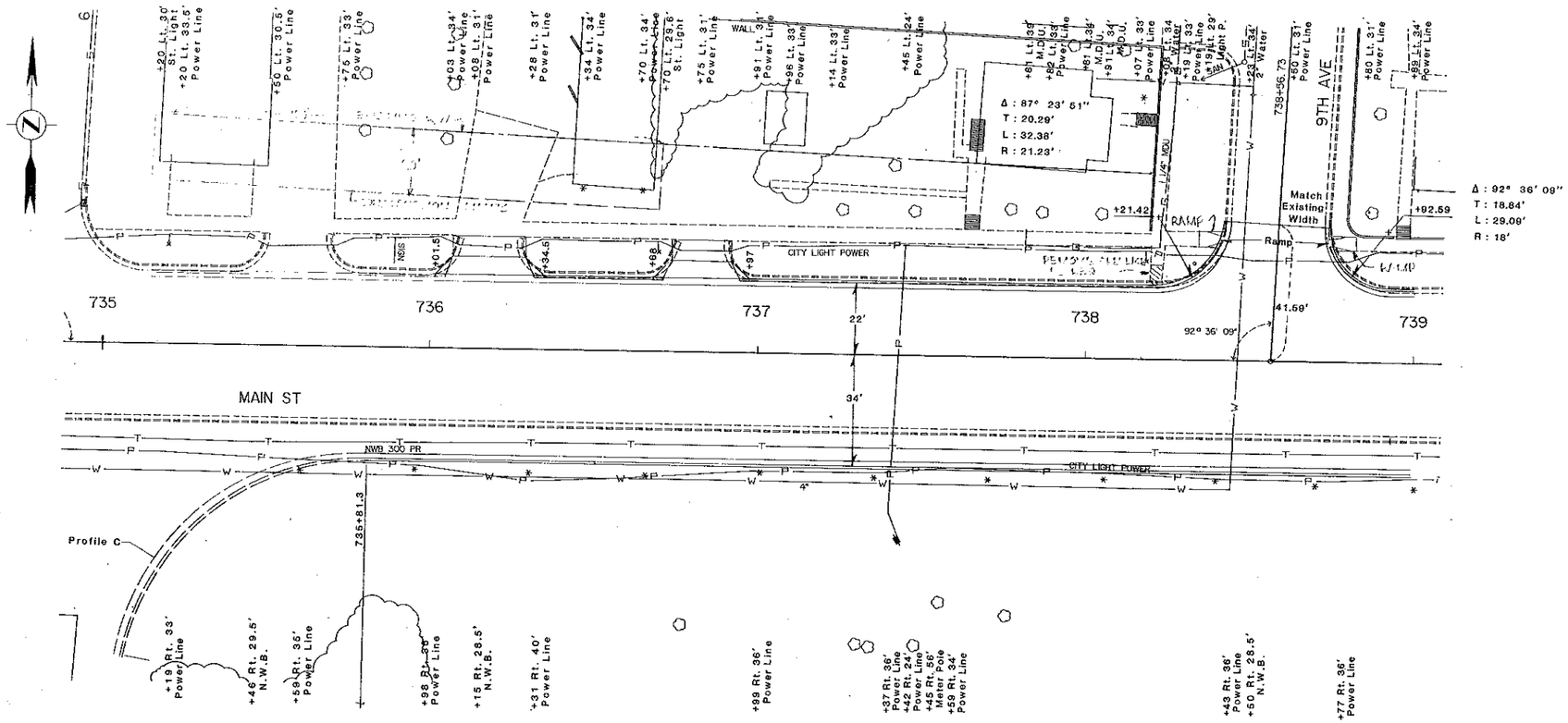


SECTION @ 16+70



SECTION @ 16+90

SIDEWALK TRANSITION AT END OF STRUCTURE



MAIN STREET AND NORTH APPROACH TO STRUCTURE (RRS)

EXC.	5,748	C.Y.
EMB.	10,259	C.Y.
BORROW	6,627	C.Y.
WASTE	2,116	C.Y. (SUBCUT EXC. - SEE NOTE 200-252)

REMOVAL OF CURB & GUTTER

736+00 to 739+00 Rt. 300 L.F.
736+00 to 739+00 Lt. 284 L.F.

REMOVAL OF CONCRETE

738+19 to 738+82 Lt. 10 S.Y.

CURB & GUTTER, TYPE-1

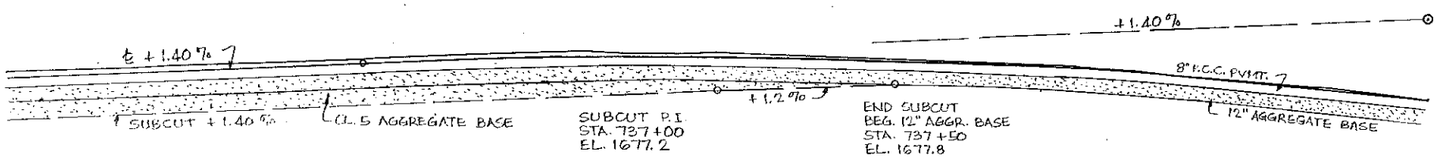
736+00 to 739+00 Lt. 290.3 L.F.
736+00 to 739+00 Rt. 300.0 L.F.

DRIVEWAY, CONCRETE H.E.S.

736+17 Lt. (22') 32.7 S.Y.
736+82.5 Lt. (18') 27.4 S.Y.

SIDEWALK, CONCRETE

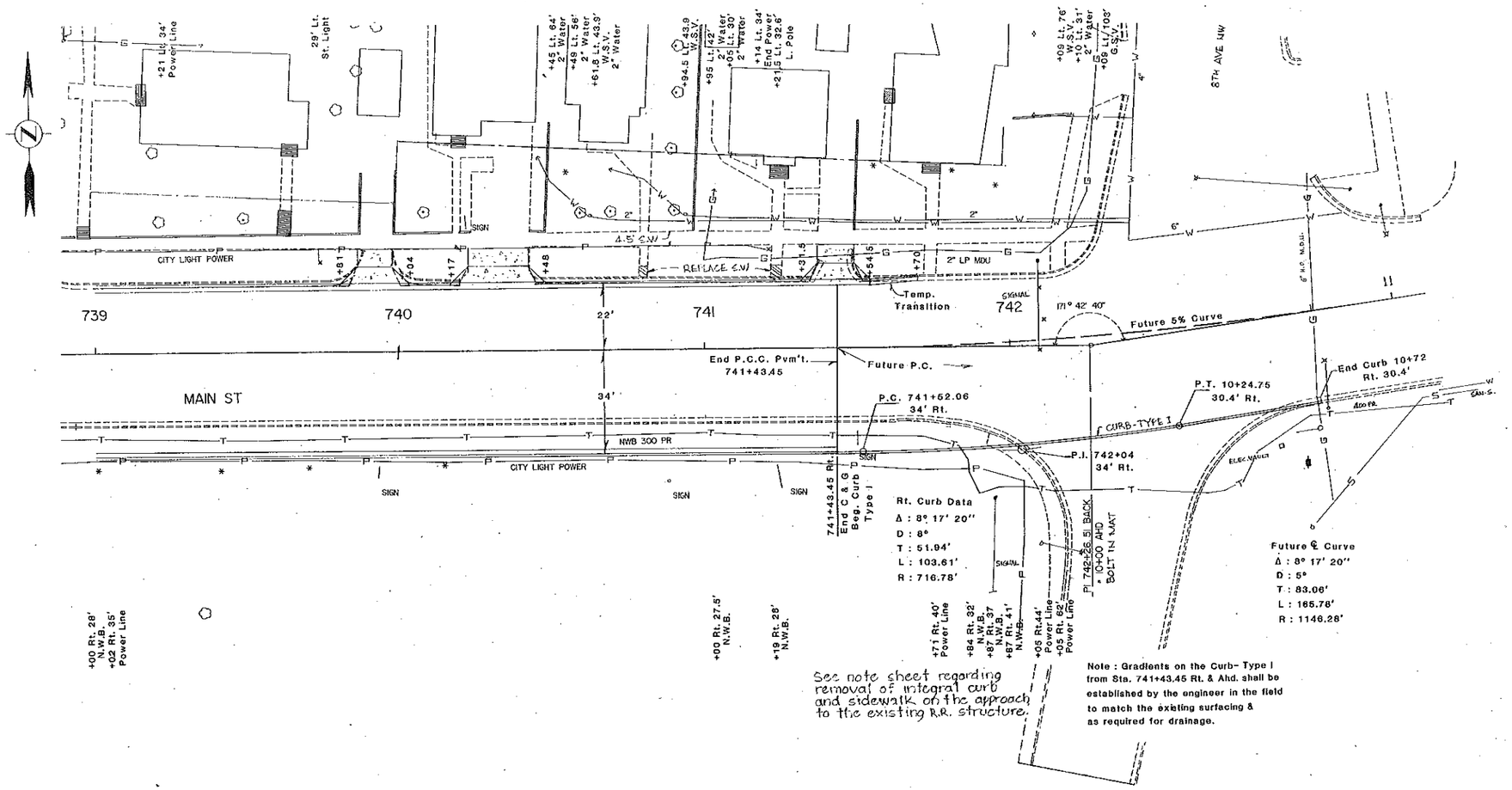
738+19 to 738+82 Lt. 10 S.Y.

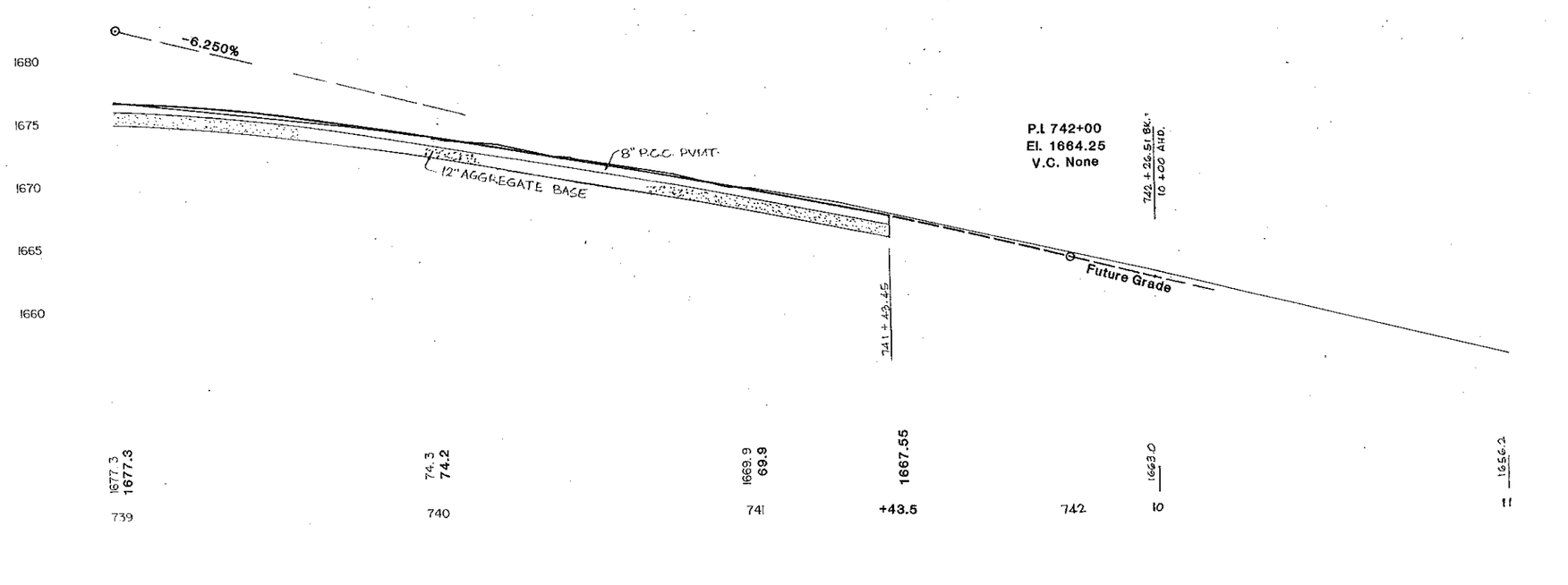


P.I. 739+00
El. 1683.0
V.C. 600'

1677.5 **1677.4** — 735
79.1 **78.8** — 736
79.8 **79.6** — 737
79.2 **79.1** — 738
1677.3 **1677.3** — 739

Main Street





REMOVAL OF CURB & GUTTER

739+00 to 10+72 Rt. 510 L.F.
739+00 to 741+70 Lt. 270 L.F.

REMOVAL OF CONCRETE

739+81 to 741+55 Lt. 66 S.Y.
741+92 Rt. & Ahd. 85 S.Y.
(Struct. Appr. Rd.)

CURB & GUTTER, TYPE-1

739+00 to 741+70 Lt. 270.0 L.F.
739+00 to 741+43.5 Rt. 243.5 L.F.

SIDEWALK, CONCRETE

740+78 to 741+26 Lt. 4 S.Y.

DRIVEWAY, CONCRETE H.E.S.

739+92.5 Lt. (12') 19.4 S.Y.
740+32.5 Lt. (20') 30.0 S.Y.
741+43.0 Lt. (12') 19.4 S.Y.

CURB, TYPE-1

741+43.45 to 10+72 Rt. 159.5 L.F.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N. D.	BRS-1-006(005)066	58

CURB & GUTTER, TYPE – 1

10 + 93.7 to 12 + 10.8 Lt. – 117.8 L.F.

11 + 31.2 to 12 + 19.2 Rt. – 88.0 L.F.

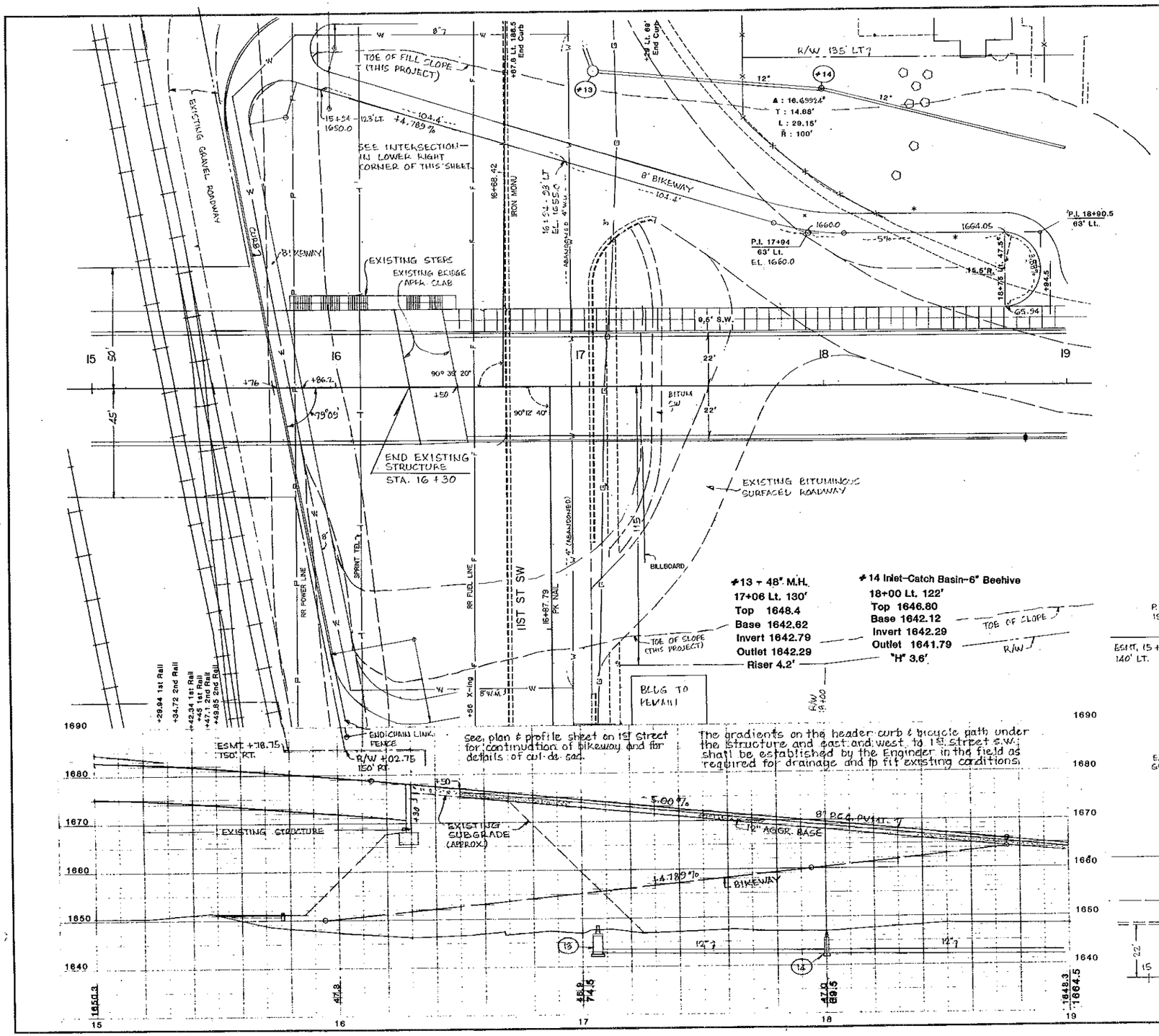
SIDEWALK, CONCRETE

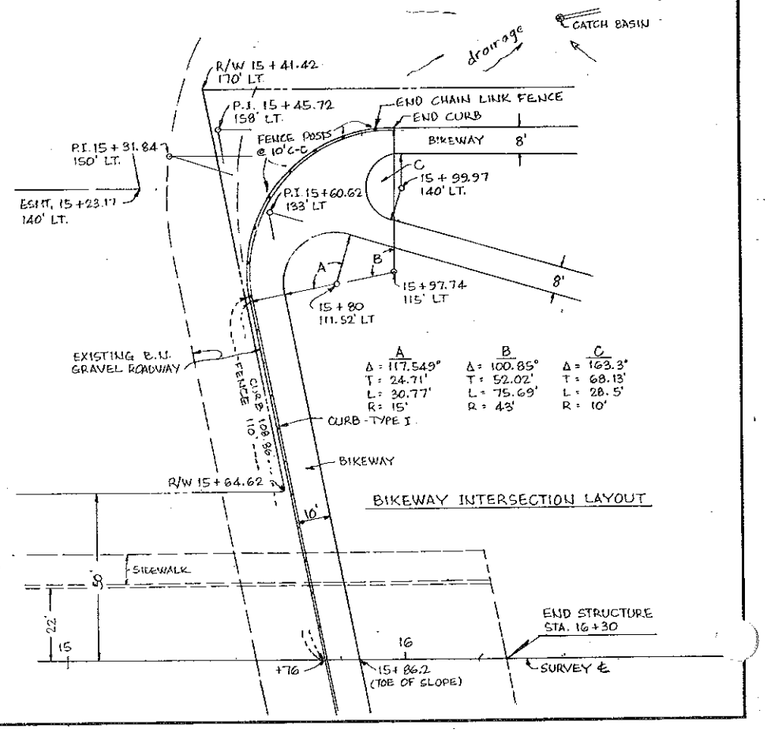
10 + 93.7 to Br. Appr. Slab – 123.6 S.Y.

BENCH MARK

No.	Description	Location	Elev.
#2	Hyd. 1/2 Blk. S. 10th & Main	11+83 Rt. 35'	1653.18

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	59





FENCE, CHAIN LINK

15 + 76.4 ℄ – Rt. & Ahd. – 140 L.F.
15 + 76.4 ℄ – Lt. & Bk. – 180 L.F.
(See Note 752-P02)

CURB, HEADER – TYPE 1

15 + 76 ℄ – Rt. & Ahd. – 112.4 L.F.
15 + 76 ℄ – Lt. & Bk. – 184.6 L.F.

CURB & GUTTER, TYPE – 1

16+ 45.8 to 19+ 00 Lt. – 254.2 L.F.
16+ 54.2 to 19+ 00 Rt. – 245.8 L.F.

SIDEWALK, CONCRETE

Br. Appr. Slab to 19+ 00 Lt. – 290.5 S.Y.

PIPE, CONC. REINF. CL.-III, STORM DRAIN

#13 to #14 12" x 92 L.F.
#14 to #15 12" x 152 L.F.

MANHOLE

#13 – 48" 1 Ea.

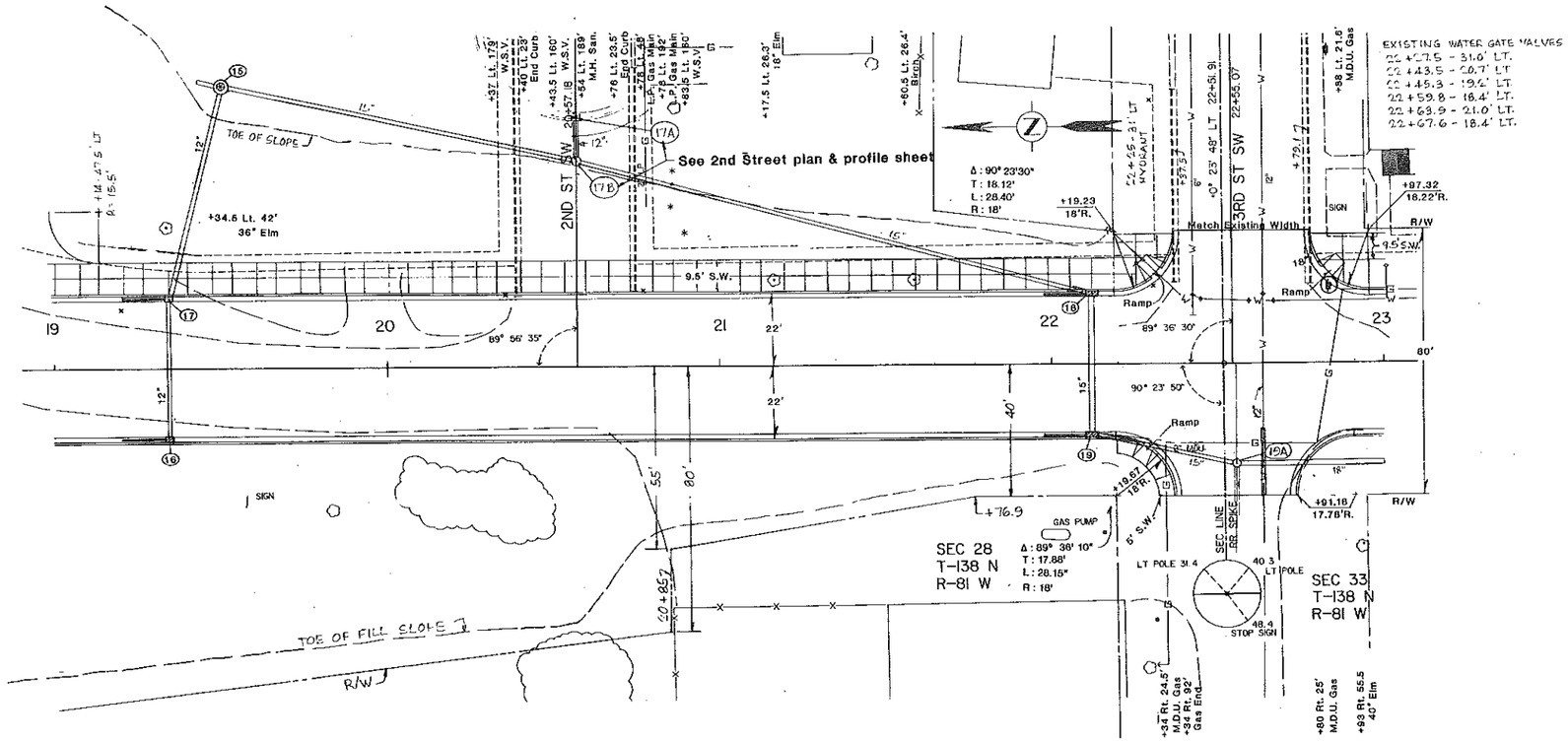
MANHOLE RISER

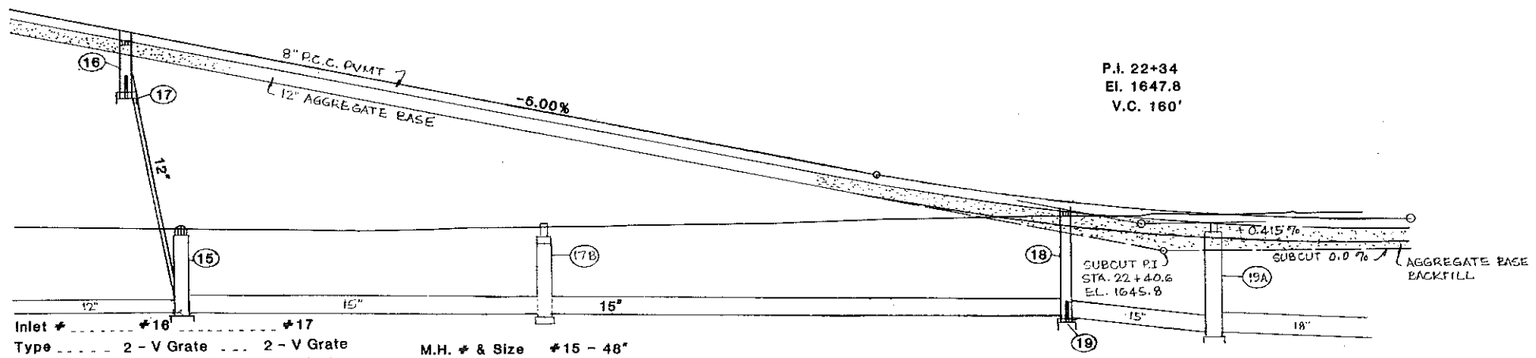
#13 –48" 4.2 L.F.

INLET-CATCH BASIN-6" BEEHIVE

#14 1 Ea.

FHWA REGION	STATE	SED AND PROJECT NO.	SHEET NO.
8	N. D.	RRS-1-006(055)066	60





Inlet #	#16	#17
Type	2 - V Grate	2 - V Grate
Station	19+34 Rt.	19+34 Lt.
Grate	1662.19	1662.19
Base	1658.26	1657.86
Invert	1658.43	1658.03
Outlet	1658.03	1643.00
"H"	3.6'	4.0'

M.H. # & Size	#15 - 48"
Station	19+50 Lt. 85'
Top	1648.3 (6" Bee Hive Cover)
Base	1641.6
Invert	1641.79
Outlet	1641.48
Riser	4.7'

Inlet #	#18	#19
Type	2 - V Grate	2 - V Grate
Station	22+12 Lt.	22+12 Rt.
Grate	1648.86	1648.86
Base	1640.83	1640.53
Invert	1641.02	1640.72
Outlet	1640.72	1640.2
"H"	7.7'	8.0'

M.H. #19A - 60"	
22+ 55.4 Rt. 30'	
Top	1647.84
Base	1639.32
Invert	1639.53
Outlet	1639.21
Riser	6.77'

See 2nd Street plan and profile sheet for data on Inlet 17A and Manhole 17B

1648.3 1664.5 | 47.9 59.5 | 48.1 54.5 | 48.4 49.9 | 1648.5 1648.1

19 | 20 | 21 | 22 | 23

REMOVAL OF CURB & GUTTER
22+37.5 Lt. 16 L.F.
22+79.1 Lt. 17 L.F.

REMOVAL OF CONCRETE
21+35 to 23+00 Lt. - 63 S.Y.
(See Note No. 200-P01)

RELOCATE HYDRANT
22+25 Lt. 31' 1 Ea.

CURB & GUTTER, TYPE -1
19+00 to 23+00 Rt. 384.6 L.F.
19+00 to 23+00 Lt. 378.9 L.F.

SIDEWALK, CONCRETE
19+00 to 23+00 Lt. 393.9 S.Y.
22+19.7 to 22+37.2 Rt. 13.1 S.Y.

REMOVAL OF TREES
19+34.5 - 42' Lt - 1 - 30"
21-17.5 - 26.3' Lt - 1 - 18"

WATERMAIN 12" PVC
22+ 63± - 20' Rt. to 40' Rt. - 20 L.F.
(See detail sheet)

FITTINGS, CAST IRON
2 - 12" Long Sleeves - 290 Lbs.
4 - 12" 1/4 Bends - 660 Lbs.
(See detail sheet)

PIPE, CONC. REINF. CL.-III, STORM DRAIN
#15 to #17 12" x 64 L.F.
#16 to #17 12" x 42 L.F.
#15 to #18 15" x 266 L.F.
#18 to #19 15" x 42 L.F.
#19 to #19A 15" X 40 L.F.
#19A to # 20 18" X 42 L.F.

MANHOLE
#15 - 48" 1 Ea.
(Bee Hive Cover)
#19A - 60" 1 Ea.

MANHOLE RISER
#15 48" x 4.7 L.F.
#19A 60" X 6.8 L.F.

INLET - TYPE 2
#16 1 Ea.
#17 1 Ea.
#18 1 Ea.
#19 1 Ea.

ADJUST UTILITY APPURTENANCE
22+27.5 Lt. 31.0' 1 Ea.
22+43.5 Lt. 20.7' 1 Ea.
22+45.3 Lt. 19.2' 1 Ea.
22+59.8 Lt. 18.4' 1 Ea.
22+63.9 Lt. 21.0' 1 Ea.
22+67.6 Lt. 18.4' 1 Ea.

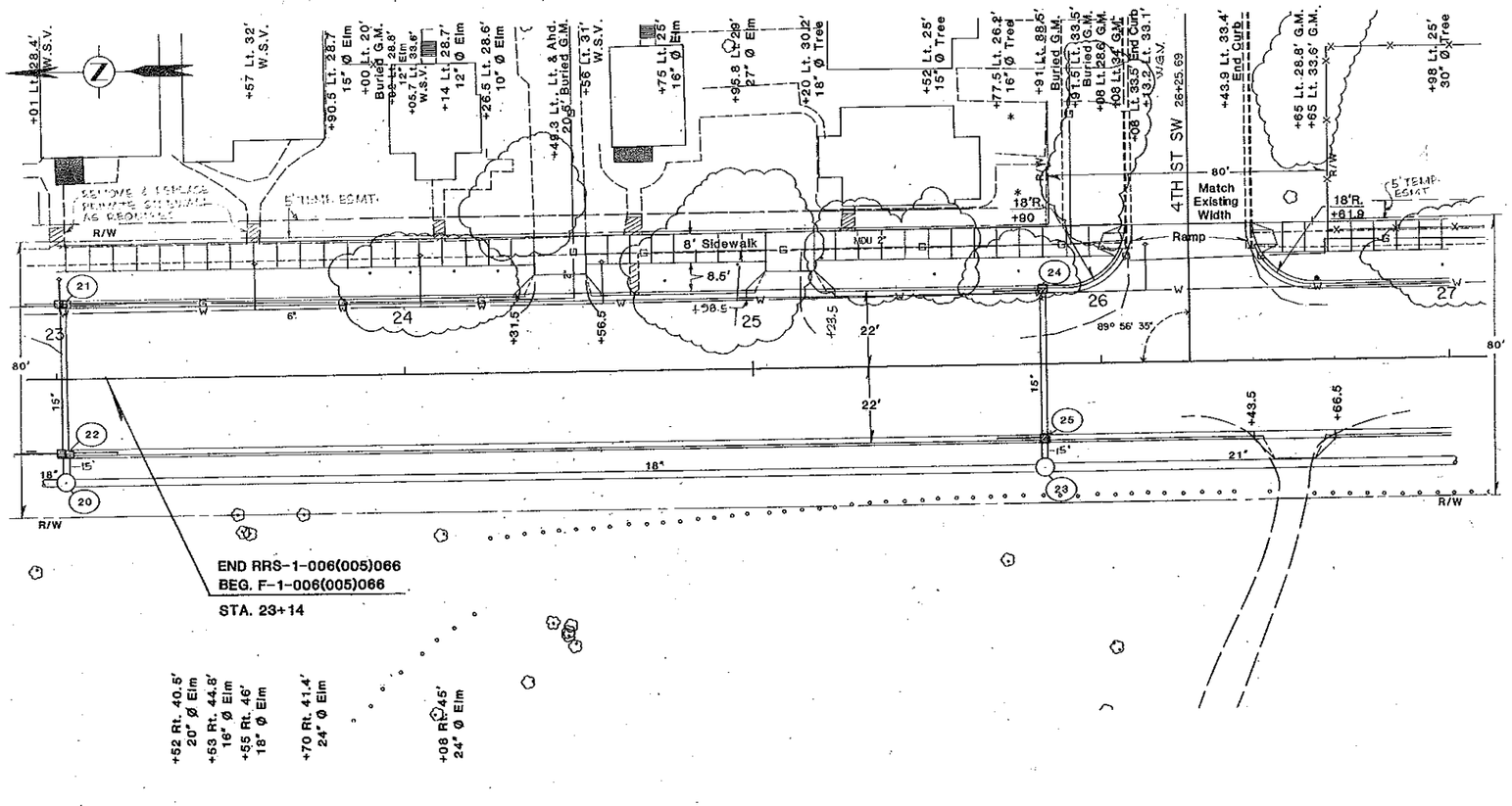
UNDERDRAIN, PIPE, PVC, PERFORATED - 4 IN.
Inlet #16 Bk. - 12.5 L.F.
Inlet #17 Bk. - 12.5 L.F.
Inlet #18 Bk. - 12.5 L.F.
Inlet #19 Bk. - 12.5 L.F.

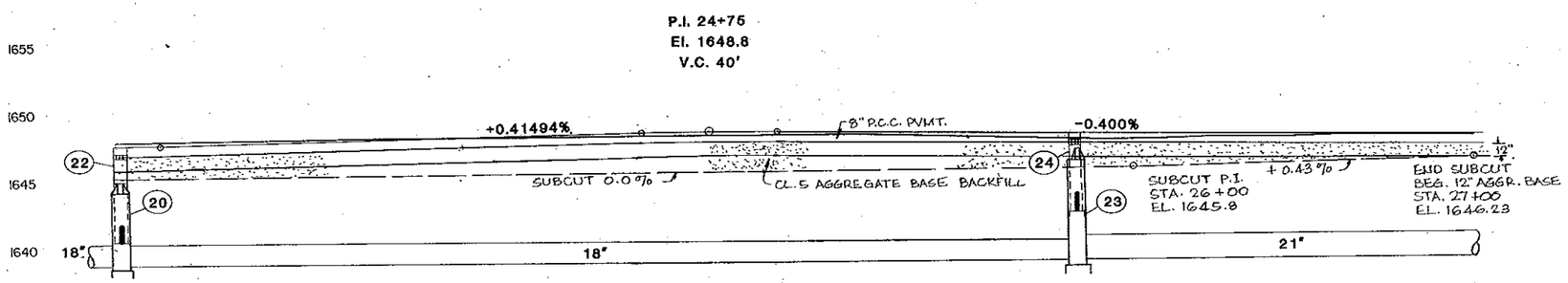
SOUTH END OF STRUCTURE TO STA. 23+14 (RRS)

EXC.	1,503 C.Y.	(INCLUDES 227 C.Y. SUBCUT)
EMB.	42,261 C.Y.	
BORROW	28,189 C.Y.	
USE	7,196 C.Y.	FROM STA. 23+14 TO 45+29
USE	5,000 C.Y.	FROM 1ST STREET (STA. 1+80± TO 6+50±)
WASTE	227 C.Y.	(SUBCUT EXC. - SEE NOTE 200-252)

BENCH MARK

No.	Description	Location	Elev.
#3	Hyd. N.E. Cor. 10th & 3rd	22+25 Lt. 31'	1652.00





Inlet No.	#21	#22
Type	2 – D Grate	2 – D Grate
Station	23+02 Lt.	23 +02 Rt.
Grate	1647.6	1647.6
Base	1643.67	1641.17
Invert	1643.86	1643.36 (East) 1641.36 (West)
Outlet	1643.36	1641.0
"H"	3.50'	6.0'

M.H. #20 – 60"
23+02 Rt. 30'
Top 1645.5
Base 1639.0
Invert 1639.21
Outlet 1638.52
Riser 4.75'

Inlet No.	#24	#25
Type	Type-1, V Grate	Type-1, V Grate
Station	25+83 Lt.	25+83 Rt.
Grate	1647.86	1647.86
Base	1643.27	1642.77
Invert	1643.46	1642.96
Outlet	1642.96	1642.6
"H"	4.0'	4.5'

M.H. #23 – 60"
25+83 Rt. 30'
Top 1647.2
Base 1638.29
Invert 1638.52
Outlet 1637.67
Riser 7.16'

1648.5 1648.1 — 23
48.6 48.5 — 24
48.5 48.7 — 25
47.9 48.3 — 26
1647.8 1647.9 — 27

REMOVAL OF CURB & GUTTER
26+08 Lt. 7 L.F.
26+44 Lt. 7 L.F.

REMOVAL OF CONCRETE
23+00 to 27+00 Lt. 195 S.Y.

CURB & GUTTER, TYPE-1
23+00 to 27+00 Rt. 400.0 L.F.
23+00 to 27+00 Lt. 384.6 L.F.

SIDEWALK, CONCRETE
23+00 to 27+00 Lt. 311 S.Y.

DRIVEWAY, CONCRETE H.E.S.
24+44 Lt. (14') 29.0 S.Y.
26+55 Rt. (12') 10.7 S.Y.
25+11 Lt. (14') 29.0 S.Y.

PIPE, CONC. REINF. CL.-III, STORM DRAIN
#20 to #22 15" x 6 L.F.
#21 to #22 15" x 42 L.F.
#20 to #23 18" x 278 L.F.
#23 to #25 15" x 6 L.F.
#24 to #25 15" x 42 L.F.
#23 to #26 21" x 362 L.F.

UNDERDRAIN, PIPE, PVC. PERFORATED – 4 IN.
Inlet # 21 Bk. – 12.5 L.F.
Inlet # 21 Ahd. – 12.5 L.F.
Inlet # 22 Bk. – 12.5 L.F.
Inlet # 22 Ahd. – 12.5 L.F.
Inlet # 24 Bk. – 12.5 L.F.
Inlet # 25 Bk. – 12.5 L.F.

MANHOLE 60 IN.
#20 1 Ea.
#23 1 Ea.

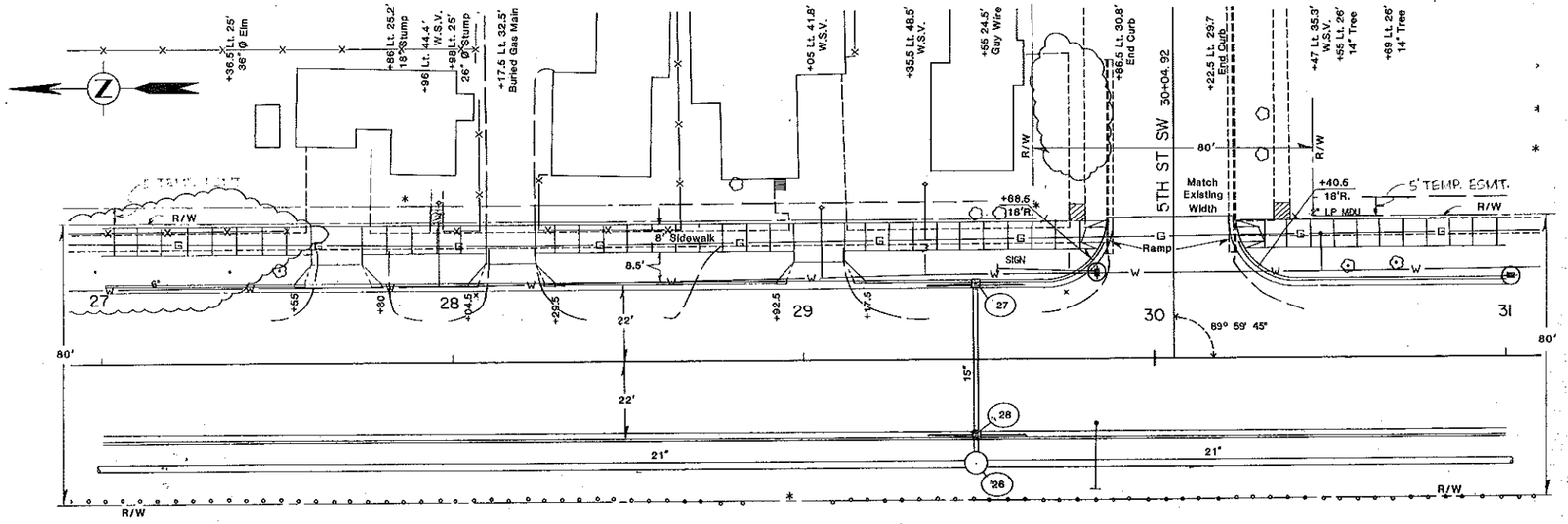
MANHOLE RISER 60 IN.
#20 4.75 L.F.
#23 7.16 L.F.

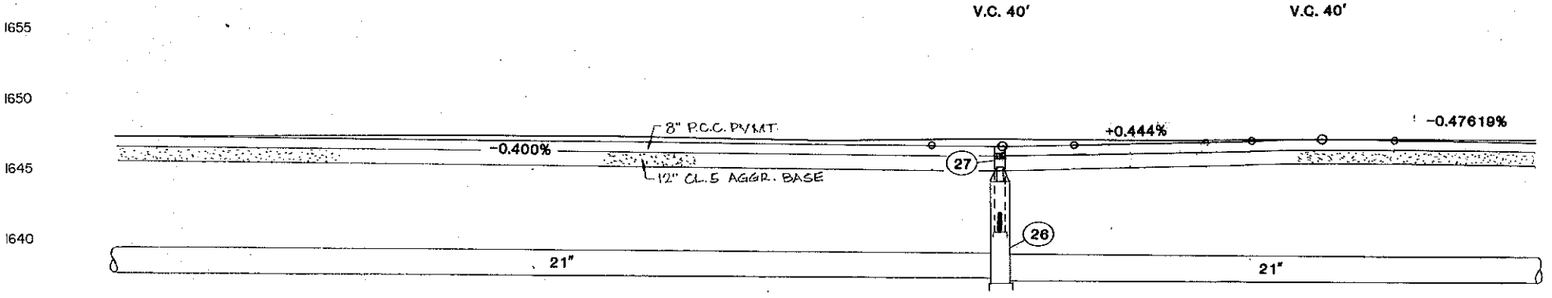
INLET, TYPE-1
#24 1 Ea.
#25 1 Ea.

INLET – TYPE 2
#21 1 Ea.
#22 1 Ea.

ADJUST UTILITY APPURTENANCE
23+01 Lt. 28.4' (W.S.V.) 1 Ea.
23+57 Lt. 32.0 ' (W.S.V.) 1 Ea.
24+05.7 Lt. 33.6' (W.S.V.) 1 Ea.
24+56 Lt. 31.0' (W.S.V.) 1 Ea.
26+13.2 Lt. 33.1' (W.S.V.) 1 Ea.

REMOVAL OF TREES
23+90.5 – 28.7' Lt – 1 – 18"
24+02 – 28.8' Lt – 1 – 10"
24+14 – 28.7' Lt – 1 – 10"
24+26.5 – 28.6' Lt – 1 – 10"
24+75 – 25' Lt – 1 – 18"
24+95.8 – 29' Lt – 1 – 30"
25+20 – 30.2' Lt – 1 – 18"
25+77.5 – 26.2' Lt – 1 – 18"
26+98 – 25' Lt – 1 – 30"





	M.H. #26 – 60"	Inlet No.	#27	#28
	29+49 Rt. 30'	Type	1 – D Grate	1 – D Grate
	Top 1645.4	Station	29+49 Lt.	29+49 Rt.
	Base 1637.25	Grade	1646.43	1646.43
	Invert 1637.67 Bk.	Base	1641.84	1641.04
	1637.48 Ahd.	Invert	1642.03	1641.23
	Outlet 1636.74	Outlet	1641.23	1640.9
	Riser 6.4'	"H"	4.0'	4.8'

+35-39.4' 18" Spruce

+82.4 Rt. 36' Guy Wire
+82.4 Rt. 37' Guy Wire

P.I. 29+50
El. 1648.9
V.C. 40'

P.I. 30+40
El. 1647.3
V.C. 40'

1647.8 **1647.9** — 27
47.7 **47.5** — 28
47.3 **47.1** — 29
47.2 **47.1** — 30
1647.1 **1647.0** — 31

REMOVAL OF CURB & GUTTER
29+86.5 Lt. 10 L.F.
30+22.5 Lt. 10 L.F.

REMOVAL OF CONCRETE
27+00 to 31+00 Lt. 191 S.Y.

CURB & GUTTER, TYPE–1
27+00 to 31+00 Rt. 400.0 L.F.
27+00 to 31+00 Lt. 384.5 L.F.

SIDEWALK, CONCRETE
27+00 to 31+00 Lt. 288.6 S.Y.

DRIVEWAY, CONCRETE H.E.S.
27+67.5 Lt. (14') 29 S.Y.
28+17 Lt. (14') 29 S.Y.
29+05 Lt. (14') 29 S.Y.

REMOVAL OF TREES
27+36.5 – 25' Lt – 1 – 30"

27+86 – 25.2' Lt – 1 – 18" (Stump)
27+98 – 25' Lt – 1 – 30" (Stump)
30+55 – 26' Lt – 1 – 18"
30+69 – 26' Lt – 1 – 18"

PIPE, CONC. REINF. CL.–III, STORM DRAIN
#26 to #28 15" x 6 L.F.
#27 to #28 15" x 42 L.F.
#26 to #29 21" x 300 L.F.

MANHOLE
#26 – 60" 1 Ea.

MANHOLE RISER
#26 60" x 6.4 L.F.

INLET – TYPE 1
#27 1 Ea.
#28 1 Ea.

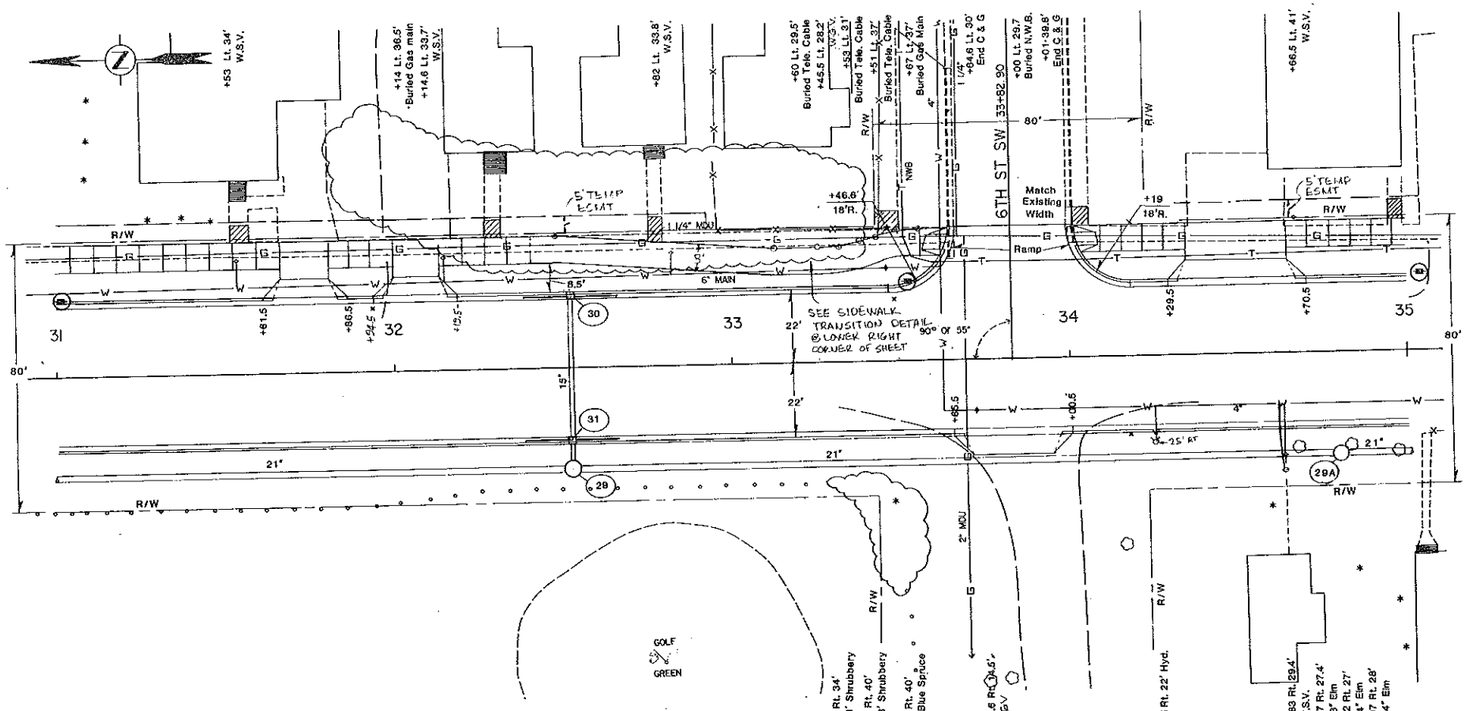
ADJUST UTILITY APPURTENANCE
30+47 Lt. 35.3' (W.S.V.) 1 Ea.

UNDERDRAIN, PIPE, PVC. PERFORATED – 4 IN.
Inlet # 27 Bk. – 12.5 L.F.
Inlet # 27 Ahd. – 12.5 L.F.
Inlet # 28 Bk. – 12.5 L.F.
Inlet # 28 Ahd. – 12.5 L.F.

BENCH MARK

NO.	Description	Location	Elev.
#4	Paint Spot on F. Post /Nail	30+08 Rt. 40'	1648.04

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N D	F-1-006(005)066	63



REMOVAL OF TREES
34+67 Rt. 27' (18") 1 Ea.
34+82 Rt. 27' (18") 1 Ea.
34+97 Rt. 28' (18") 1 Ea.

RELOCATE HYDRANT
34+25 Rt. 22' 1 Ea.

CURB & GUTTER, TYPE-1
31+00 to 35+00 Rt. 400 L.F.
31+00 to 35+00 Lt. 389 L.F.

SIDEWALK, CONCRETE
31+00 to 35+00 Lt. 302 S.Y.

DRIVEWAY, CONCRETE H.E.S.
31+74 Lt. (14') 29 S.Y.
32+07 Lt. (14') 29 S.Y.
33+83 Rt. (24') 18 S.Y.
34+50 Lt. (30') 68.4 S.Y.

PIPE, CONC. REINF. CL. III STORM DRAIN
#29 to #31 15" x 6 L.F.
#30 to #31 15" x 42 L.F.
#29 to #29A 21" x 224 L.F.
#29A to #32 21" x 228 L.F.

REMOVAL OF CONCRETE
31+00 to 35+00 - 198 S.Y.

REMOVAL OF CURB & GUTTER
33+64.6 Lt - 10 L.F.

WATER SERVICE LINE - 1 IN. COPPER
34+61 - 15' Rt. to 35' Rt. - 20 L.F.

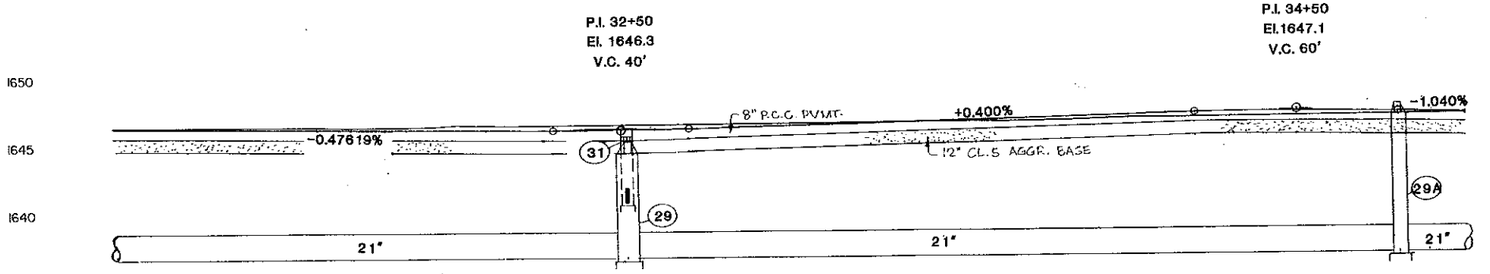
MANHOLE
#29 - 60" 1 Ea.
#29A - 48" 1 Ea.

MANHOLE RISER
#29 60" x 7.2 L.F.
#29A 48" x 9.8 L.F.

INLET - TYPE 1
#30 1 Ea.
#31 1 Ea.

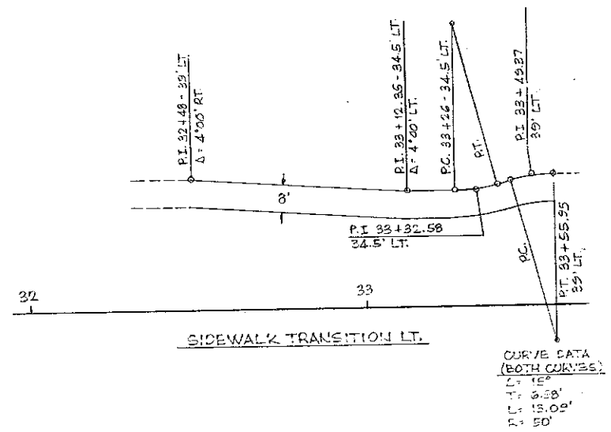
ADJUST UTILITY APPURTENANCE
31+53.0 Lt. 34' (W.S.V.) 1 Ea.
32+14.6 Lt. 33.7' (W.S.V.) 1 Ea.
32+82.0 Lt. 33.8' (W.S.V.) 1 Ea.
33+45.5 Lt. 28.2' (W.G.V.) 1 Ea.
33+71.6 Rt. 14.5' (W.G.V.) 1 Ea.

UNDERDRAIN, PIPE, PVC. PERFORATED - 4 IN.
Inlet # 30 Bk. - 12.5 L.F.
Inlet # 30 Ahd. - 12.5 L.F.
Inlet # 31 Bk. - 12.5 L.F.
Inlet # 31 Ahd. - 12.5 L.F.



Inlet No.	#30	#31
Type	1 - D Grate	1 - D Grate
Station	32+52 Lt.	32+52 Rt.
Grate	1645.83	1645.83
Base	1641.24	1640.74
Invert	1641.43	1640.93
Outlet	1640.93	1640.6
"H"	4.0'	4.5'

M.H. No. - Size	#29 - 60"	#29A - 48"
Station	32+52 Rt. 30'	34+80 Rt. 30'
Top	1645.46	1647.40
Base	1636.51	1636.01
Invert	1636.74	1636.24
Outlet	1636.24	1635.74
Riser	7.2'	9.81'

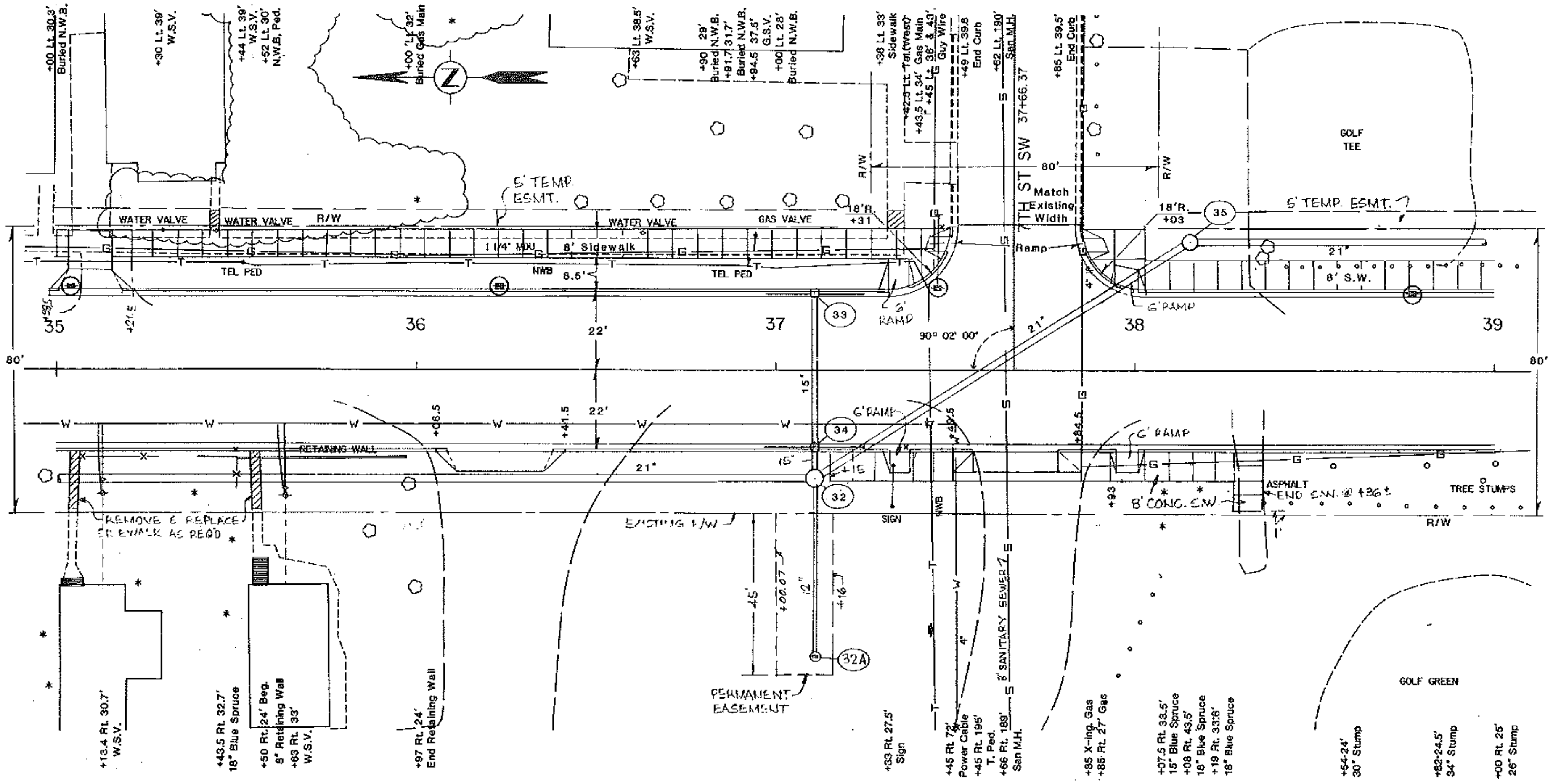


1647.1	46.8	46.7	46.7	1646.6
1647.0	46.5	46.5	46.9	1646.8
31	32	33	34	35

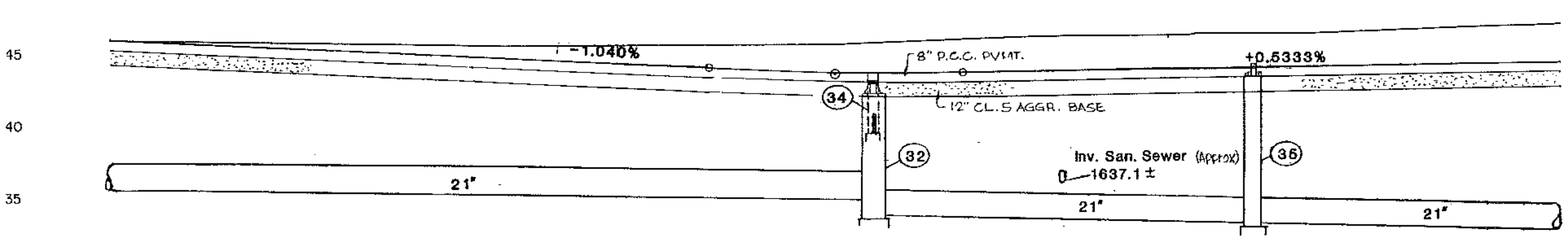
BENCH MARK

No.	Description	Location	Elev.
#5	Hyd. S.W. Cor. 10th & 9th	34+25 Rt. 22'	1649.90

8	N.D	F-1-006(005)066	64



P.I. 37+00
El. 1644.5
V.C. 70'



Inlet #32 A
Type: Inlet, Catch Basin – Type A
Sta. 37+11 Rt. 80'
Top 1643.60
Base 1638.85
Invert 1639.02
Outlet 1638.50
"H" 4.0'

Inlet No.	#33	#34
Type	1 - D Grate	1 - D Grate
Station	37+11 Lt.	37+11 Rt.
Grate	1644.11	1644.11
Base	1640.52	1640.22
Invert	1640.71	1640.41
Outlet	1640.41	1640.26
"H"	3.00'	3.30'

M.H. No. - Size	#32 - 60"	#35 - 48"
Station	37+11 Rt. 30'	38+15 Lt. 36'
Top	1644.90	1645.30
Base	1634.45	1634.07
Invert	1634.68 Ahd. 1635.74 Bk.	1634.30
Outlet	1634.39	1633.59
Riser	8.70'	9.65'

REMOVAL OF CONCRETE
35+00 to 39+00 Lt. 124 S.Y.
35+00 to 35+60 Rt. 10 S.Y.±

REMOVAL OF TREES
38-54 - 24' Rt - 1 - 30" (Stump)
38-82 - 24' Rt - 1 - 30" (Stump)
39-00 - 25' Rt - 1 - 30" (Stump)

CURB & GUTTER, TYPE-1
35+00 to 39+00 Rt. 400.0 L.F.
35+00 to 39+00 Lt. 384.5 L.F.

SIDEWALK, CONCRETE
35+00 to 39+00 Lt. 336.7 S.Y.
37+15 to 38+36 Rt. 84.0 S.Y.
35+00 to 35+60 Rt. 10 S.Y.±

DRIVEWAY, CONCRETE H.E.S.
35+10 Lt. (12') 25.4 S.Y.
36+24 Rt. (24') 18.0 S.Y.
37+67 Rt. (24') 31.1 S.Y.

PIPE, CONC. REINF. CL.-III, STORM DRAIN
#32A to #32 12" x 46 L.F.
#32 to #34 15" x 6 L.F.
#33 to #34 15" x 42 L.F.
#32 to #35 21" x 120 L.F.
#35 to #36 21" x 282 L.F.

WATER SERVICE LINE - 1 IN. COPPER
35+11 - 15' Rt. to 35' Rt. - 20 L.F.
35+61 - 15' Rt. to 35' Rt. - 20 L.F.

MANHOLE
#32 - 60" 1 Ea.
#35 - 48" 1 Ea.

MANHOLE RISER
#32 60" x 8.70 L.F.
#35 48" x 9.65 L.F.

INLET - TYPE 1
#33 1 Ea.
#34 1 Ea.

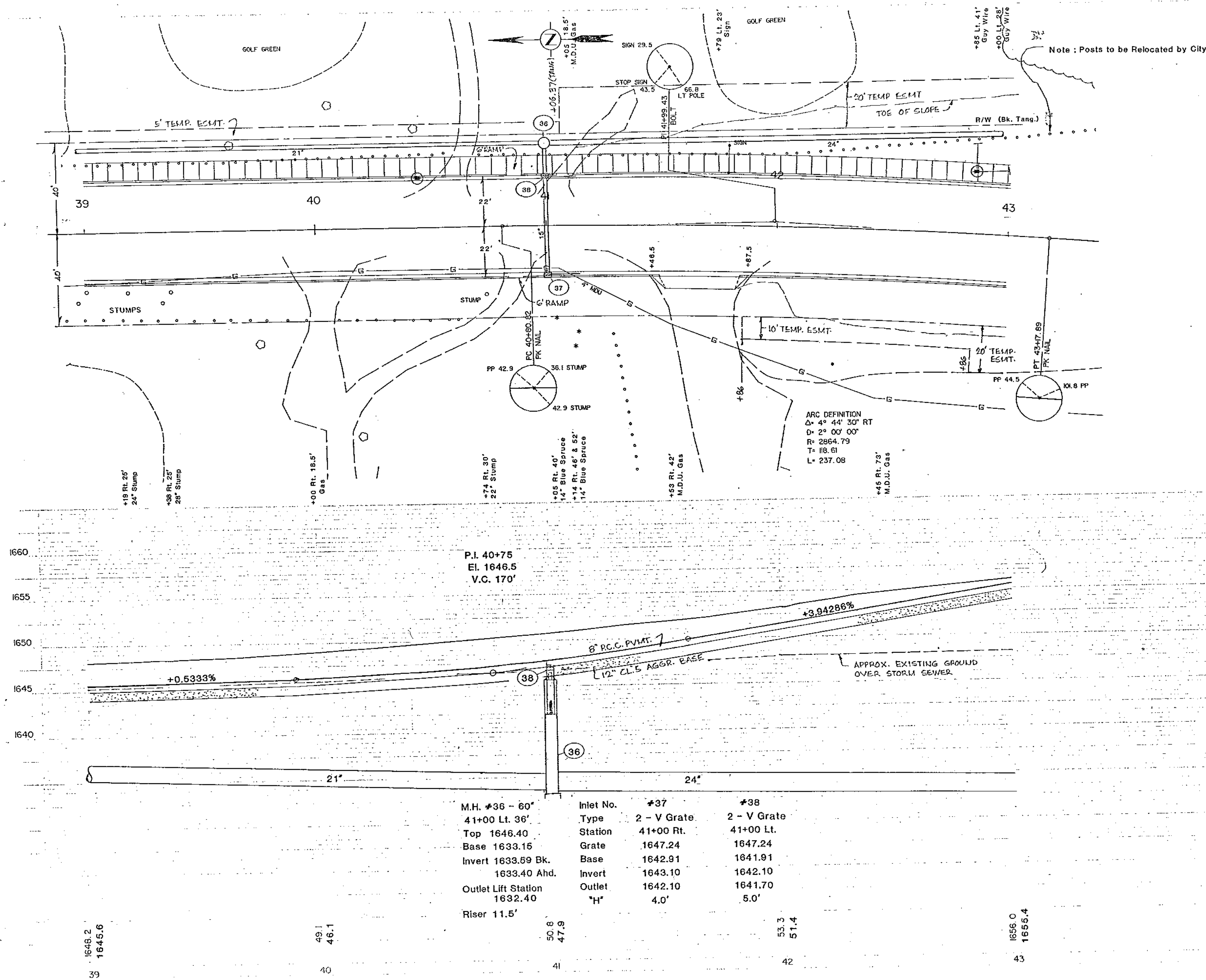
ADJUST UTILITY APPURTENANCE
35+30 Lt. 39' (W.S.V.) 1 Ea.
35+44 Lt. 39' (W.S.V.) 1 Ea.
36+63 Lt. 38.5' (W.S.V.) 1 Ea.

INLET-CATCH BASIN - TYPE A
#32A - 1 Ea.

UNDERDRAIN, PIPE, PVC, PERFORATED - 4 IN.
Inlet # 33 Bk. - 12.5 L.F.
Inlet # 33 Ahd. - 12.5 L.F.
Inlet # 34 Bk. - 12.5 L.F.
Inlet # 34 Ahd. - 12.5 L.F.

23+14 TO 45+29
EXC. 10,078 C.Y. (INCLUDES 598 C.Y. SUBCUT)
EXC. 50 C.Y. (FOR BRIDGE APPR. SLAB SOUTH END OF HEART RIVER BR.)
EMB. 1,684 C.Y.
USE 7,796 C.Y. IN EMB. SOUTH OF RAILROAD STRUCTURE)
WASTE 648 C.Y. (SUBCUT EXC. - SEE NOTE 200-252)

8	N.D.	F-1-006(005)066	65



GOLF GREEN
SIGN 29.5
STOP SIGN 43.5
66.8 LT POLE
5' TEMP. ESMT.
20' TEMP ESMT
TOE OF SLOPE
R/W (Bk. Tang.)
Note : Posts to be Relocated by City.
21"
24"
6' RAMP
22'
15'
STUMPS
STUMP
10' TEMP. ESMT.
20' TEMP. ESMT.
PP 42.9
36.1 STUMP
42.9 STUMP
PP 44.5
101.8 PP
PC 40+80.82 PK NAIL
PT 43+17.89 PK NAIL
ARC DEFINITION
Δ= 4° 44' 30" RT
D= 2° 00' 00"
R= 2864.79
T= 118.61
L= 237.08
P.I. 40+75
El. 1646.5
V.C. 170'
+0.5333%
+3.94286%
8" P.C.C. PVMT.
12" CL.5 AGGR. BASE
APPROX. EXISTING GROUND OVER STORM SEWER
39
40
41
42
43

M.H. #36 - 60"	
41+00 Lt. 36'	
Top	1646.40
Base	1633.15
Invert	1633.59 Bk.
	1633.40 Ahd.
Outlet Lift Station	1632.40
Riser	11.5'

Inlet No.	#37	#38
Type	2 - V Grate	2 - V Grate
Station	41+00 Rt.	41+00 Lt.
Grate	1647.24	1647.24
Base	1642.91	1641.91
Invert	1643.10	1642.10
Outlet	1642.10	1641.70
"H"	4.0'	5.0'

CURB & GUTTER, TYPE-1
39+00 to 43+00 Rt. 398.3 L.F.
39+00 to 43+00 Lt. 401.7 L.F.

SIDEWALK, CONCRETE
39+00 to 43+00 Lt. 357.4 S.Y.

DRIVEWAY, CONCRETE H.E.S.
41+67 Rt. (30') 21.7 S.Y.

PIPE, CONC. REINF. CL.-III, STORM DRAIN
#36 to #39 24" X 308 L.F.
#36 to #38 15" X 12 L.F.
#37 to #38 15" x 42 L.F.

MANHOLE
#36 - 60" 1 Ea.

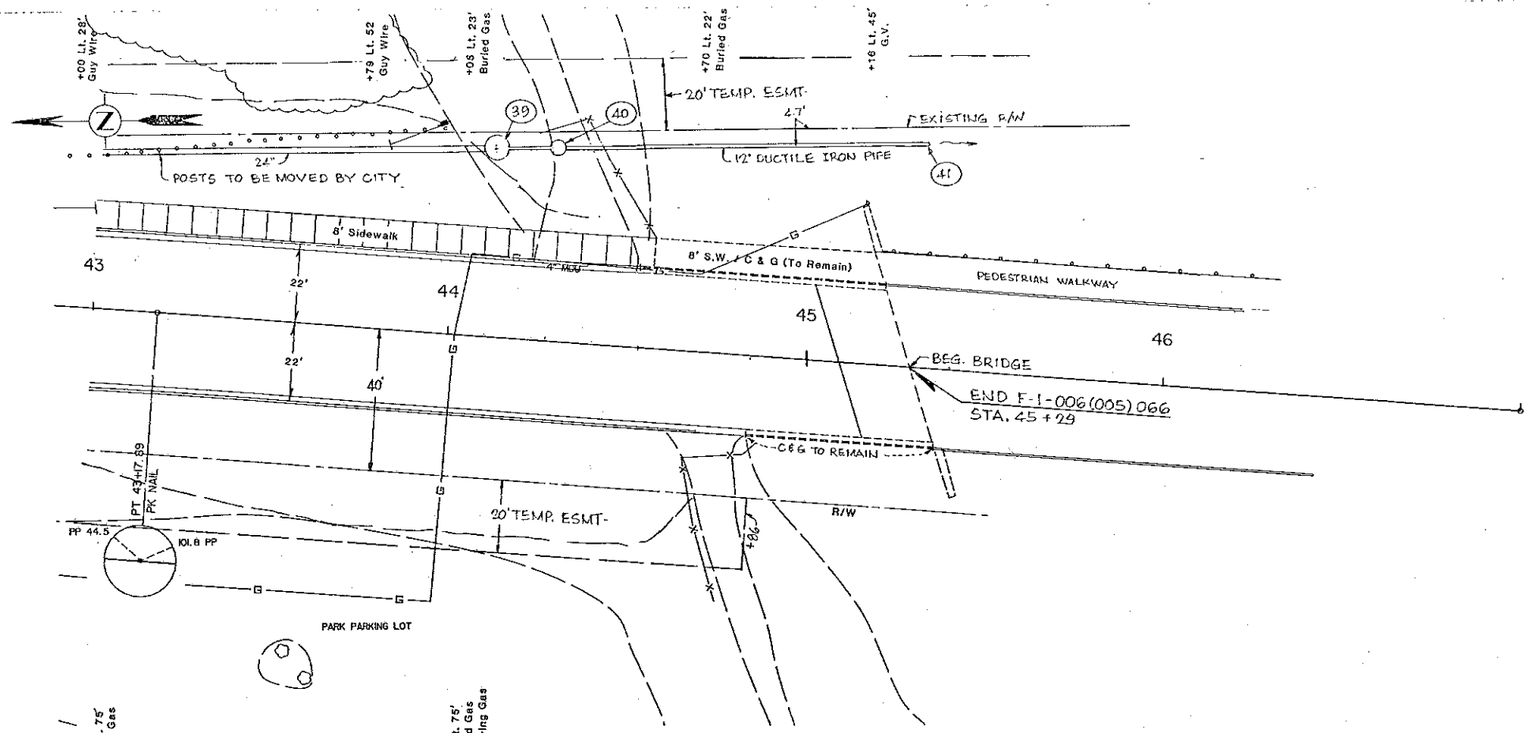
MANHOLE RISER
#36 60" x 11.5 L.F.

INLET - TYPE 2
#37 1 Ea.
#38 1 Ea.

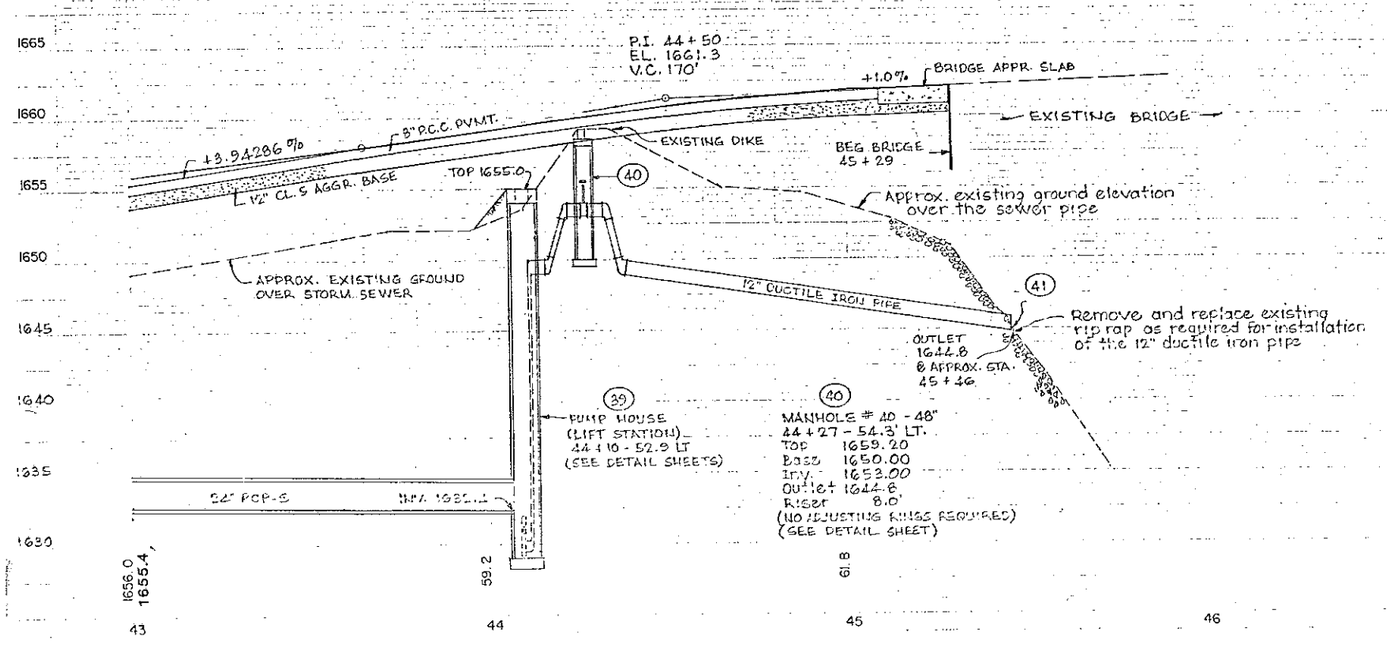
REMOVAL OF TREES
39+19 - 25' Rt - 1 - 30" (Stump)
39+38 - 25' Rt - 1 - 30" (Stump)
40+74 - 30' Rt - 1 - 18" (Stump)

UNDERDRAIN, PIPE, PVC, PERFORATED - 4 IN.
Inlet # 37 Ahd. - 12.5 L.F.
Inlet # 38 Ahd. - 12.5 L.F.

FHWA PROJECT	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N. D.	F-1-006(005)066	66



NOTE: Reduce heigth of curb to 1" to provide access to dike Rt. & Lt.



CURB & GUTTER, TYPE 1

43+00 to 44+53± Lt. 153.1 L.F.
43+00 to 44+85± Rt. 184.9 L.F.

SIDEWALK, CONCRETE

43+00 to 44+56± Lt. 138.8 S.Y.

PUMP HOUSE

#39-1 Lump Sum
(see details)

PUMPING EQUIPMENT

#39-1 Lump Sum
(See details)

MANHOLE

#40-48" 1 Ea.
(No adjusting rings)
(see details)

MANHOLE RISER

#40 48" x 8.0 L.F.

PIPE, DUCTILE IRON – 12 INCH

#40 to #41 – 120 L.F.
The exact length required to match the existing slope shall be determined in the field.

NOTE:
The borrow areas for this project are located just south of the Heart River and east and west of Highway 6. (See borrow area layouts)

See detail sheets for Bridge Approach Slabs at north and south end of the existing Heart River Bridge.

FED. AID SECTION	STATE	FED. AID PROJ. NO.	SHEET NO.
3	N.D.	F-1-096(005)066	69

REMOVAL OF CURB & GUTTER
4+00 to 7+30± Rt. 444 L.F.

REMOVAL OF CONCRETE
4+00 to 7+30± Rt. & Lt. 320 S.Y.

CURB & GUTTER, TYPE- 1
4+12.3 to 7+80± Lt. 375.9 L.F.
4+12.3 to 5+60 Rt. 171.4 L.F.

SIDEWALK, CONCRETE
4+00 to 5+61 Rt. 93 S.Y.

THIS PORTION OF THE ROADWAY SHALL BE REMOVED AND APPROX. 5000 C.Y. OF EXCESS EXCAVATION USED IN THE EMBANKMENT SOUTH OF THE NEW STRUCTURE.

THIS ROADWAY SHALL REMAIN IN PLACE UNTIL THE NEW STRUCTURE AND CONNECTING ROADWAY ARE COMPLETED AND OPENED TO TRAFFIC. EXCAVATION FROM ULTIMATE REMOVAL SHALL BE WASTED.

P.I. 4+56.14
P.I. 5+27.77
Δ : 4°
D : 6°
T : 33.36'
L : 66.67'
R : 955.37'

IST ST SW

Survey ℄
Off Loc.
Off. Loc.
P.C. 4+22.78
P.I. 4+56.14
P.T. 4+89.45
P.C. 4+94.41
P.I. 5+27.77
P.T. 5+61.08 Bk. = 5+61.0 Ahd.
℄ 1st St.
7+19.84
STOP
Lt. Curb
Δ : 62°
T : 30.04'
L : 54.11'
R : 50'
Ramp
6' S.W.
6" LP
C & G/Sidewalk to Remain
Match Existing C & G
15' R. +12.3
END NEW C&G 5+60± RT.
+ 7+34
END SURFACING
8TH AVE SW 7+59.80
Match Existing C & G

+02 Rt. 36.5' End R.
+07 Rt. 43' W.G.V.
+07 Rt. 48' H.H.
+13 Rt. 59.5' W.S.V.
+76.5 Rt. 23' 4' Curb
+76.5 Rt. 35.1' Curb
+00 Rt. 35.5' Curb
+00 Rt. 30' Gasmain
+67 Rt. 45' M.H. San. 8" SAN
+00 Rt. 30' Gasmain
+00 Rt. 28' Gasmain
+30 Rt. 32' Beg. R.
+27 Rt. 21' Curb
+27 Rt. 14' End R. & Curb
+36 Rt. 30' Gasmain
+40 Rt. 120' Hyd.
+42 Rt. 120' Hyd.
+55 Rt. 80' W.M.V.
+81 Rt. 32.5' Curb End R.
+00 Rt. 31' Gasmain

Lt. Edge of Gutter
P.I. 4+25.7
El. 1648.71
V.C. 40'

Lt. Edge of Gutter
P.I. 7+34
El. 1647.75
V.C. None

(CURB & GUTTER GRADES ON RADIUS FROM STA. 7+34 AHD. TO BE ESTABLISHED IN THE FIELD)

Lt. Edge of Gutter +0.764%
Lt. Edge of Gutter -0.310%
-0.310% ℄
7" HOT BITUMINOUS PAVEMT
6" AGGREGATE BASE

P.I. 7+34 ℄
El. 1647.5
V.C. None

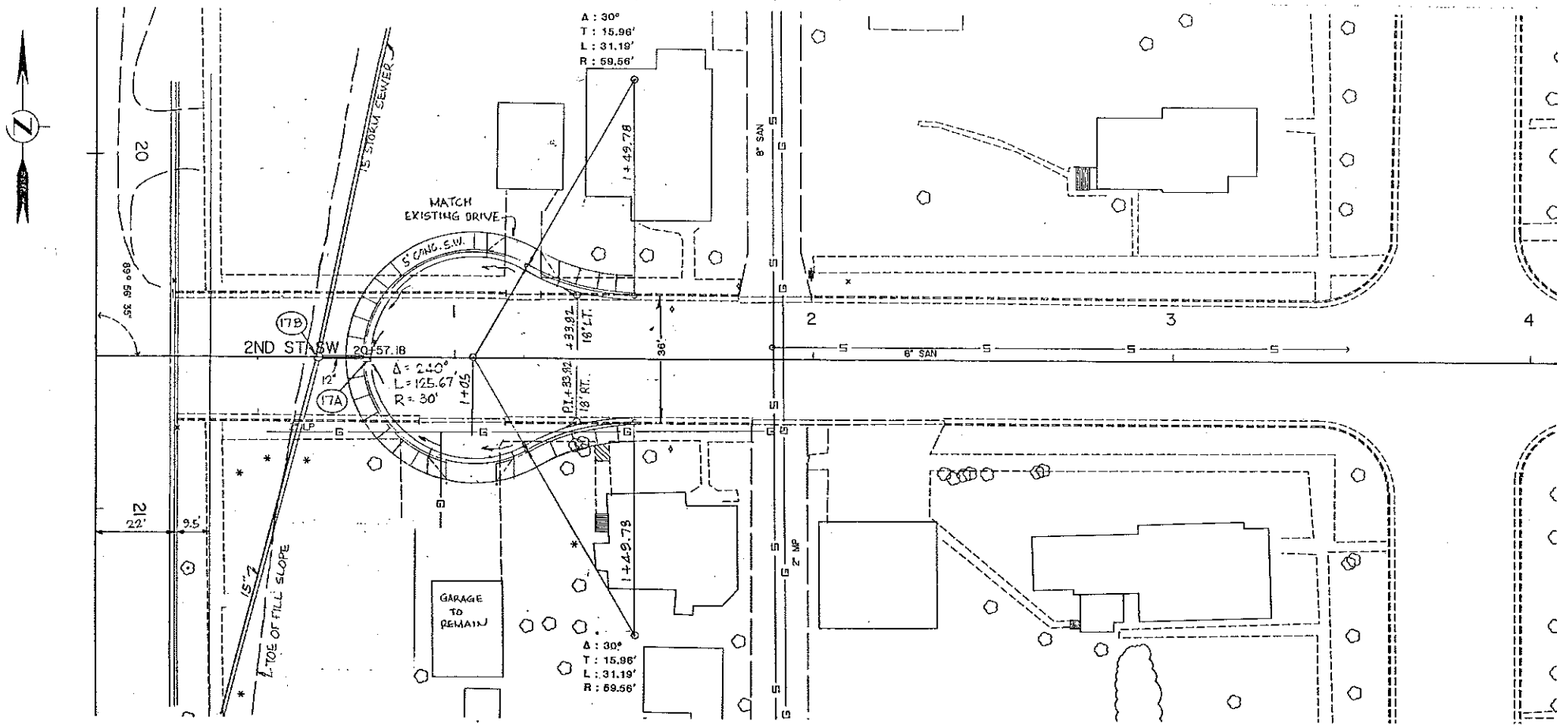
1660
1655
1650
1645
1640

1649.0 1648.5
48.5 48.25
48.2 47.9
48.9 1647.6
1647.9
1649.7

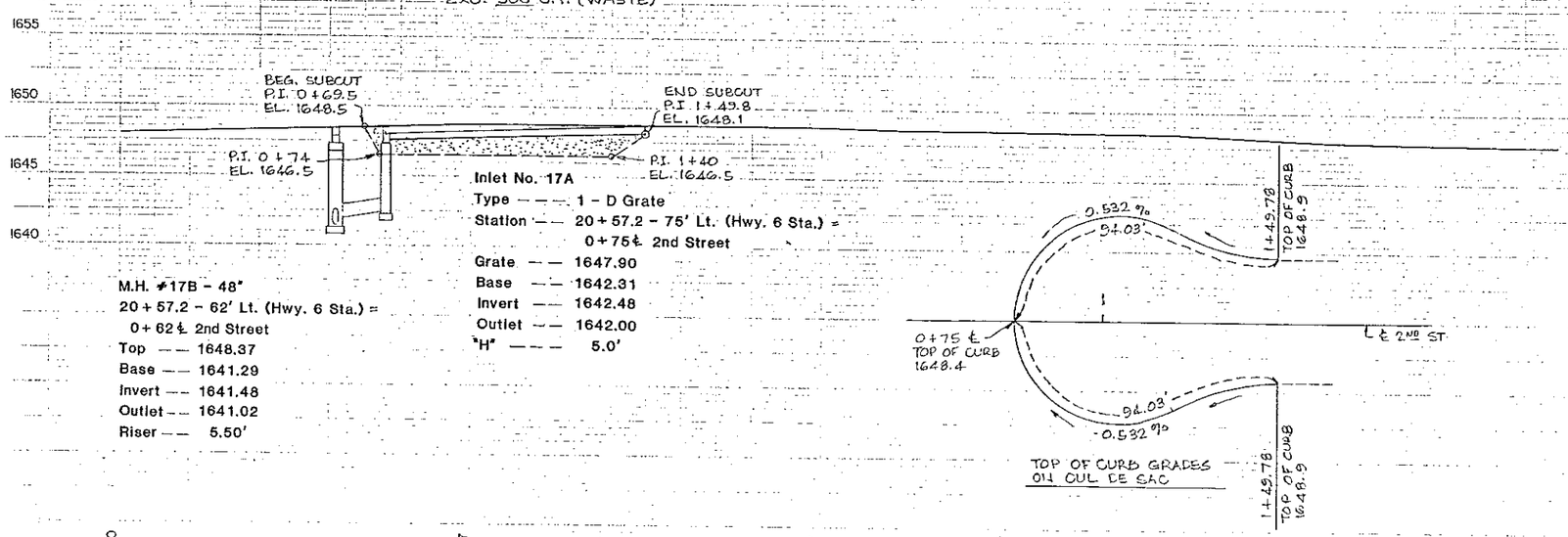
4 5 6 7 8

1st Street East

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRS-1-006(005)065	70



2ND ST. CUL-DE-SAC
EXC. 300 C.Y. (WASTE)



Inlet No. 17A
Type — — — 1 - D Grate
Station — — 20+57.2 - 75' Lt. (Hwy. 6 Sta.) = 0+75℄ 2nd Street
Grate — — 1647.90
Base — — 1642.31
Invert — — 1642.48
Outlet — — 1642.00
"H" — — — 5.0'

M.H. #17B - 48"
20+57.2 - 62' Lt. (Hwy. 6 Sta.) = 0+62℄ 2nd Street
Top — — 1648.37
Base — — 1641.29
Invert — — 1641.48
Outlet — — 1641.02
Riser — — 5.50'

REMOVAL OF CURB & GUTTER
0+45 to 1+49.8 Rt. - 105 L.F.
0+52 to 1+49.8 Lt. - 98 L.F.

REMOVAL OF CONCRETE
0+45 to 1+49.8 R.t - 90 S.Y.
0+52 to 1+49.8 L.t. - 66 S.Y.

CURB & GUTTER, TYPE - 1
0+75 to 1+49.8 Rt. & Lt. - 188.1 L.F.

SIDEWALK, CONCRETE
0+69.5 to 1+49.8 Rt. & Lt. - 85.3 S.Y.

DRIVEWAY, CONCRETE H.E.S.
1+05 Rt. (14') 13.3 S.Y.
1+19 Lt. (10') 11.1 S.Y.

INLET - TYPE 1
#17A - 1 Ea.

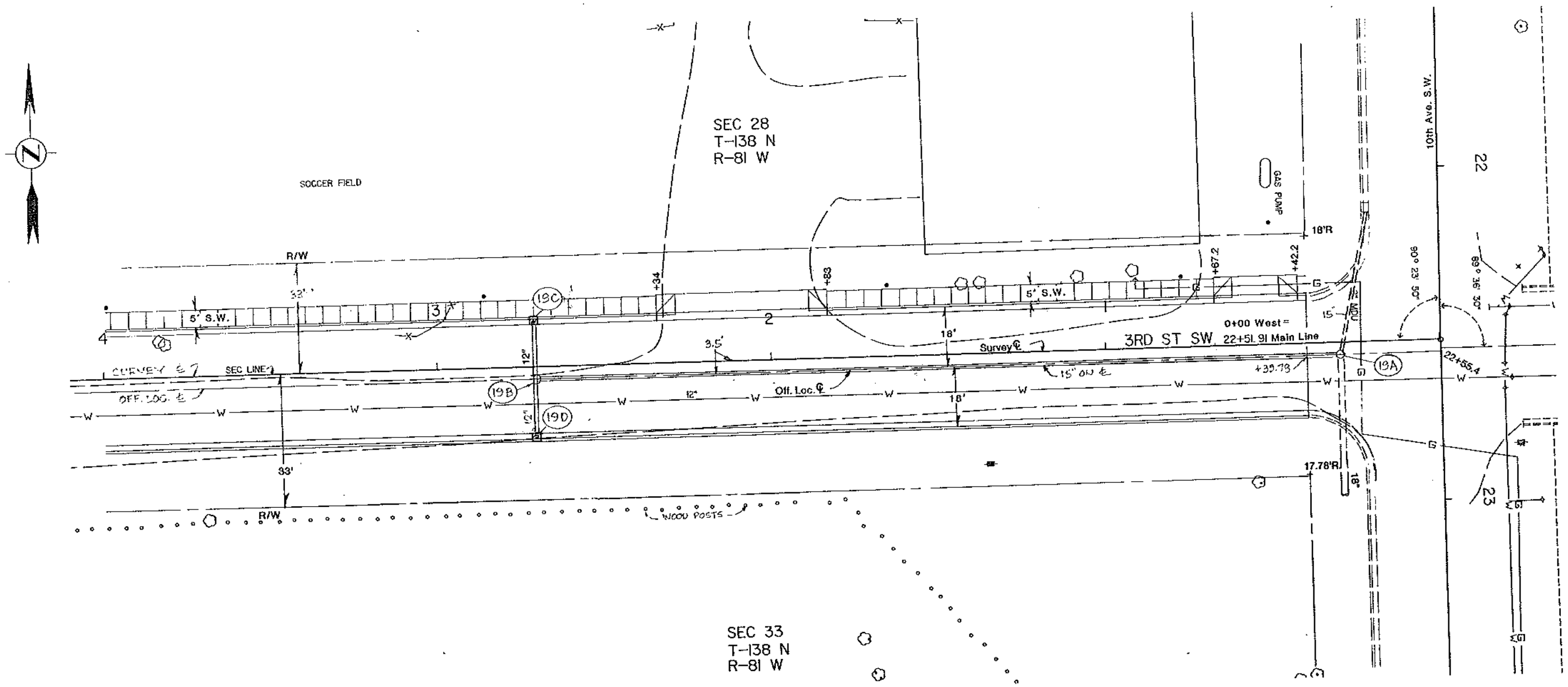
MANHOLE
#17B - 48" - 1 Ea.

MANHOLE RISER
#17B 48" X 5.5 L.F.

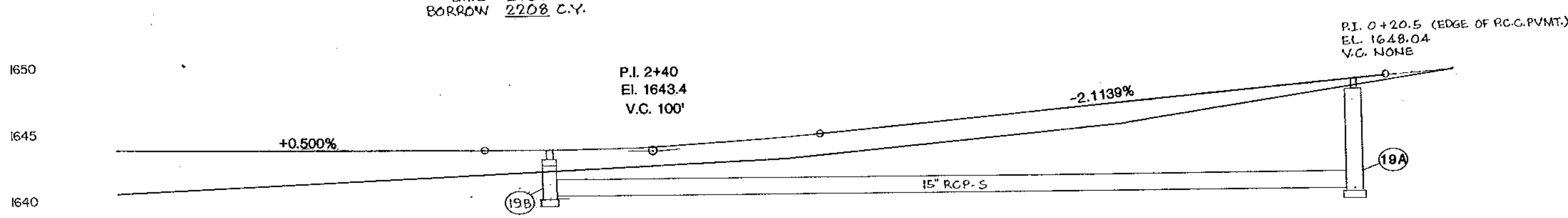
PIPE, CONC., REINF. CL. III STORM DRAIN
#17A to #17B 12" X 10 L.F.

UNDERDRAIN, PIPE, PVC, PERFORATED - 4 IN.
Inlet # 17A Lt. - 12.5 L.F.
Inlet # 17A Rt. - 12.5 L.F.

2ND STREET S.W.



3RD STREET S.W.
0+39.8 TO 7+78.7
EXC. 243 C.Y.
EMB. 2451 C.Y.
BORROW 2208 C.Y.



M.H. 19B - 48"	
2+70.9 ℄	
Top	1643.61
Base	1639.94
Invert	1640.13
Outlet	1639.53
Riser	2.50'

No adjusting rings required

Inlet No.	19C	19D
Type	1 - D Grate	1 - D Grate
Station	2+70.9 Rt.	2+70.9 Lt.
Grate	1643.18	1643.18
Base	1640.19	1640.19
Invert	1640.36	1640.36
Outlet	1640.13	1640.13
"H"	2.4'	2.40'

1641.0 / 4
41.9 / 43.70 / 3
42.7 / 44.26 / 2
44.8 / 46.56 / 1
1648.5 / 0

CURB & GUTTER TYPE-1
0+39.78 to 4+00 Lt. & Rt. 720.4 L.F.

SIDEWALK, CONCRETE
0+39.78 to 4+00 Rt. 157.9 S.Y.

DRIVEWAY, CONCRETE H.E.S.
0+54.7 Rt. (14') 15.3 S.Y.
1+08.5 Rt. (40') 31.2 S.Y.

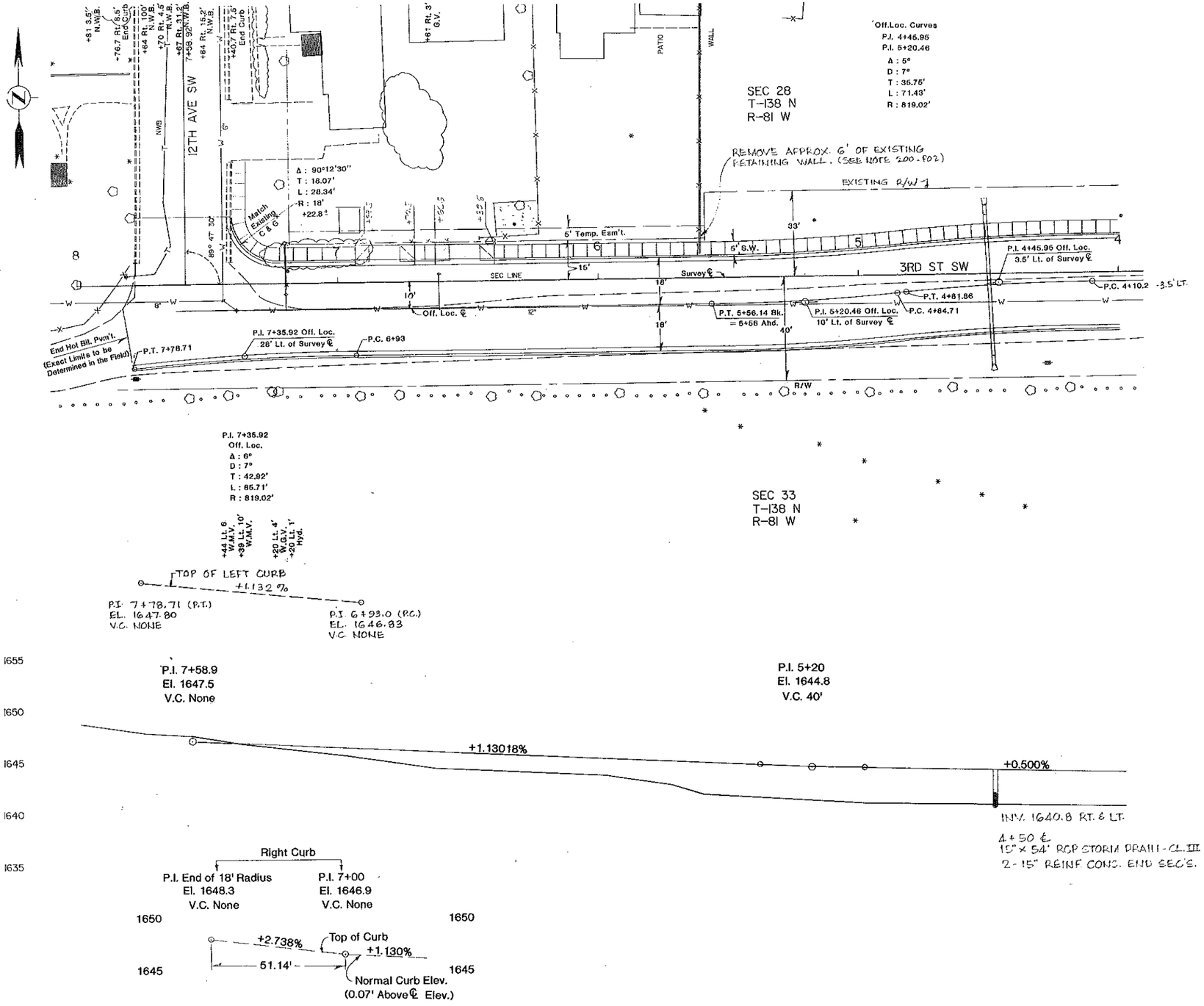
PIPE, CONC. REINF. CL.-III, STORM DRAIN
19C to 19B 12" X 15 L.F.
19D to 19B 12" X 15 L.F.
19A to 19B 15" x 237 L.F.

MANHOLE
19B - 48" 1 Ea.

MANHOLE RISER
19B 48" x 2.5 L.F.
(No adjusting rings required)

INLET - TYPE 1
19C 1 Ea.
19D 1 Ea.

UNDERDRAIN, PIPE, PVC, PERFORATED - 4 IN.
Inlet # 19C Bk. - 12.5 L.F.
Inlet # 19C Ahd. - 12.5 L.F.
Inlet # 19D Bk. - 12.5 L.F.
Inlet # 19D Ahd. - 12.5 L.F.



RELOCATE HYDRANT
7+ 20 - 1' Lt. - 1Ea.

REMOVAL OF CURB & GUTTER
7+40.7 Rt. 19 L.F.

CURB & GUTTER, TYPE-1
4+00 to 7+78.7 Rt. 378.7 L.F.
4+00 to 7+41 Lt. 351.1 L.F.

SIDEWALK, CONCRETE
4+00 to 7+41 Lt. 178.8 S.Y.

PIPE, CONC. REINF. CL.-III STORM DRAIN
4+50 ℄ 15" x 64 L.F.

END SECTION, CONC. REINF. 15 IN.
4+50 Lt.& Rt. 2 Ea.

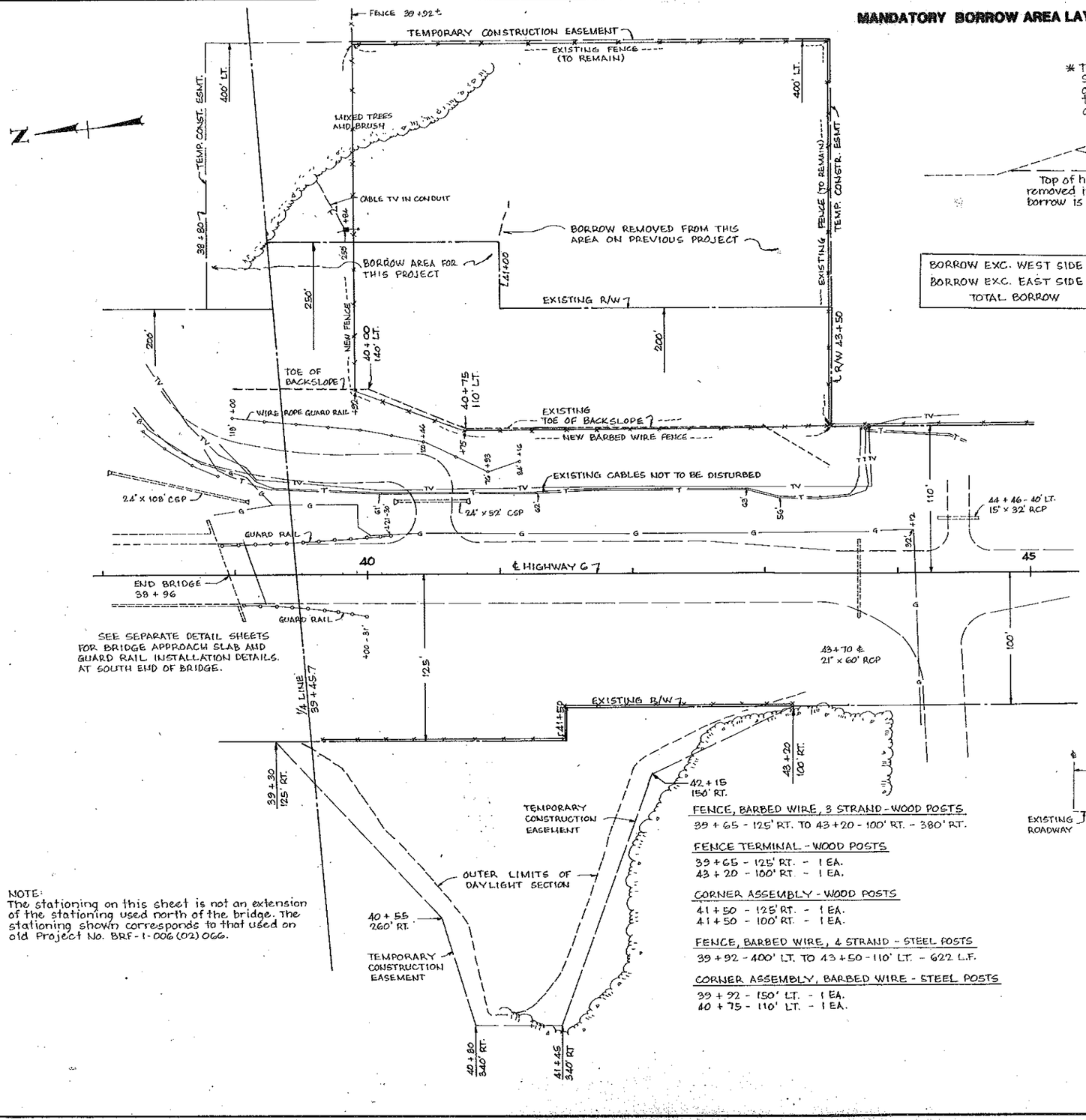
REMOVAL OF EXISTING RETAINING WALL
5+ 62 Rt. - 1 Lump Sum
(See Note 200-P02)

ADJUST UTILITY APPURTENANCES
6+ 61 - 3' Rt. (W.G.V.) 1 Ea.
7+ 20 - 4' Lt. (W.G.V.) 1 Ea.
7+ 39 -10' Lt. (W.M.V.) 1 Ea.
7+ 44 - 6' Lt. (W.M.V.) 1 Ea.

DRIVEWAY, CONCRETE H.E.S.
6+ 51 Rt. (12') 14.1 S.Y.
6+ 82 Rt. (12') 14.1 S.Y.

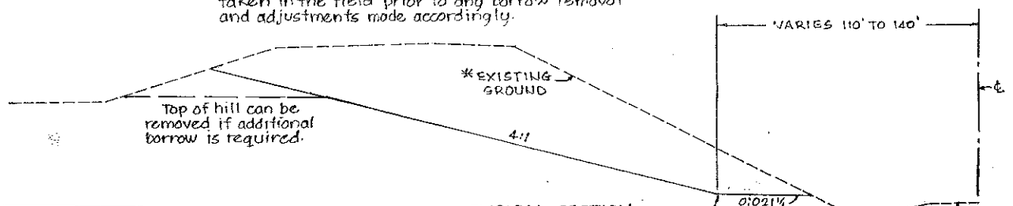
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	BRS-1-006(005)066	73

MANDATORY BORROW AREA LAYOUTS



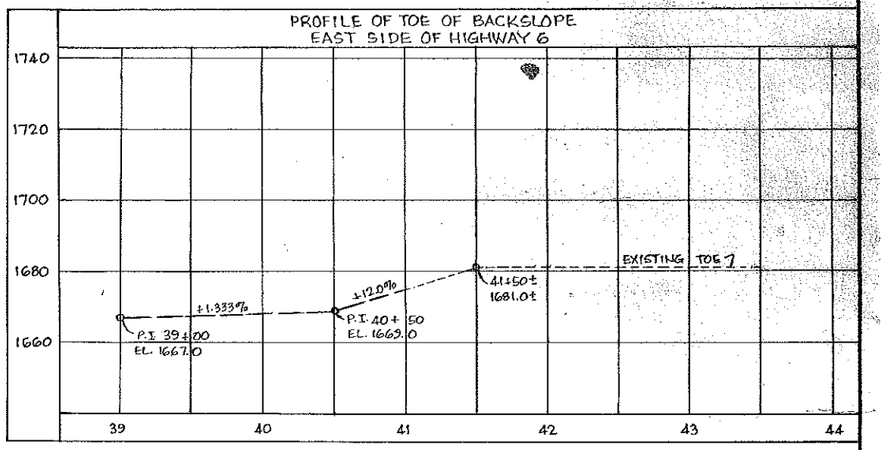
NOTE:
The stationing on this sheet is not an extension of the stationing used north of the bridge. The stationing shown corresponds to that used on old Project No. BRF-1-006(02)066.

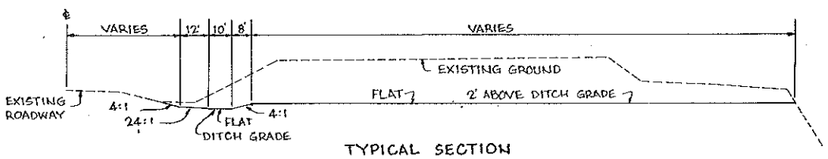
* The existing ground elevations in the vicinity of Sta. 41 as shown on the cross section sheets are approximate only. New cross sections shall be taken in the field prior to any borrow removal and adjustments made accordingly.



TYPICAL SECTION
STA. 38 +70 LT. ℄ AHD.
LEFT (EAST) SIDE OF HIGHWAY

BORROW EXC. WEST SIDE	= 17,302 C.Y.
BORROW EXC. EAST SIDE	= 19,722 C.Y.
TOTAL BORROW	= 37,024 C.Y.





TYPICAL SECTION
STA. 39 + 65± TO 43 + 50
RIGHT (WEST) SIDE OF HIGHWAY

FENCE, BARBED WIRE, 3 STRAND - WOOD POSTS

39 + 65 - 125' RT. TO 43 + 20 - 100' RT. - 380' RT.

FENCE TERMINAL - WOOD POSTS

39 + 65 - 125' RT. - 1 EA.
43 + 20 - 100' RT. - 1 EA.

CORNER ASSEMBLY - WOOD POSTS

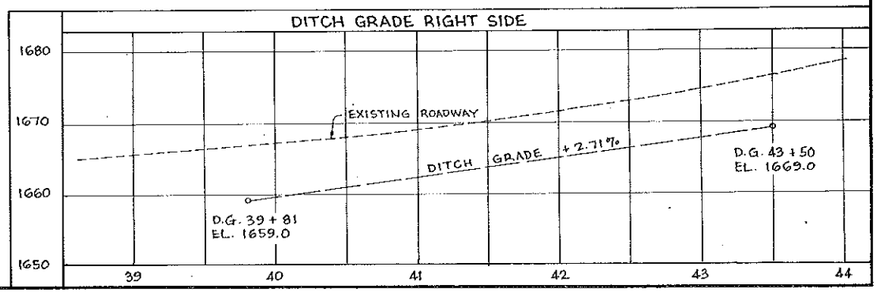
41 + 50 - 125' RT. - 1 EA.
41 + 50 - 100' RT. - 1 EA.

FENCE, BARBED WIRE, 4 STRAND - STEEL POSTS

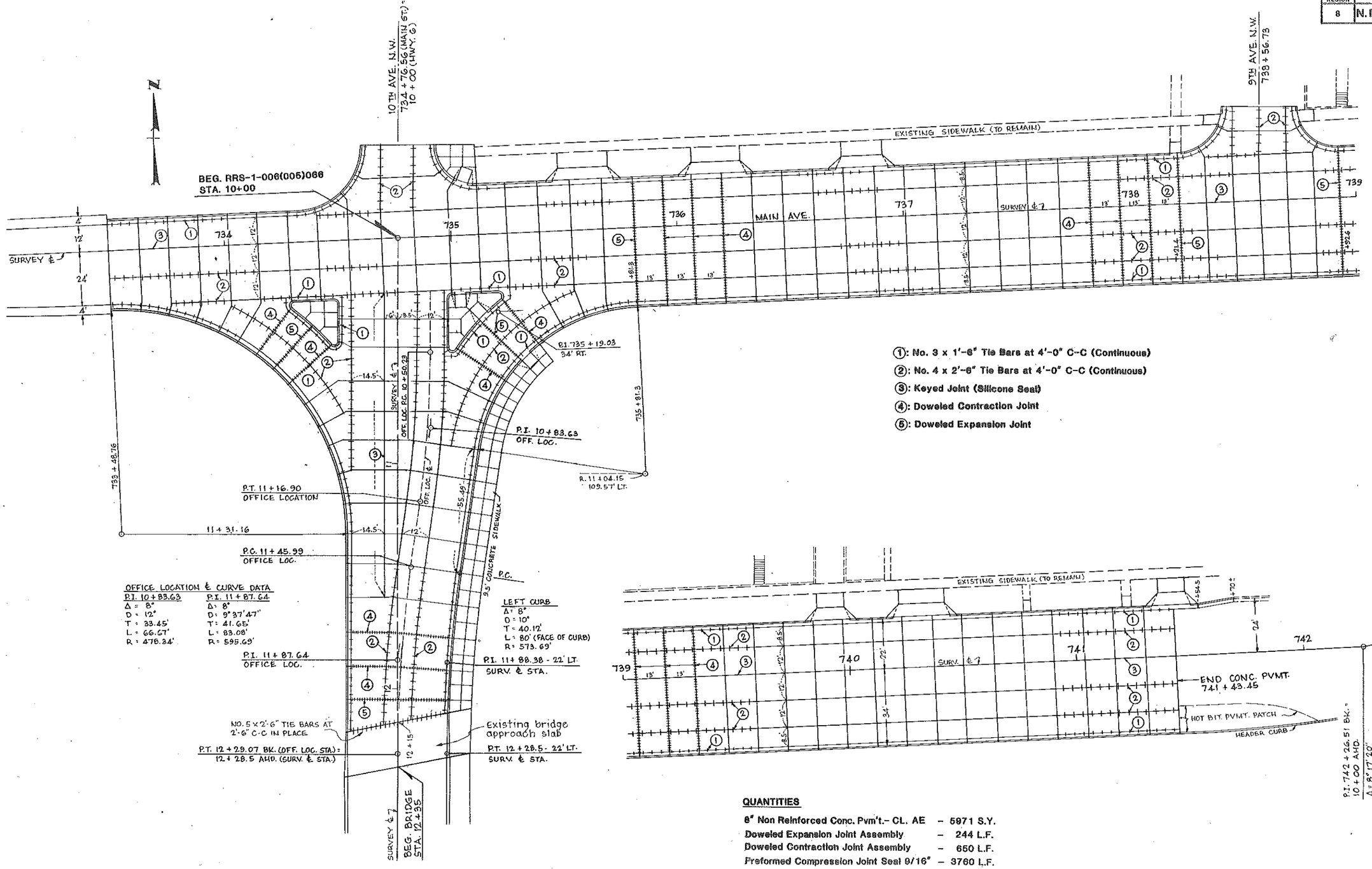
39 + 92 - 400' LT. TO 43 + 50 - 110' LT. - 622 L.F.

CORNER ASSEMBLY, BARBED WIRE - STEEL POSTS

39 + 92 - 150' LT. - 1 EA.
40 + 75 - 110' LT. - 1 EA.



FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	14



OFFICE LOCATION & CURVE DATA

P.I. 10 + 83.63	P.I. 11 + 87.64
Δ = 8°	Δ = 8°
D = 12°	D = 9° 37' 47"
T = 33.45'	T = 41.65'
L = 66.67'	L = 83.08'
R = 478.34'	R = 595.69'

LEFT CURB
Δ = 8°
D = 10°
T = 40.12'
L = 80' (FACE OF CURB)
R = 573.69'

① : No. 3 x 1'-6" Tie Bars at 4'-0" C-C (Continuous)
② : No. 4 x 2'-6" Tie Bars at 4'-0" C-C (Continuous)
③ : Keyed Joint (Silicone Seal)
④ : Doweled Contraction Joint
⑤ : Doweled Expansion Joint

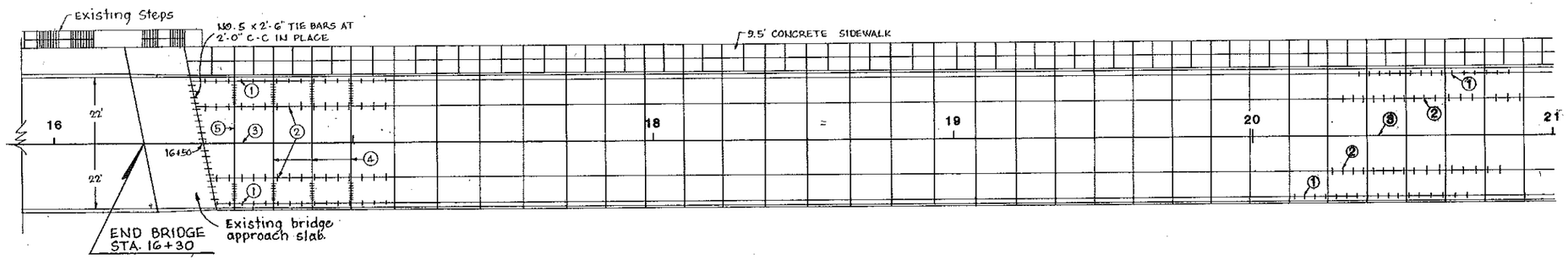
QUANTITIES

8" Non Reinforced Conc. Pvm't.– CL. AE	–	5971 S.Y.
Doweled Expansion Joint Assembly	–	244 L.F.
Doweled Contraction Joint Assembly	–	650 L.F.
Preformed Compression Joint Seal 9/16"	–	3760 L.F.
Longitudinal Joint Silicone Seal	–	930 L.F.
Expansion Joint Silicone Seal	–	244 L.F.

PAVEMENT LAYOUT DETAILS

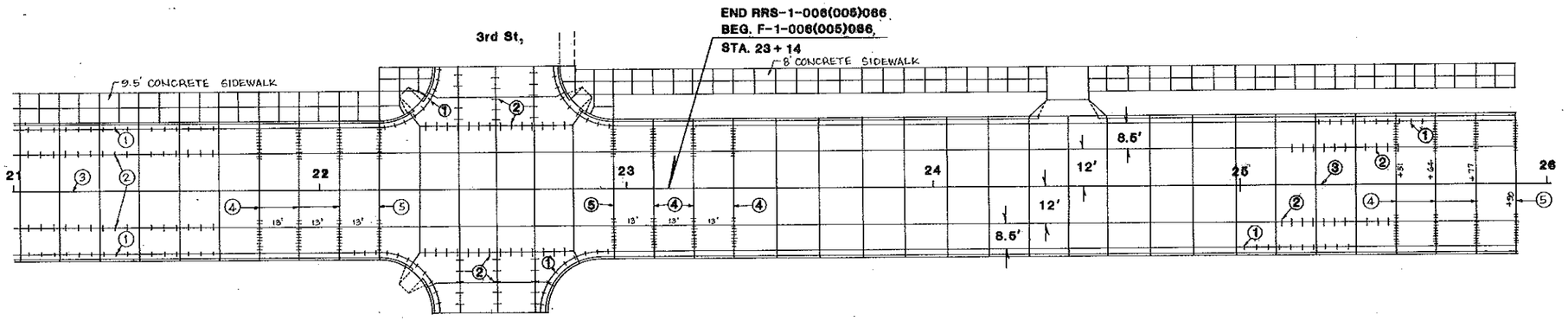
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)086	75

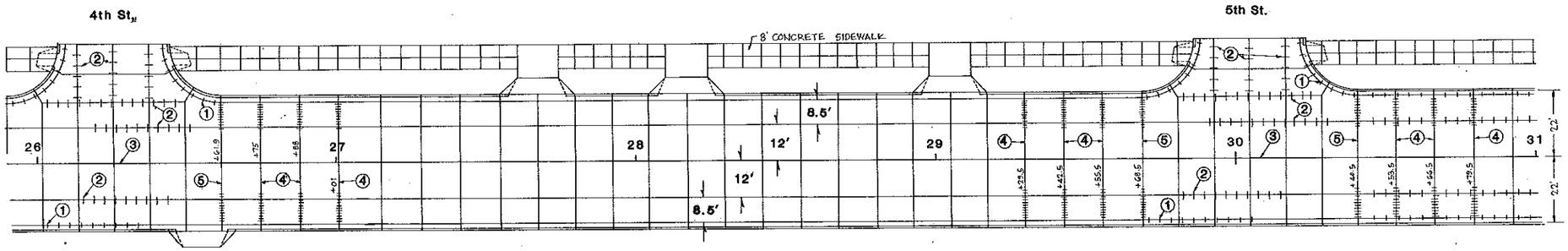
QUANTITIES	RRS-PORTION 16+50 to 23+14	F-PORTION 23+14 to 31+00
8" Non Reinforced Conc. Pvm't.-CL. AE	– 3192 S.Y.	— 3760 S.Y.
Doweled Expansion Joint Assembly	– 123 L.F.	— 164 L.F.
Doweled Contraction Joint Assembly	– 287 L.F.	— 574 L.F.
Preformed Compression Joint Seal 9/16"	– 2044 L.F.	— 2454 L.F.
Longitudinal Joint Silicone Seal	– 664 L.F.	— 786 L.F.
Expansion Joint Silicone Seal	– 123 L.F.	— 164 L.F.



①: No. 3 x 1'-6" Tie Bars at 4'-0" C-C (Continuous)
②: No. 4 x 2'-6" Tie Bars at 4'-0" C-C (Continuous)
③: Keyed Joint (Silicone Seal)
④: Doweled Contraction Joint
⑤: Doweled Expansion Joint

Joint Spacing
13' Ave.
15' Max.

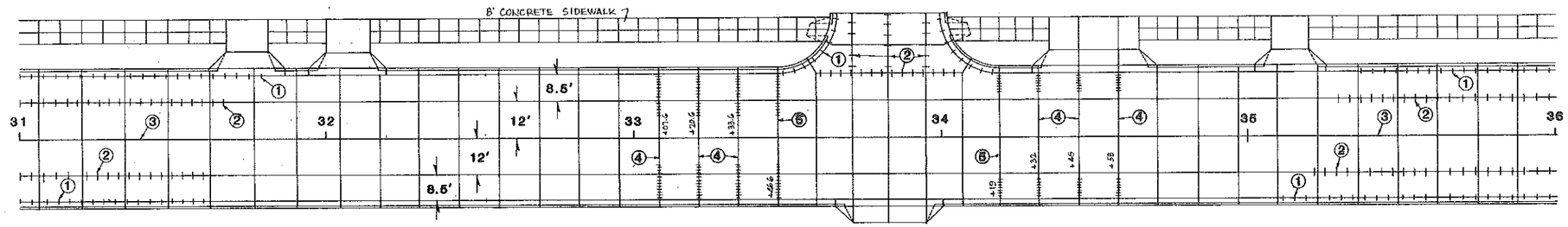




P.C.C. PAVING DETAILS

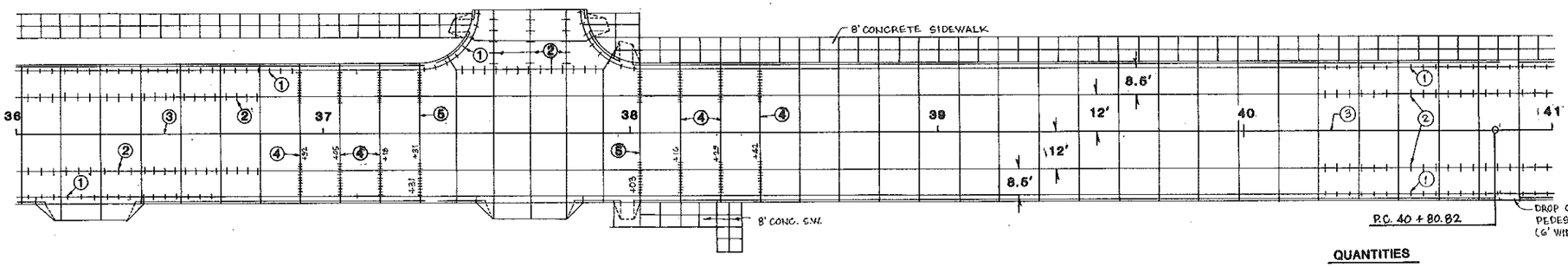
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	76

6th St.



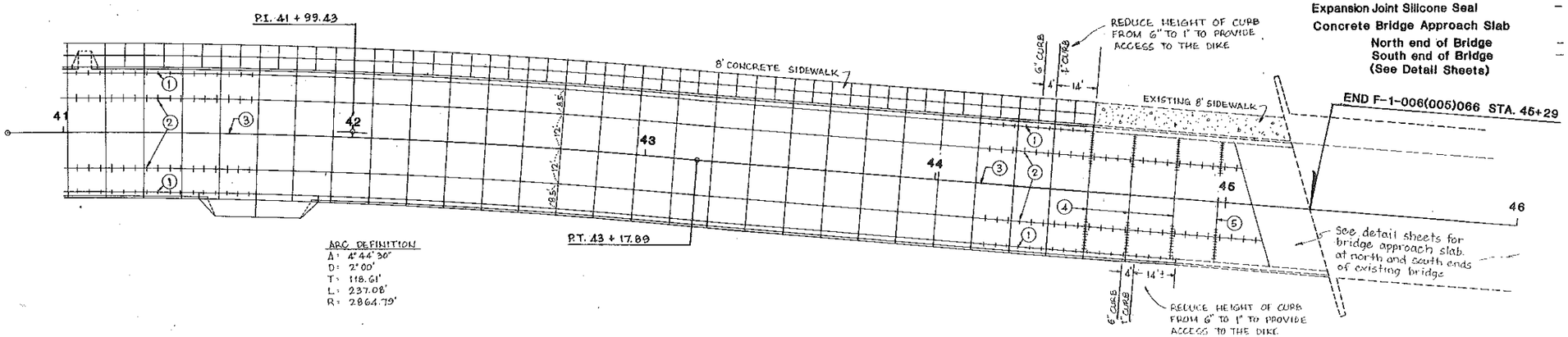
①: No. 3 x 1'-6" Tie Bars at 4'-0" C-C (Continuous)
②: No. 4 x 2'-6" Tie Bars at 4'-0" C-C (Continuous)
③: Keyed Joint (Silicone Seal)
④: Doweled Contraction Joint
⑤: Doweled Expansion Joint

7th St.



QUANTITIES

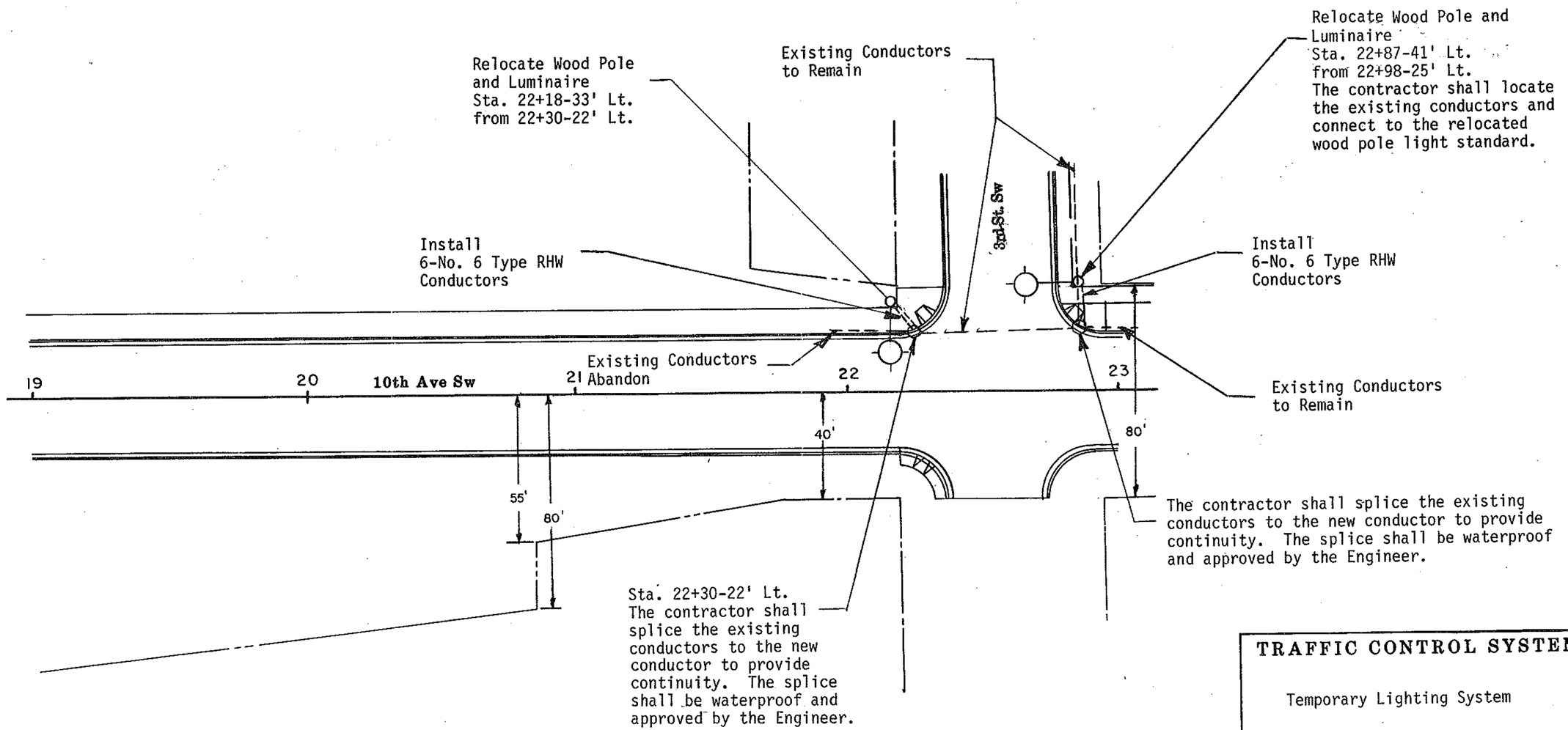
8" Non Reinforced Conc. Pvm't.- CL. AE	–	6599 S.Y.
Doweled Expansion Joint Assembly	–	205 L.F.
Doweled Contraction Joint Assembly	–	615 L.F.
Preformed Compression Joint Seal 9/16"	–	4381 L.F.
Longitudinal Joint Silicone Seal	–	1409 L.F.
Expansion Joint Silicone Seal	–	205 L.F.
Concrete Bridge Approach Slab		
North end of Bridge	–	91.1 S.Y.
South end of Bridge (See Detail Sheets)	–	97.8 S.Y.



P.C.C.PAVING DETAIL

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	77

NOTE: The feed point for these circuits is in the alley south of 3rd St. S.W. between 10th Ave. S.W. and 9th Ave. S.W.



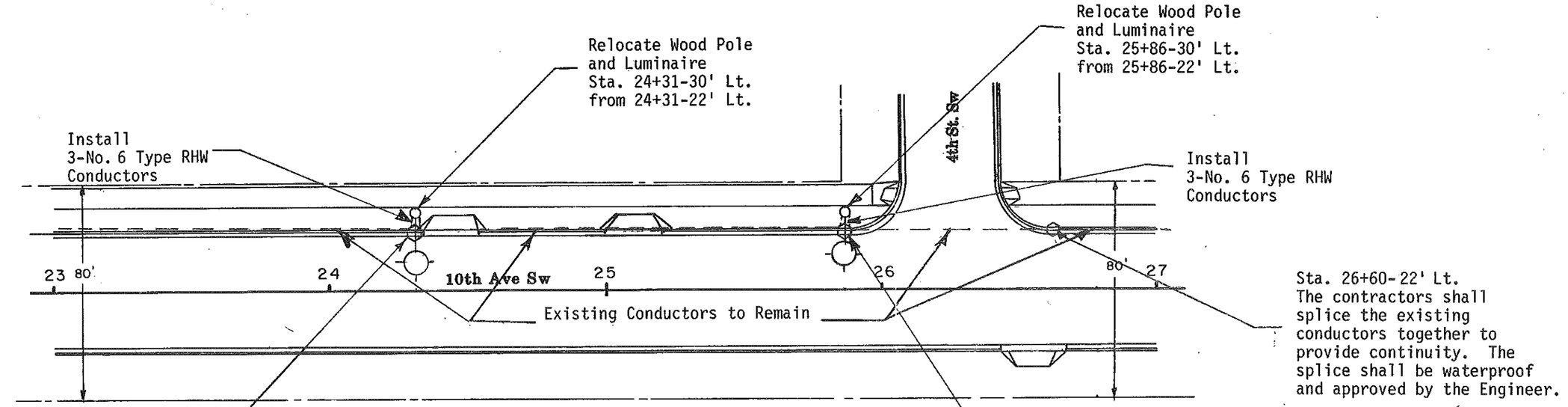
TRAFFIC CONTROL SYSTEM

Temporary Lighting System

10th Ave sw (ND Hwy 6)

Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	78

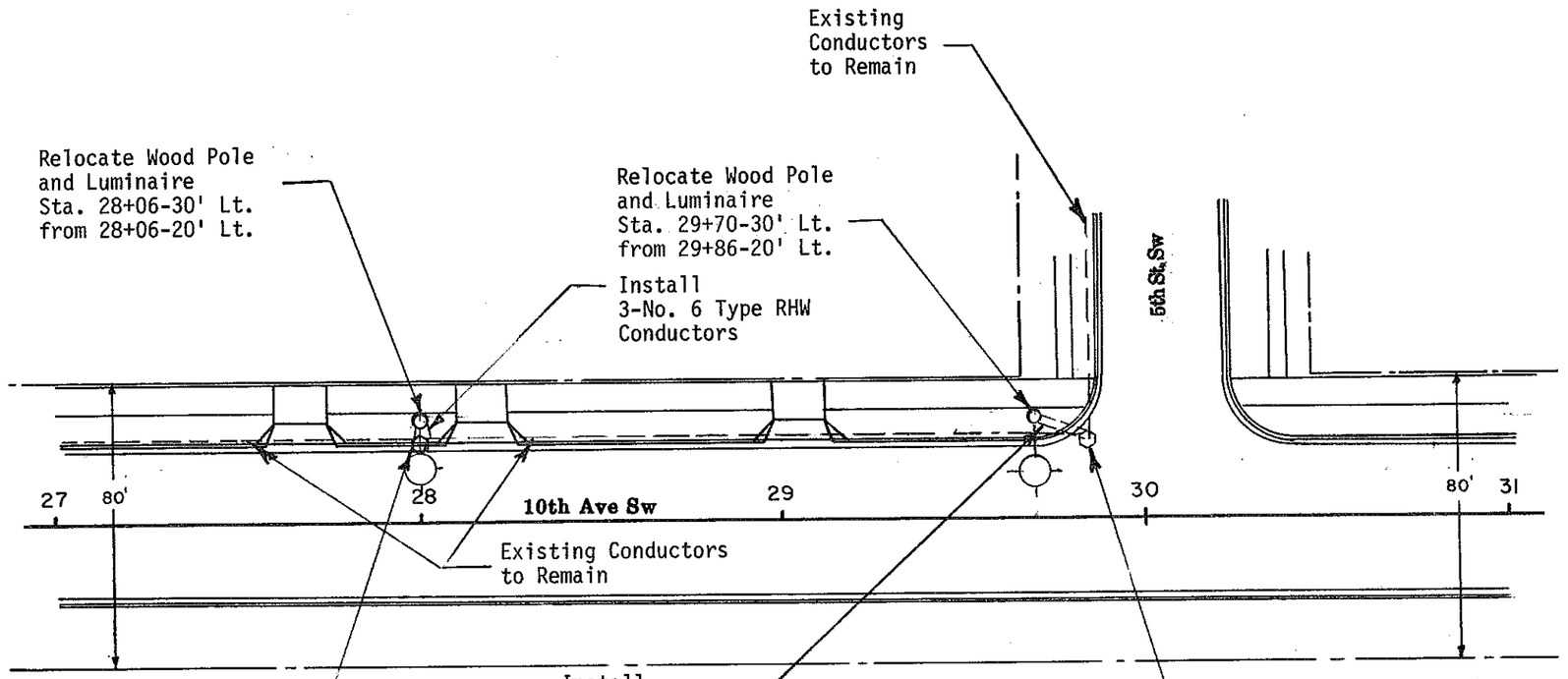


TRAFFIC CONTROL SYSTEM

Temporary Lighting System

10th Ave sw (ND Hwy 6)
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	79



Sta. 24+31-22' Lt.
The contractor shall splice the existing conductors to the new conductors to provide continuity. The splice shall be waterproof and approved by the Engineer.

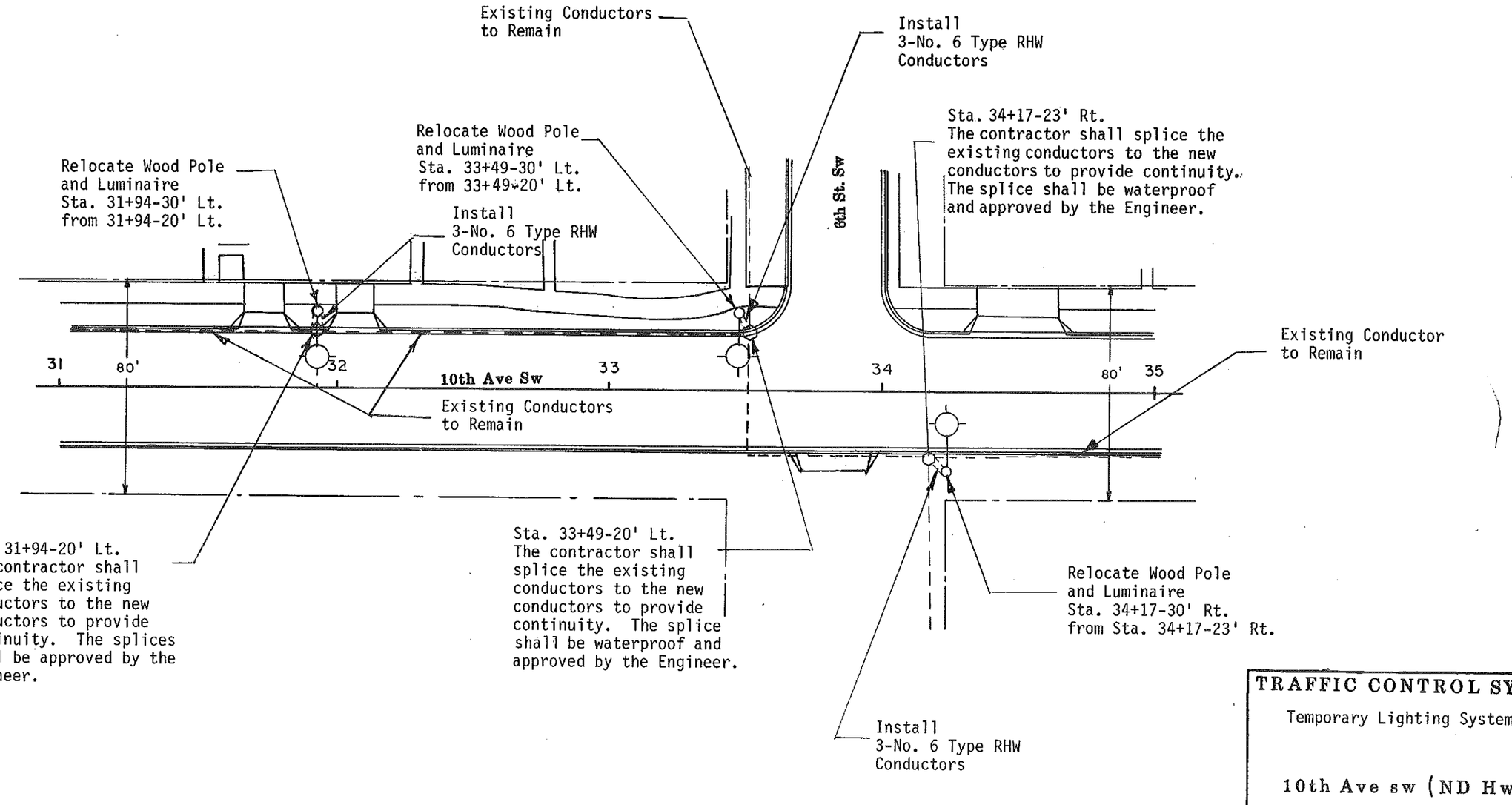
Sta. 29+86-20' Lt.
The contractors shall splice the existing conductors to the new conductors to provide continuity. The splices shall be waterproof and approved by the Engineer.

TRAFFIC CONTROL SYSTEM

Temporary Lighting System

10th Ave sw (ND Hwy 6)
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	80



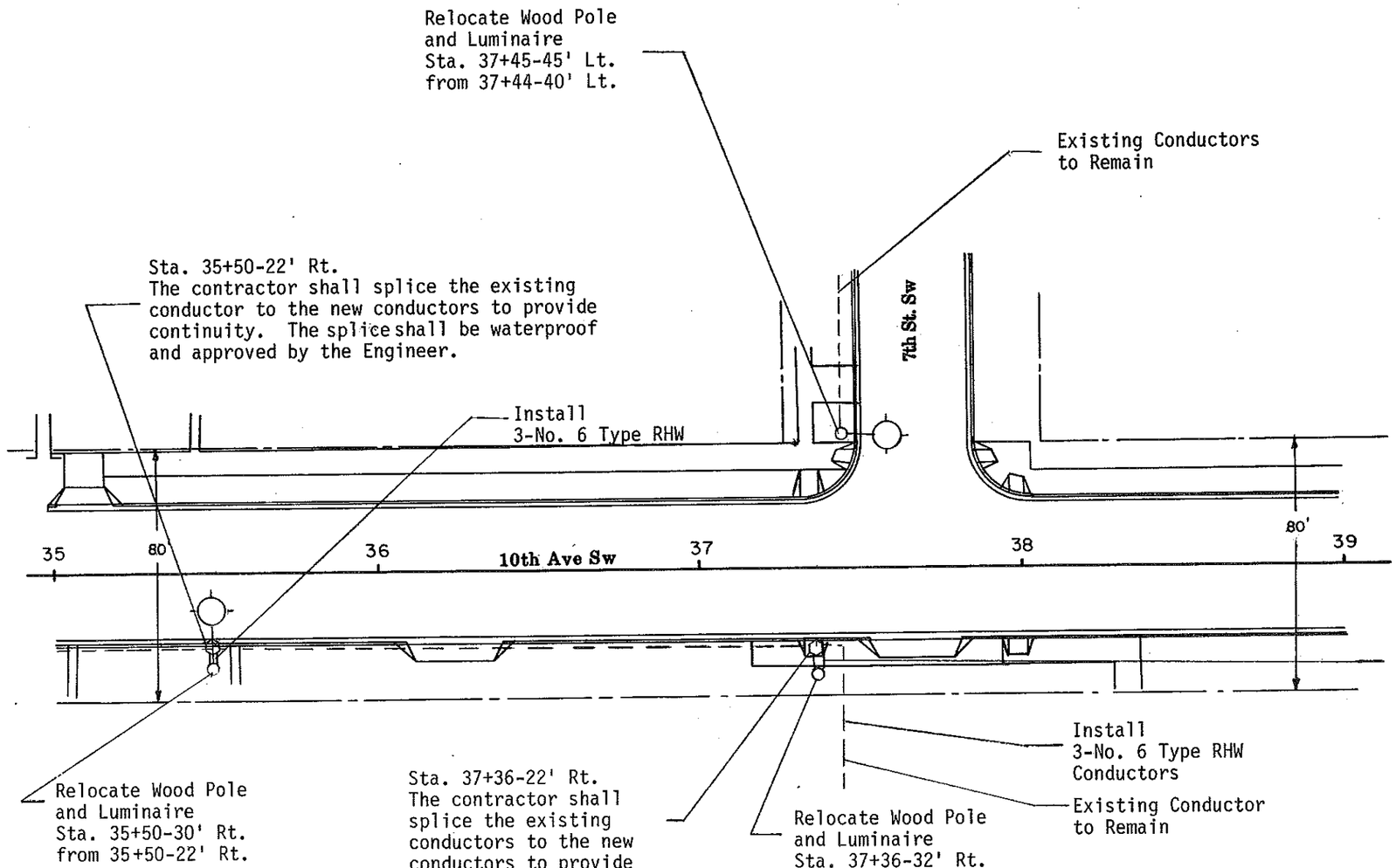
TRAFFIC CONTROL SYSTEM

Temporary Lighting System

10th Ave sw (ND Hwy 6)

Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	81



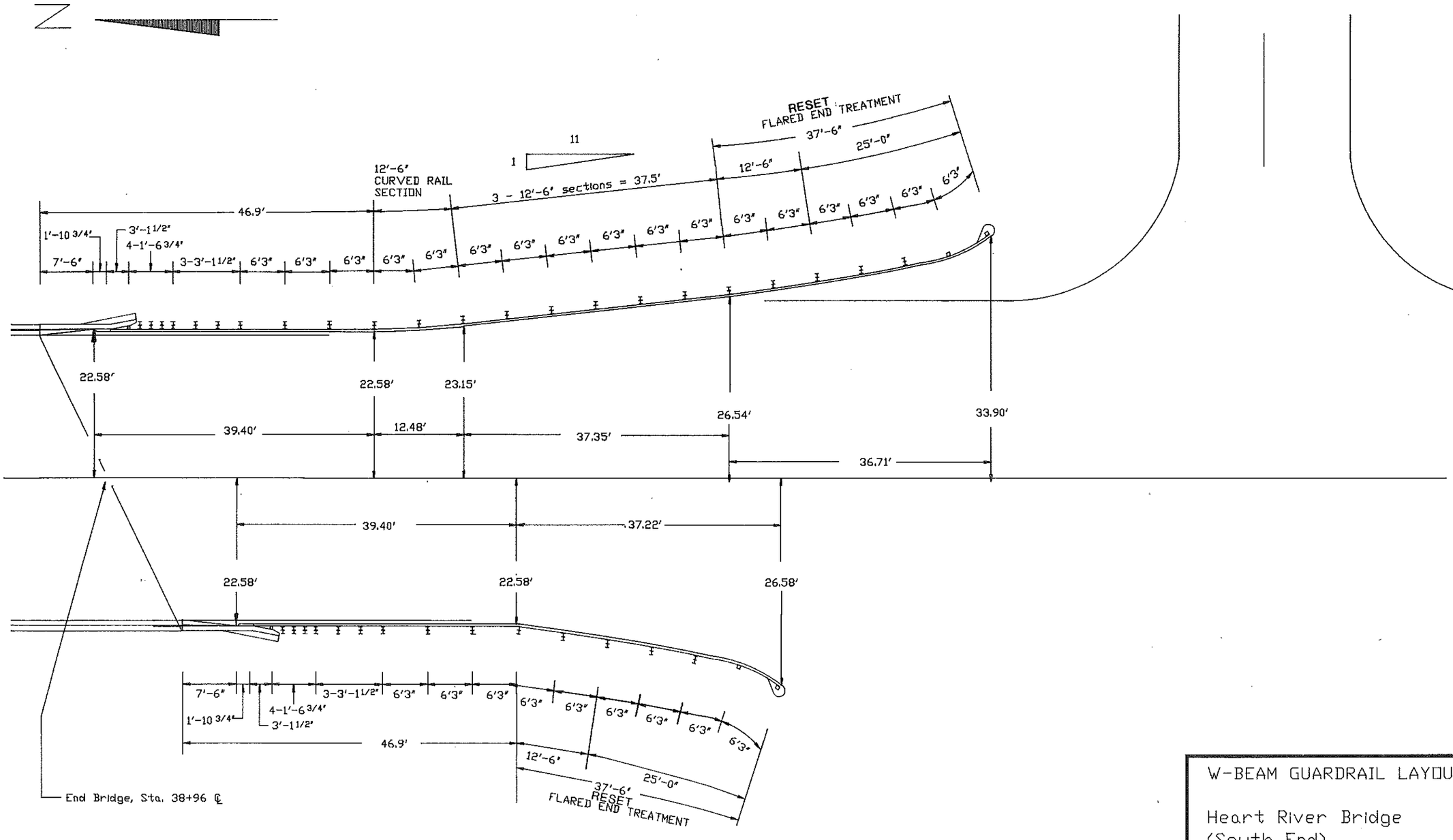
Sta. 37+45-45' Lt.
The contractor shall locate the existing conductors and make connection to the relocated wood pole and luminaire to provide continuity.

TRAFFIC CONTROL SYSTEM

Temporary Lighting System

10th Ave sw (ND Hwy 6)
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	82



W-BEAM GUARDRAIL LAYOUT

Heart River Bridge
(South End)

Highway 6
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	83

W-BEAM SUMMARY SHEET

LOCATION	W-BEAM GUARDRAIL AT BRIDGE ENDS																		
	(A) SAFETY SHAPE TRAN-SITION	(A) SAFETY SHAPE REIN-FOR-CING BARS	(A) 1/4" x 11-1/2" x 1' - 2 1/2" PLATE	(A) 1" STD PIPE 7 3/4" LONG	(B) TERM-CON-NECTOR	(B) 6" STD PIPE 9" LONG	(B) ID 7/8" X 10" LONG HEX HEAD BOLT	(B) 5/8" x 1 3/4" LONG HEX HEAD BOLT	(B) 5/8" @ 15/8" x 2" LONG BUTTON HEAD BOLT	(B) W6 x 9.0 # OFF-SET BLOCK	(B) W6 x 9.0 # x 14" x 6' 0" POST	(B) 5/8" @ x 1 1/4" LONG BUTTON HEAD BOLT	(B) 12' 6" DOUBLE RAIL SECTION	(B) 12' 6" STRAIGHT RAIL SECTION	(B) 12' 6" CURVED RAIL SECTION	(B) REFL-ECTOR-IZED PLATES	(C) GUARD-RAIL ENBANK-MENT-TYPE C
	CU FT	LBS	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	CY
Sta 39+11.72 to 39+51.12 Rt.					1	1	4	36	17	18	18	56	1	5	1	4	0
Sta 38+95.28 to 39+84.51 Lt.					1	1	4	20	9	10	10	24	1	2	0	2	0
TOTAL	0	0.0	0	0	2	2	8	56	26	28	28	80	2	7	1	6	0

INSTALL W-BEAM GUARD RAIL

Sta 39+11.72 to 39+51.12 Rt.	89.4 LF
Sta 38+95.28 to 39+84.51 Lt.	39.4 LF
TOTAL	128.8 LF

REMOVE BOX BEAM GUARD RAIL

Sta 39+04.22 to 39+68.49 Rt.	64 LF
Sta 38+87.78 to 40+05.87 Lt.	118 LF
TOTAL	182 LF

RESET W-BEAM GUARDRAIL FLARED END TREATMENT AND TRANSITION

Sta 39+51.12 to 39+88.34 Rt.	1 EA.
Sta 39+84.51 to 40+21.22 Lt.	1 EA.
TOTAL	2 EA.

REMOVE END TREATMENT & TRANSITION

Sta 39+68.49 to 40+06.21 Rt.	1 EA.
Sta 40+05.87 to 40+42.59 Lt.	1 EA.
TOTAL	2 EA.

(A) These items are not to be bid separately but shall be incidental to the price bid for the item "Concrete for Safety Transition".

(B) These items are not to be bid separately but shall be included in the price bid for the item "W-Beam Guardrail".

(C) The amount of Embankment Type-C, (cubic yards), is for informational purposes only.

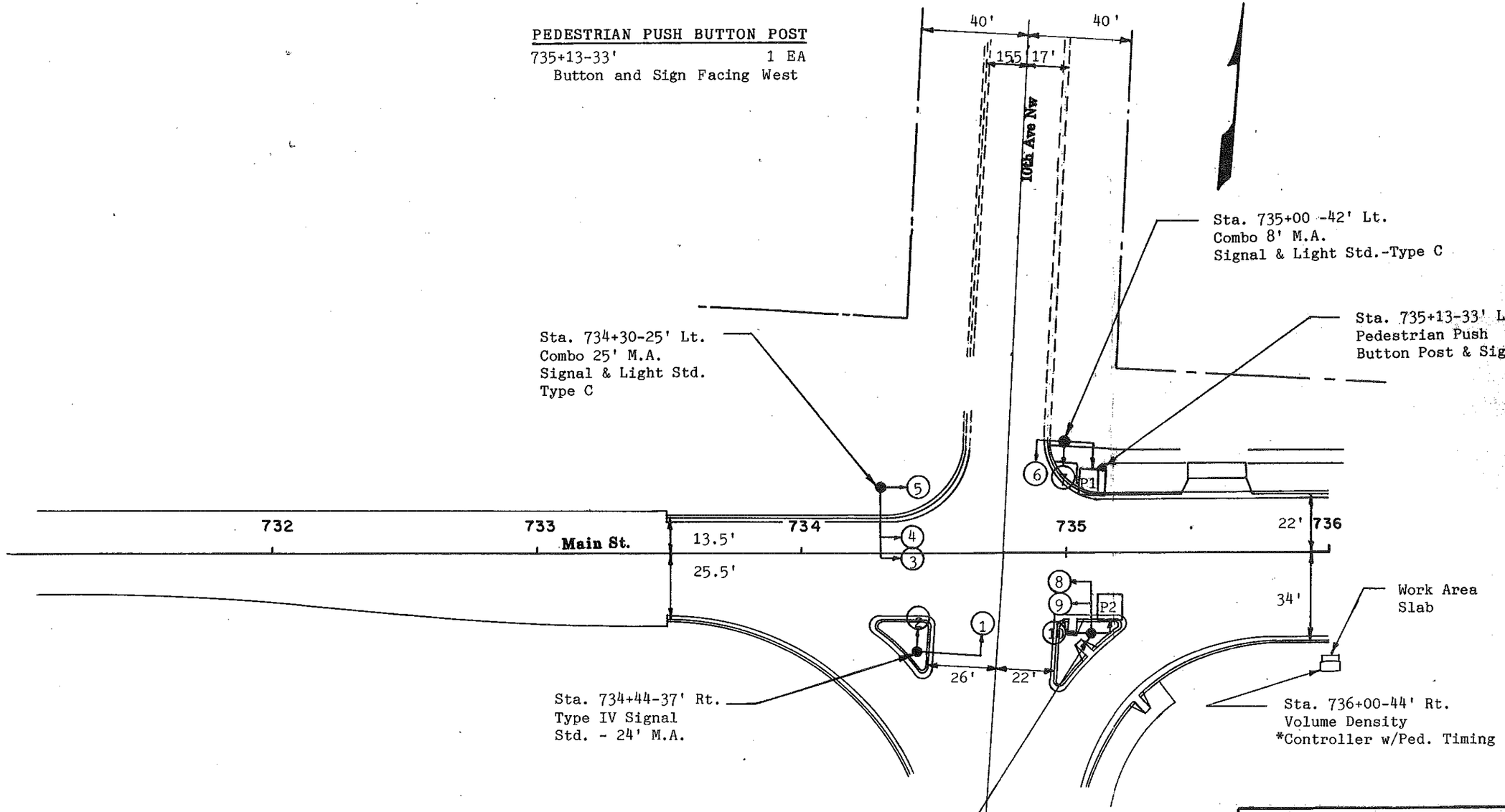
TRAFFIC CONTROL SYSTEM
W-Beam Guardrail Quantities

Heart River Bridge
(South End)
Highway #6
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	84

PEDESTRIAN PUSH BUTTON POST

735+13-33' 1 EA
Button and Sign Facing West



*Controller door shall face north with hinges on east side.

TRAFFIC CONTROL SYSTEM

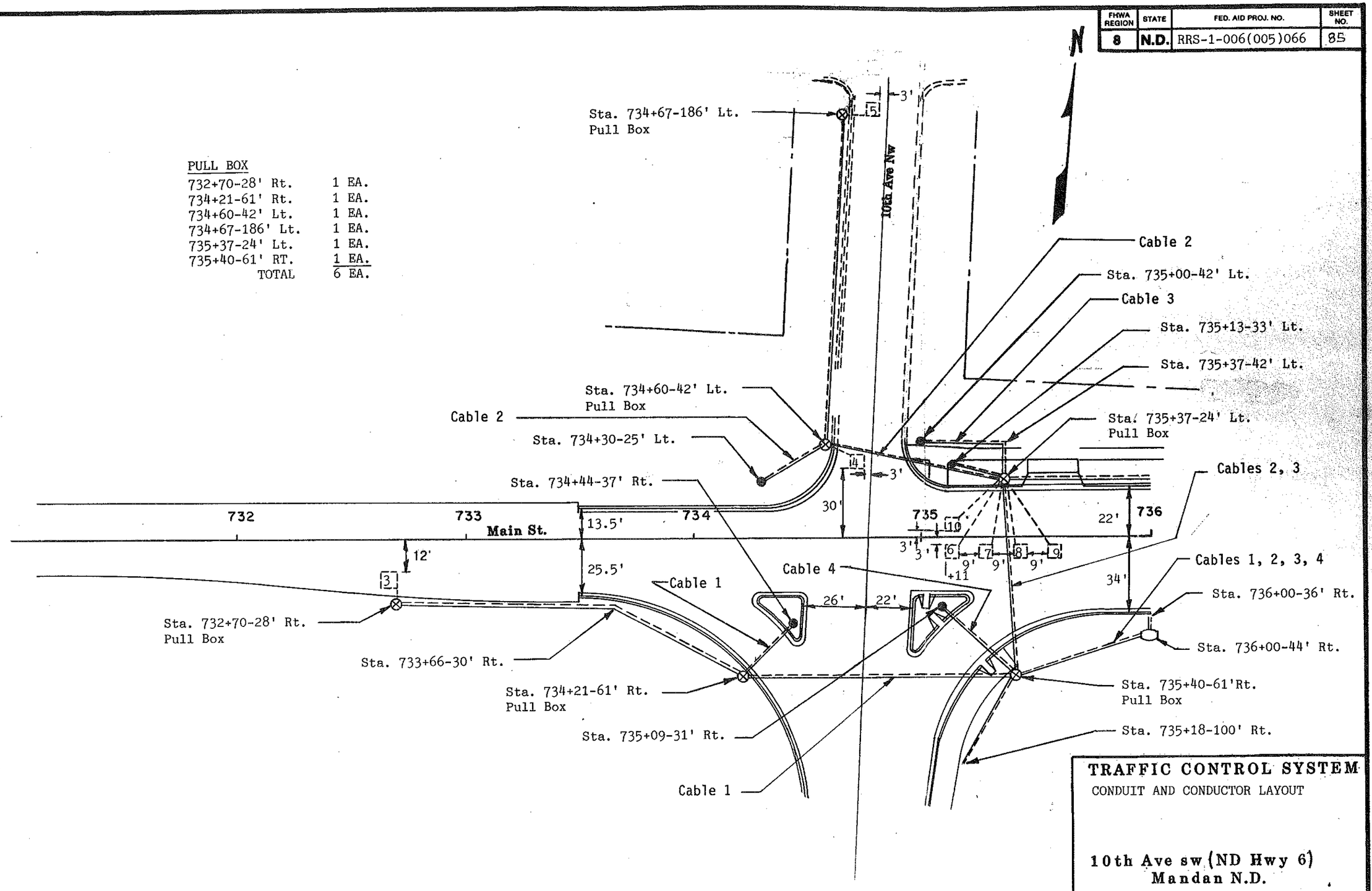
TRAFFIC SIGNAL LAYOUT

10th Ave sw (ND Hwy 6)
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	85

PULL BOX

732+70-28' Rt.	1 EA.
734+21-61' Rt.	1 EA.
734+60-42' Lt.	1 EA.
734+67-186' Lt.	1 EA.
735+37-24' Lt.	1 EA.
735+40-61' RT.	1 EA.
TOTAL	6 EA.



TRAFFIC CONTROL SYSTEM

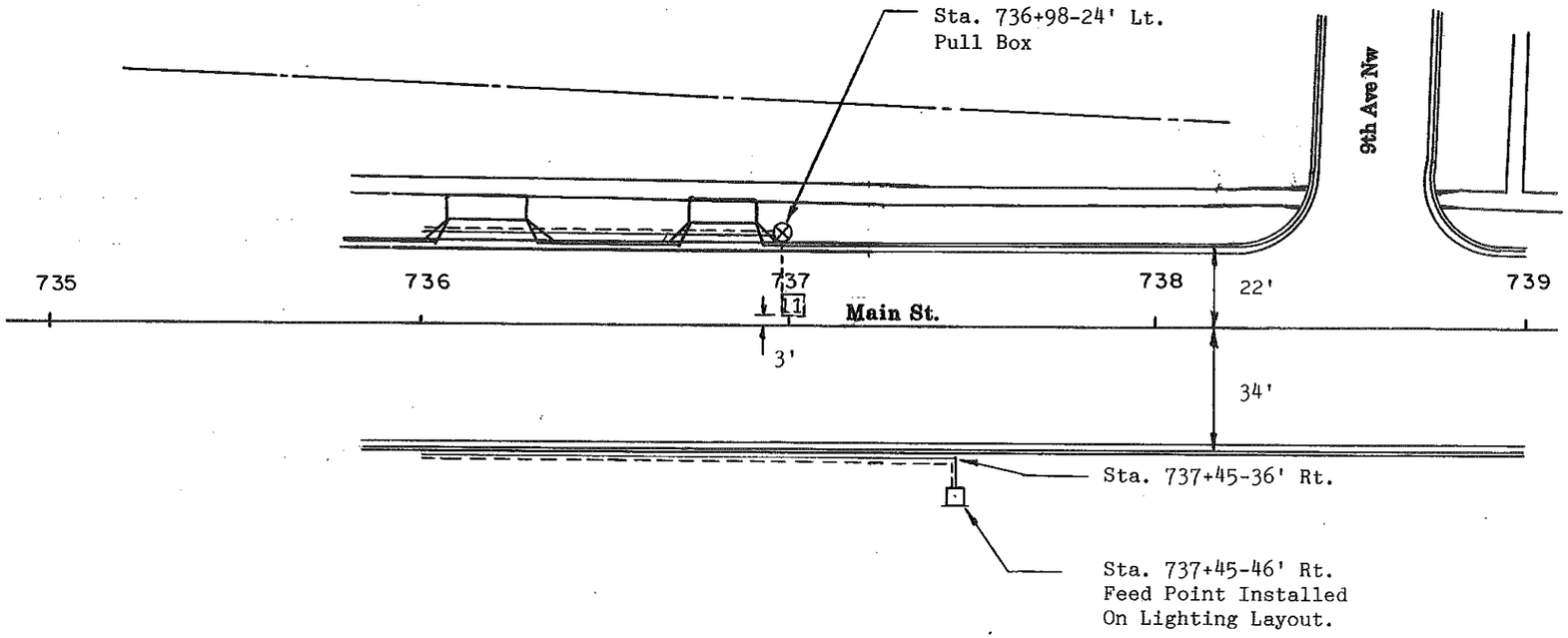
CONDUIT AND CONDUCTOR LAYOUT

10th Ave sw (ND Hwy 6)
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	86

N

PULL BOX
736+98-24' Lt. 1 EA.

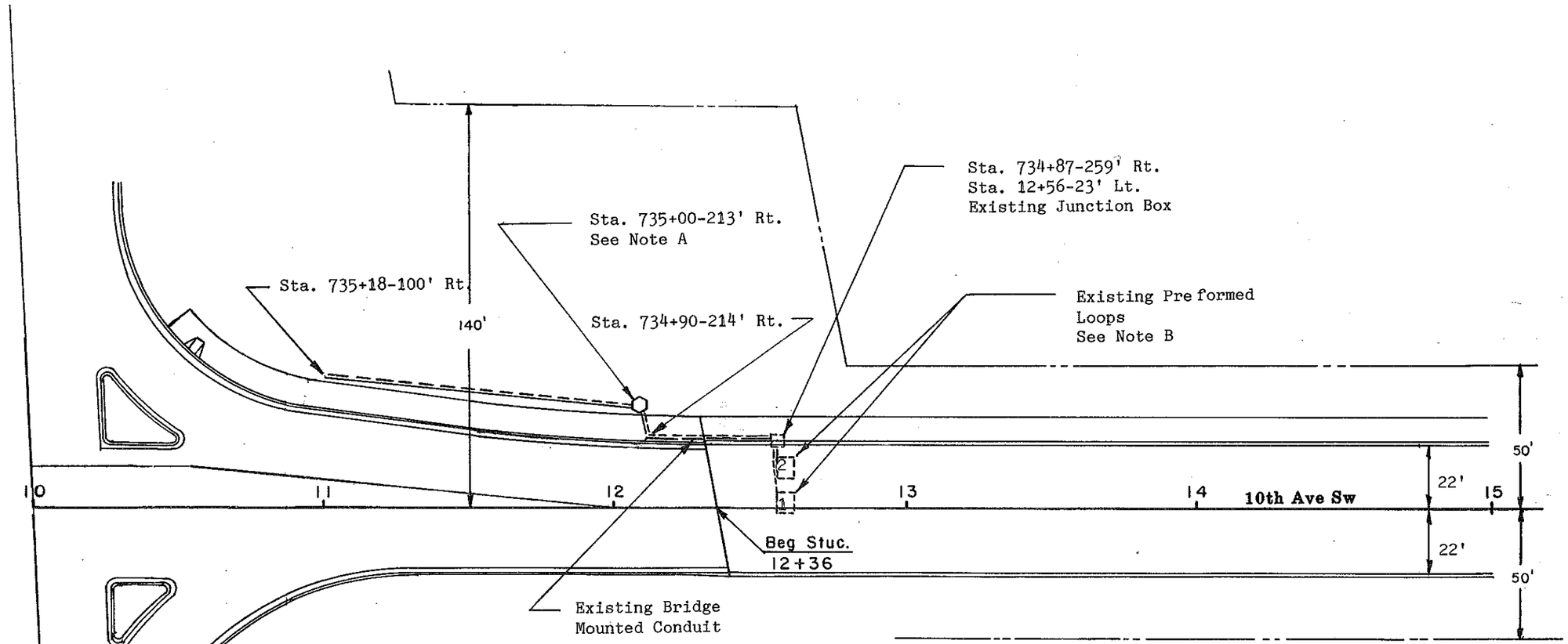


TRAFFIC CONTROL SYSTEM

CONDUIT AND CONDUCTOR LAYOUT

10th Ave sw (ND Hwy 6)
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	87



Note A: The contractor shall locate the existing conduit at Sta. 735+00-213' Rt. to make the necessary connection. The contractor shall be responsible for any damage to the existing conduit and shall replace any damaged conduit at his own expense.

Note B: Loop Number 2 shall not be connected at this time.

TRAFFIC CONTROL SYSTEM

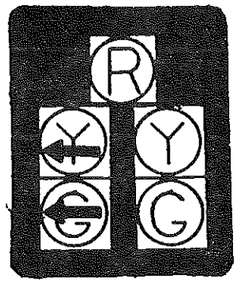
Conduit and Conductor Layout

10th Ave sw (ND Hwy 6), Mandan N.D.

512645

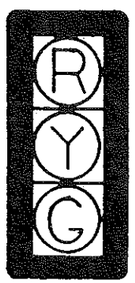
FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	ND	RRS-1-006(005)066	88

CONDUCTORS		CABLE 1 (12-12)		CABLE 2 (12-12)		CABLE 3 (12-12)		CABLE 4 (12-12)		CABLE 5	
Base	Tracer	Head	Indication	Head	Indication	Head	Indication	Head	Indication	Head	Indication
1 Black			Spare		Spare		Spare		Spare		
2 White			Neutral		Neutral		Neutral		Neutral		Neutral
3 Red		1,2	Red	3,4,5	Red	6,7	Red	8,9,10	Red		
4 Green			Ground		Ground		Ground		Ground		Ground
5 Orange		1,2	Yellow	3,4,5	Yellow	6,7	Yellow	8,9,10	Yellow		
6 Blue		1,2	Green	3,4,5	Green	6,7	Green	8,9,10	Green		
7 White	Black		Spare		Spare		Spare		Spare		
8 Red	Black		Spare		Spare		Spare		Spare		
9 Green	Black		Spare	3	Green		Spare		Spare		
10 Orange	Black		Spare	3	Yellow		Spare		Spare		
11 Blue	Black		Spare		Spare	P1	Walk	P2	Walk		
12 Black	White		Spare		Spare	P1	Don't Walk	P2	Don't Walk		

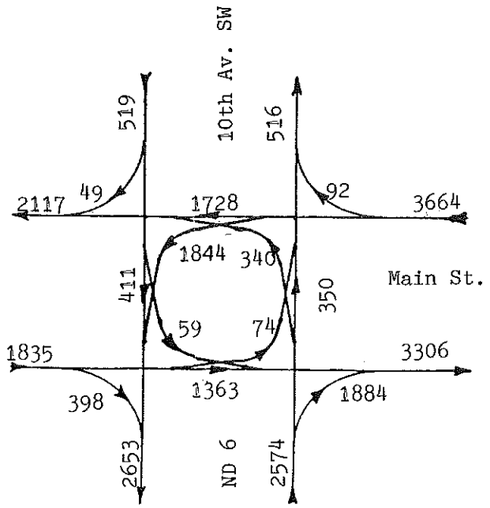


Head 3
(12" Lenses)

All Pedestrian
Heads
(12" Lenses)



Heads 1,2,4,
5,6,7,8,9, and 10
(12" Lenses)



ESTIMATED 1990 ADT

DETECTOR LOOPS

Loop No.	No. of Turns	Size	Type of Loop	Conductor LF	Saw Slot LF	Preformed Loop EA
1	3	6'X8'	Passage	Existing Loop Not Connected		
2	3	6'X8'	Passage			
3	3	6'X6'	Passage	104	29	
4	4	6'X6'	Calling			1
5	3	6'X6'	Passage	100	29	
6 thru 9	4	6'X6'	Presence			4
10	4	6'X6'	Calling			1
11	4	6'X6'	Passage			1
			TOTAL	204	58	7

TRAFFIC CONTROL SYSTEM

Heads, Conductors, Detector Loops & Traffic Volumes

10th Ave. SW (ND Hwy 6)
Mandan, ND

STATION	CONDUIT RUNS Length	Size	CABLE RUNS Length	Type [Loop No.]
734+67-186' Lt. to 734+60-42' Lt.	143'	1"	150'	Loop Lead In [5]
734+30-25' Lt. to 734+60-42' Lt.	33'	2"	39'	Cable 2
734+60-42' Lt. to 735+37-24' Lt.	78'	2"	79'	Loop Lead In [5]
			85'	Loop Lead In [4]
			79'	Cable 2
735+00-42' Lt. to 735+37-42' Lt. to 735+37-24' Lt.	54'	2"	60'	Cable 3
735+13-33' Lt. to 735+37-24' Lt.	25'	1"	34'	(1) 12-2 Conductor
736+98-24' Lt. to 735+37-24' Lt.	160'	2"	167'	Loop Lead In [11]
735+37-24' Lt. to 735+40-61' Rt.	84'	3"	85'	Loop Lead In [4]
			85'	Loop Lead In [5]
			85'	Loop Lead In [11]
			91'	Loop Lead In [6-9]
			91'	Loop Lead In [10]
			85'	Cable 2
			85'	Cable 3
			85'	(1) 12-2 Conductor
732+70-28' Rt. to 733+66-30' Rt. to 734+21-61' Rt.	158'	1"	165'	Loop Lead In [3]
734+44-37' Rt. to 734+21-61' Rt.	32'	2"	38'	Cable 1
734+21-61' Rt. to 735+40-61' Rt.	118'	3"	119'	Cable 1
			119'	Loop Lead In [3]
735+09-31' Rt. to 735+40-61' Rt.	42'	2"	48'	Cable 4
			51'	(1) 12-2 Conductor
734+87-259' Rt. to 734+90-214' Rt. to 735+00-213' Rt. to 735+18-100' Rt. to 735+40-61' Rt.	158'	2"	220'	Loop Lead In [1]

STATION	CONDUIT RUNS Length	Size	CABLE RUNS Length	Type [Loop No.]
735+40-61' Rt. to 736+00-44' Rt.	61'	4"	71'	Cable 2
			71'	Cable 3
			71'	Cable 4
			71'	Loop Lead In [1]
			71'	Loop Lead In [3]
			71'	Loop Lead In [4]
			71'	Loop Lead In [6-9]
			71'	Loop Lead In [5]
			71'	Loop Lead In [10]
			71'	Loop Lead In [11]
			142'	(2) 12-2 Conductor
			71'	Cable 1
736+00-44' Rt. to 736+00-36' Rt. to 737+45-36' Rt. to 737+45-46' Rt.	161'	2"	364'	(2) No. 6 Type RHW
			182'	(1) No. 6 Type THW
736+00-44' Rt. to 736+00-36' Rt. to 737+45-36' Rt. to 737+45-46' Rt.	161'	1"*		

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	89

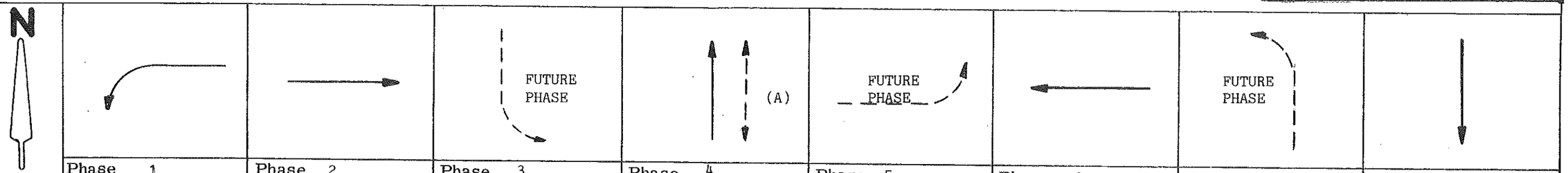
Note: The Number in [brackets] indicates the loop to which this loop lead in conductor is spliced.

* Future communications conduit

TRAFFIC CONTROL SYSTEM
CONDUIT & CONDUCTOR QUANTITIES

Traffic Signals
10th Ave SW (ND Hwy 6)
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	90



Head No.	Phase 1 R/W	Clear To ∅ 2	4	6	8	Phase 2 R/W	Clear To ∅ 4	6	8	1	Phase 3 R/W	Clear To ∅	Phase 4 R/W	Clear To ∅ 6	8	1	2	Phase 5 R/W	Clear To ∅	Phase 6 R/W	Clear To ∅ 8	1	2	4	Phase 7 R/W	Clear To ∅	Phase 8 R/W	Clear To ∅ 1	2	4	6
1																												G	Y	Y	*	Y
2																												G	Y	Y	*	Y
3	G	Y	Y	*	Y																*										
	R	R	R	*	R															G	Y	*	*	Y							
4																				G	Y	*	*	Y							
5																				G	Y	*	*	Y							
6													G	Y	*	Y	Y														
7													G	Y	*	Y	Y														
8						G	Y	*	Y	Y																					
9						G	Y	*	Y	Y																					
10						G	Y	*	Y	Y																					

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

Blank Squares Denote a Red Indication.

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

(A) Only upon pedestrian actuation

TRAFFIC CONTROL SYSTEM

Controller Phasing
10th Ave SW (ND Hwy 6)
Mandan, ND

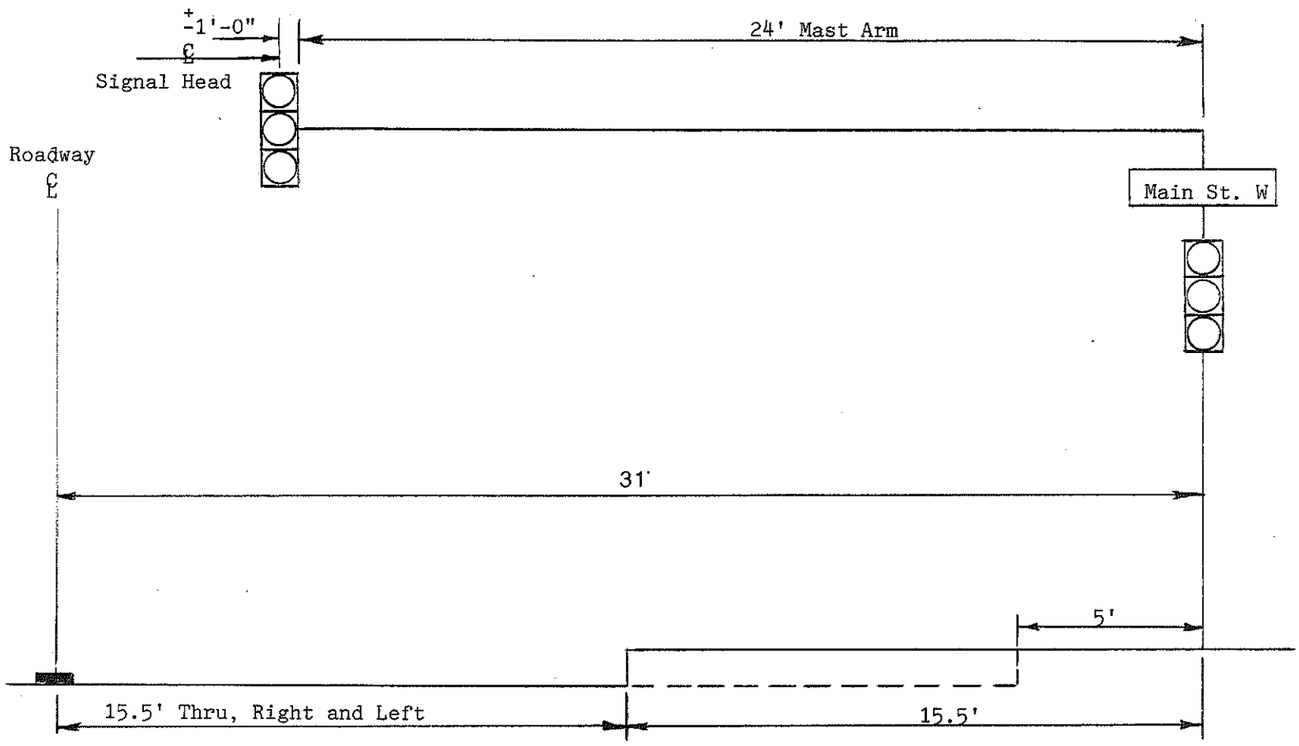
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET
8	N.D.	RRS-1-006(005)066	21

		Ø 1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8
BASIC INTERVALS (or FUNCTIONS)									
Initial		1.0	18.8		22.2		18.8		16.8
Extension (Gap)		---	4.9		6.0		4.9		4.3
Maximum (Maximum Green or Ext. Limit)		25	40		30		40		30
Yellow Change		3.0	3.1		3.1		3.1		3.0
Red Clearance		0.7	1.0		1.0		1.0		0.8
Walk		---	---		8.5		---		---
Pedestrian Clearance		---	---		10.5		---		---
VOLUME DENSITY TIMING FUNCTIONS									
Variable Initial Timing Options									
Added Initial									
Minimum Initial			5.8		5.8		5.8		5.8
Added Initial per Actuation			2.1		2.1		2.1		2.1
Actuations Before Added Initial			2		2		2		2
Computed Initial									
Minimum Initial			5.8		5.8		5.8		5.8
Maximum Initial			18.8		22.2		18.8		16.8
Actuations to Reach Maximum Initial			6.2	PHASE	7.8	PHASE	6.2	PHASE	5.2
Extensible Initial									
Minimum Initial			5.8		5.8		5.8		5.8
Maximum Initial			18.8		22.2		18.8		16.8
Added Initial per Actuation			2.1		2.1		2.1		2.1
TIME WAITING GAP REDUCTION OPTIONS									
Passage Time			4.9	FUTURE	6.0	FUTURE	4.9	FUTURE	4.3
Minimum Gap			1.4		1.4		1.4		1.4
Time to Reduce to Minimum Gap			13.2		1.8		13.2		7.2
Reduce Gap Every			1.0		1.0		1.0		1.0
Reduce Gap Every Second By			0.3		2.4		0.3		0.4
Reduce Gap By			3.5		4.6		3.5		2.9
Locking Memory			X		X		X		X
Non-Locking Memory		X							
Flashing-Normal & Conflict Monitor		R	Y		R		Y		R
Start Up Phasing		R	G		R		G		R
Type of Detector Loop	Presence	X							
	Calling*						X		X
	Passage		X		X		X		X

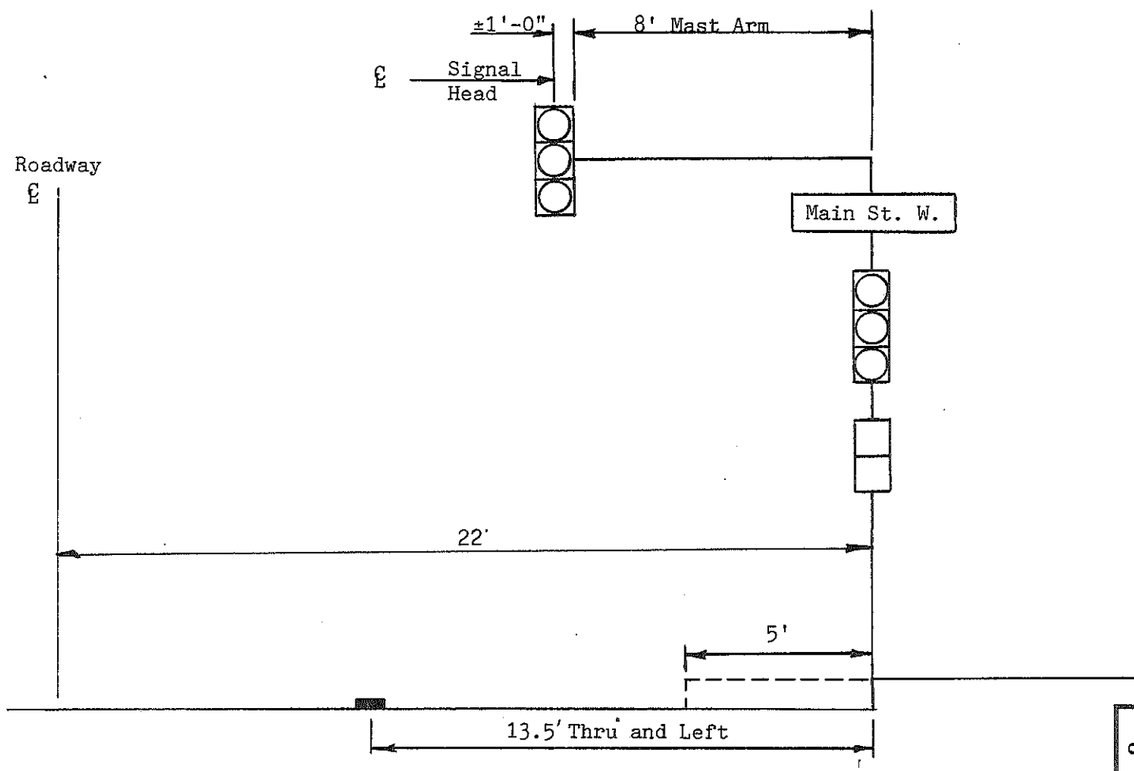
*Calling Loops shall place one call into the Controller on the Yellow or Red interval. Calling Loops shall be disconnected during the Green interval.

TRAFFIC CONTTOL SYSTEM
CONTROLLER SETTINGS

10th Ave SW (ND Hwy 6)
Mandan, ND



Sta. 734+44-37' Rt.
South Bound, North Approach
Cross Section



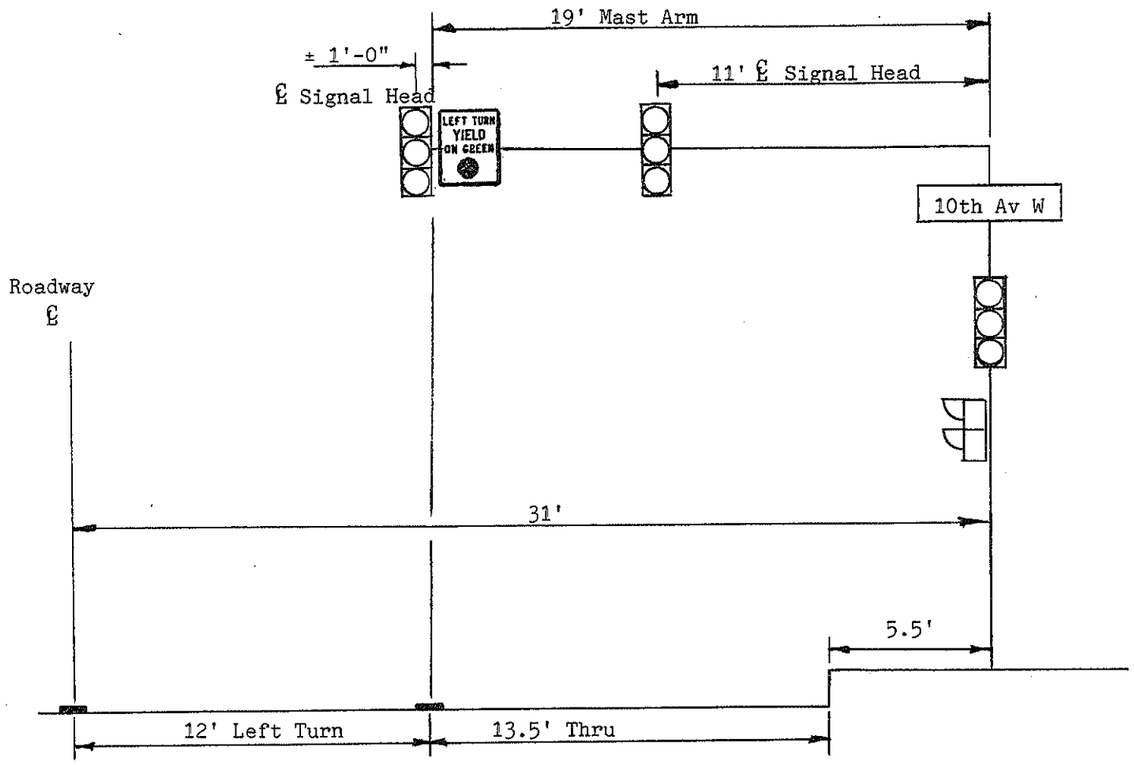
Sta. 735+00-42' Lt.
North Bound, South Approach
Cross Section

TRAFFIC CONTROL SYSTEM

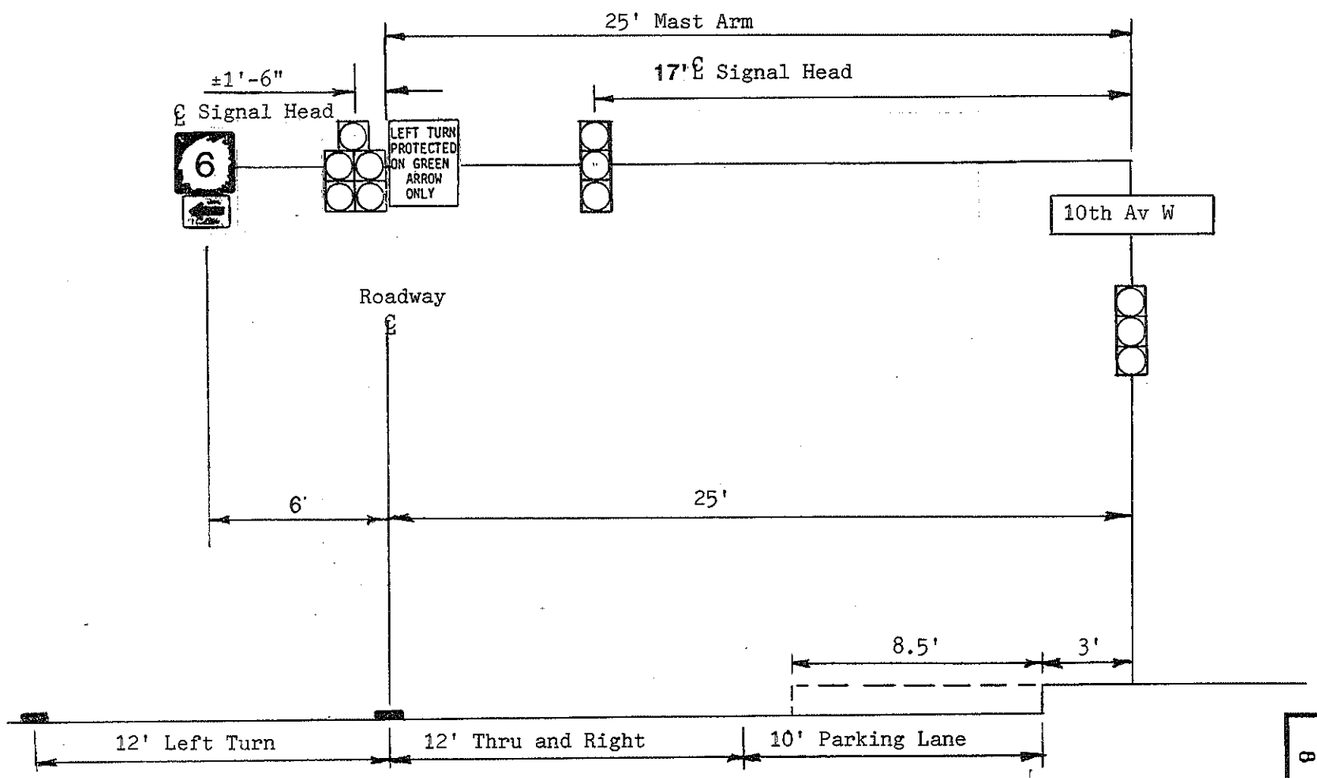
Signal Head & Mast Arm Location

10th Ave SW (ND Hwy 6)
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	92



Sta. 735+09-31' Rt.
Eastbound, West Approach
Cross Section



Sta. 734+30-25' Lt.
Westbound, East Approach
Cross Section

TRAFFIC CONTROL SYSTEM

Signal Head & Mast Arm Location

10th Ave Sw (ND Hwy 6)
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	93

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	94

QUANTITIES

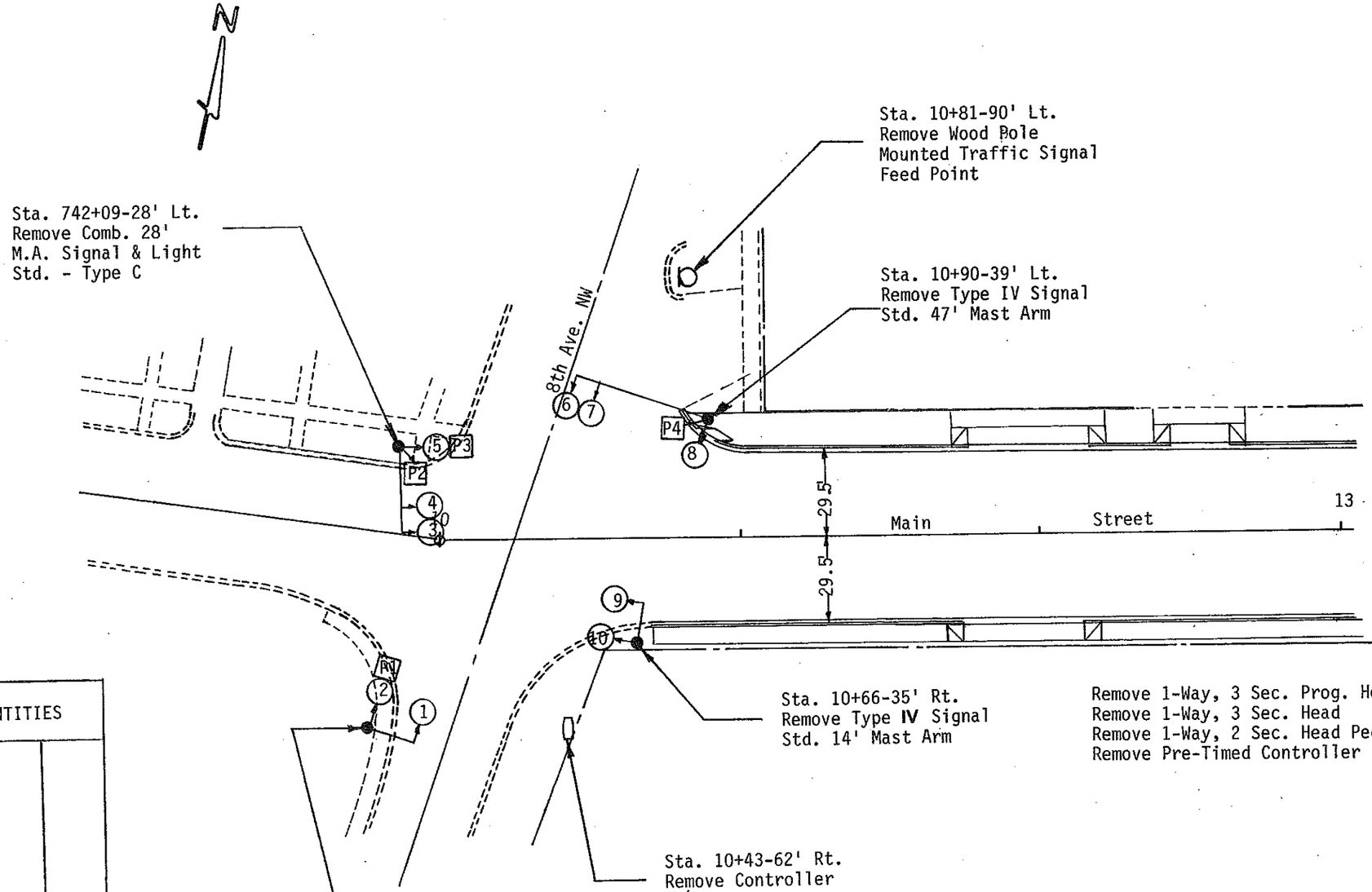
	Concrete Foundations-Traffic Signals	Pull Box	1" Dia. Rigid Conduit	2" Dia. Rigid Conduit	3" Dia. Rigid Conduit	4" Dia. Rigid Conduit	Underground Conductor No. 6 - Type RHW	Underground Conductor No. 6 - Type THW	Detector Loop Polyethylene Conduit Pre-wired	Preformed Loop Detector	Loop Lead-In Conductor	No. 12 AWG 2 Conductor Cable	No. 12 AWG 5 Conductor Cable (A)		No. 12 AWG 12 Conductor Cable	Saw Slot	Combo 8 ft. M.A. Signal and Light Std. - Type C	Type IV Signal Std. - 19 foot Mast Arm	Type IV Signal Std. - 24 Foot Mast Arm	Combo 25 Ft. M.A. Signal and Light Std. - Type C	1 Way, 3 Sec. Head W/12" Lenses - Mast Arm Mounted	1 Way, 3 Sec. Head W/12" Lenses - Post Mounted	1 Way, 2 Sec. Head Ped. Signal - Post Mounted	Volume Density Controller W/Ped. Timing	Pedestrian Push Button Post	1 Way, 5 Sec. Head W/12" Lenses Mast Arm Mounted							
	EA	EA	LF	LF	LF	LF	LF	LF	LF	EA	LF	LF	LF		LF	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA							
734+30-25' Lt.	1												104		48 (A)					1	1	1			1							
734+44-37' Rt.	1												62						1		1	1										
735+00-42' Rt.	1												46				1				1	1	1									
735+09-31' Rt.	1												91					1			2	1	1									
736+00-44' Rt.	1																						1									
735+13-33' Lt.																								1								
Var. Locations		7	487	718	202	61	364	182	204	7	1919	312			837	58																
TOTAL	5	7	487	718	202	61	364	182	204	7	1919	312	303		885	58	1	1	1	1	5	4	2	1	1	1							

(A) used for internal wiring of signal standards

TRAFFIC CONTROL SYSTEM
Summary of Quantities

Signals
10th Ave SW (ND Hwy 6)
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	95



QUANTITIES		
Remove Traffic Signal System		
EA		
1		

Remove 1-Way, 3 Sec. Prog. Head	1 EA
Remove 1-Way, 3 Sec. Head	9 EA
Remove 1-Way, 2 Sec. Head Ped. Signal	4 EA
Remove Pre-Timed Controller	1 EA

TRAFFIC CONTROL SYSTEM

Remove Traffic Signal System

8th Ave. NW & Main St.

Mandan, ND

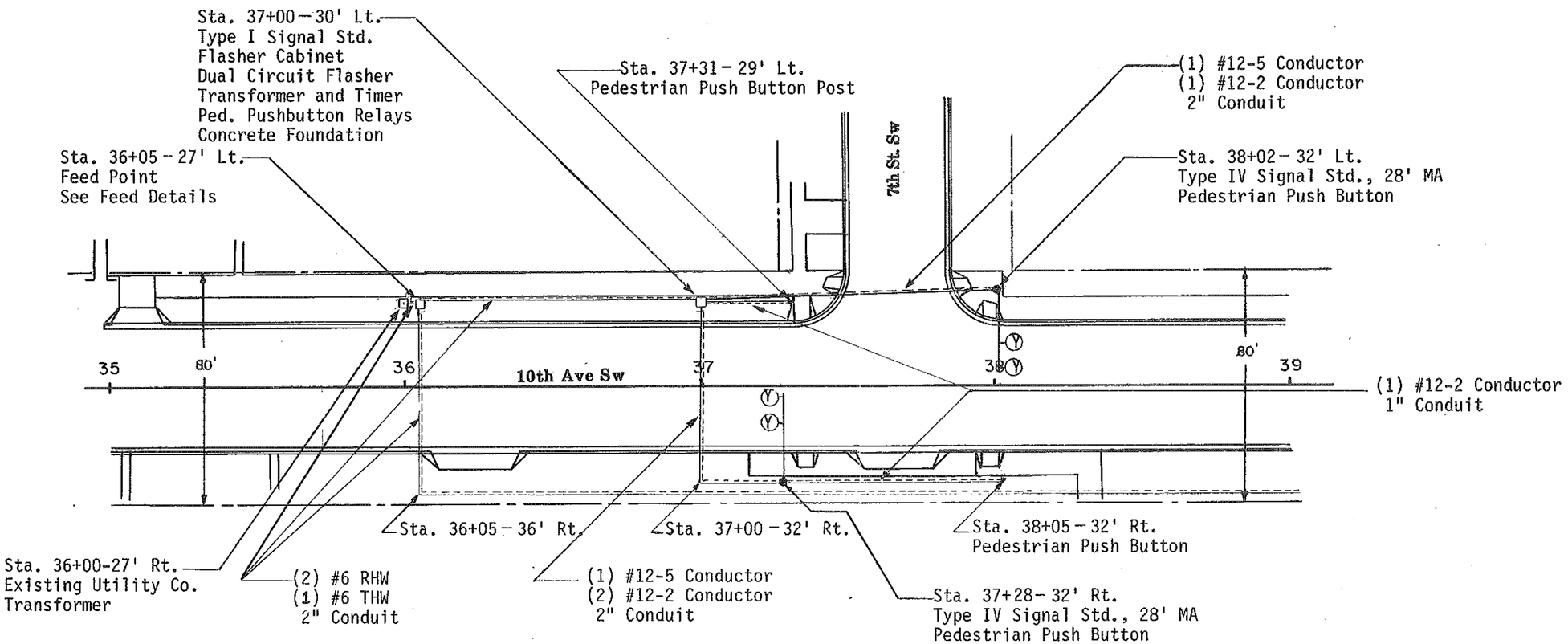
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	96

PEDESTRIAN PUSH BUTTON AND SIGN

Sta.	Dir. Facing	No.
37+28 Rt.	South	1 EA.
37+31 Lt.	South	1 EA.
38+02 Lt.	South	1 EA.
38+05 Rt.	North	1 EA.

FLASHING BEACON-MAST ARM MOUNTED

7th Street 1 EA



NOTE: The electrical connection at the Utility Co. transformer (Sta. 36+00-27' Rt.) shall be made by the Utility Company.

TRAFFIC CONTROL SYSTEM

Flashing Beacon
Conduit and Conductor Layout

10th Ave sw (ND Hwy 6)

Mandan N.D.

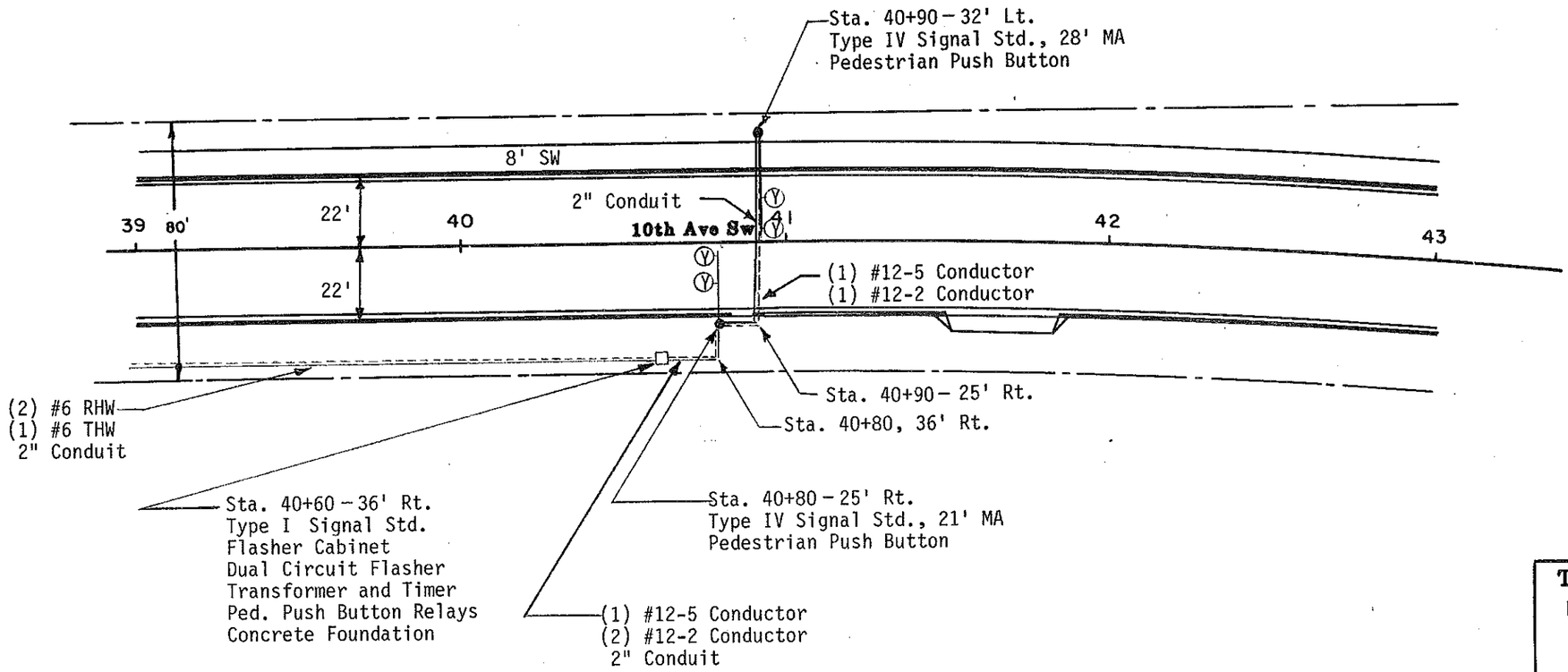
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	97

PEDESTRIAN PUSH BUTTON AND SIGN

Sta.	Dir. Facing	No.
40+80 – 25' Rt.	South	1 EA.
40+90 – 32' Lt.	North	1 EA.

FLASHING BEACON-MAST ARM MOUNTED

Sta. 40+85 1 EA



TRAFFIC CONTROL SYSTEM

Flashing Beacon

Conduit and Conductor Layout

10th Ave sw (ND Hwy 6)

Mandan N.D.

STATION	CONDUIT RUNS Length	Size	CABLE RUNS Length	Type
36+00-27' Lt. to 36+05-27' Lt.	13'	2"	50' 25'	(2) No. 6 Type RHW (1) No. 6 Type THW
36+05-27' Lt. to 37+00-30' Lt.	97'	2"	228' 114'	(2) No. 6 Type RHW (1) No. 6 Type THW
37+00-30' Lt. to 37+31-29' Lt.	29'	1"	48'	(1) 12-2 Conductor
37+00-30' Lt. to 38+02-32' Lt.	100'	2"	119' 116'	(1) 12-2 Conductor (1) 12-5 Conductor
37+00-30' Lt. to 37+00-32' Rt. to 37+28-32' Rt.	88'	2"	209'	(2) 12-2 Conductor (1) 12-5 Conductor
37+28-32' Rt. to 38+05-32' Rt.	75'	1"	88'	(1) 12-2 Conductor
36+05-27' Lt. to 36+05-36' Rt. to 40+60-36' Rt.	525'	2"	1092' 546'	(2) No. 6 Type RHW (1) No. 6 Type THW
40+60-36' Rt. to 40+80-36' Rt. to 40+80-25' Rt.	29'	2"	91' 45'	(2) 12-2 Conductor (1) 12-5 Conductor
40+80-25' Rt. to 40+90-25' Rt. to 40+90-32' Lt.	65'	2"	78' 77'	(1) 12-2 Conductor (1) 12-5 Conductor

SUMMARY OF QUANTITIES (A)

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	F-1-006(005)066	98

	No. 12 AWG 2 Conductor Cable	No. 12 AWG 5 Conductor Cable	No. 6 Type RHW Conductor	No. 6 Type THW Conductor	2 In. Dia. Rigid Conduit	1 In. Dia. Rigid Conduit	Concrete Foundation - Traffic Signals	Type IV Signal Std. - 21' M.A. w/Pushbutton	Type IV Signal Std. - 28' M.A. w/Pushbutton	8" Flashing Beacon Heads	Type I Signal Std.	Switch Box	Pedestrian Pushbutton Post	Flasher Cabinet	Dual Circuit Flasher and Reset Timer	Transformer and Pedestrian Pushbutton Relays	Feed Point Std. and Meter Trim				
	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA				
36+05-27' Lt.												2					1				
37+00-30' Lt.							1				1			1	1	1					
37+28-32' Rt.		51(B)					1		1	2											
37+31-29' Lt.													1								
38+02-32' Lt.		51(B)					1		1	2											
38+05-32' Rt.													1								
40+60-36' Rt.							1				1			1	1	1					
40+80-25' Rt.		44(B)					1	1		2											
40+90-32' Lt.		51(B)					1		1	2											
Var. Loc.	633	342	1370	685	913	104															
Total	633	539	1370	685	913	104	6	1	3	8	2	2	2	2	2	2	1				

(A) These items are not to be bid separately, but shall be included in the price bid for the item "Flashing Beacon - Mast Arm Mounted."

(B) Used for internal wiring of signal standard.

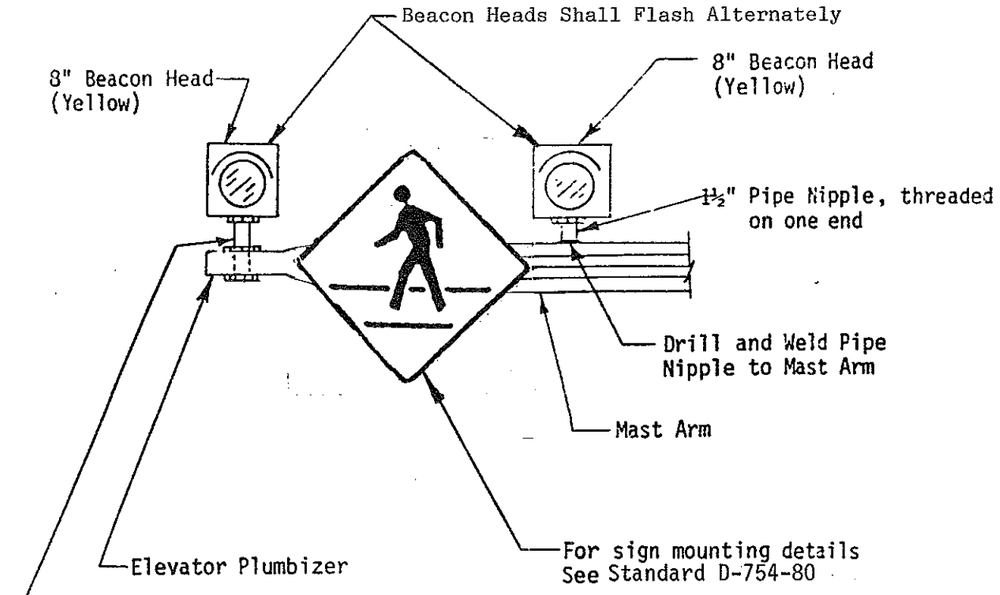
TRAFFIC CONTROL SYSTEM

FLASHING BEACON QUANTITIES

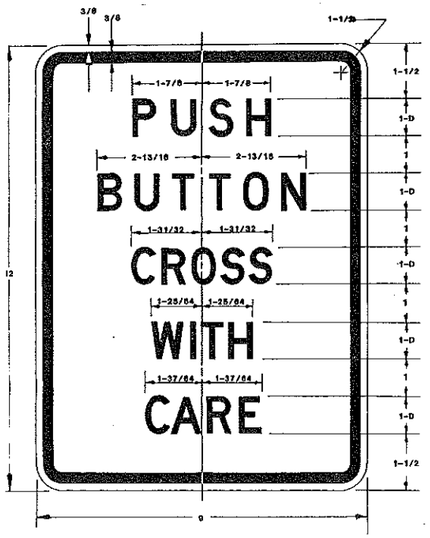
10TH AVENUE S.W.
(N.D. HWY. 6)

MANDAN, ND

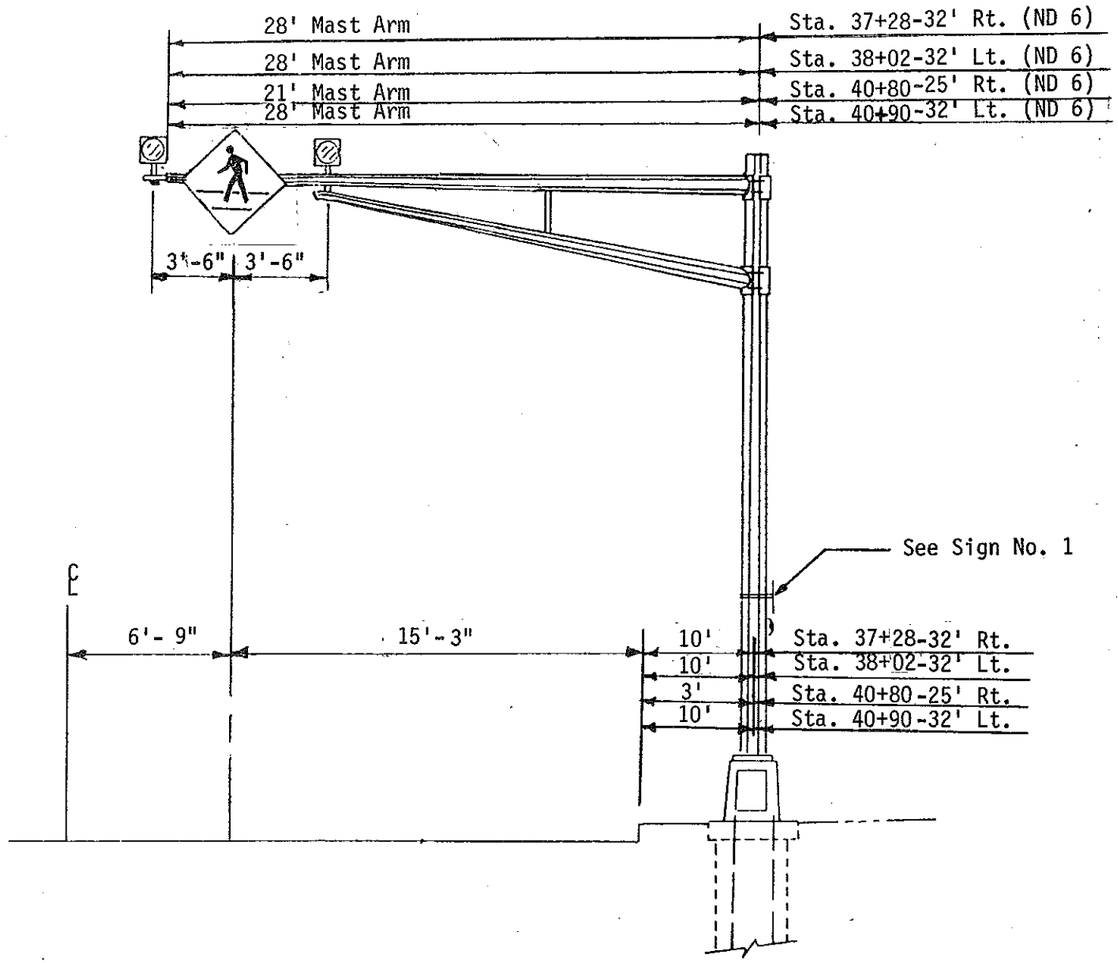
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	99



1½" Pipe Nipple threaded on both ends, length as required so both beacon heads are mtd. at the same elevation.



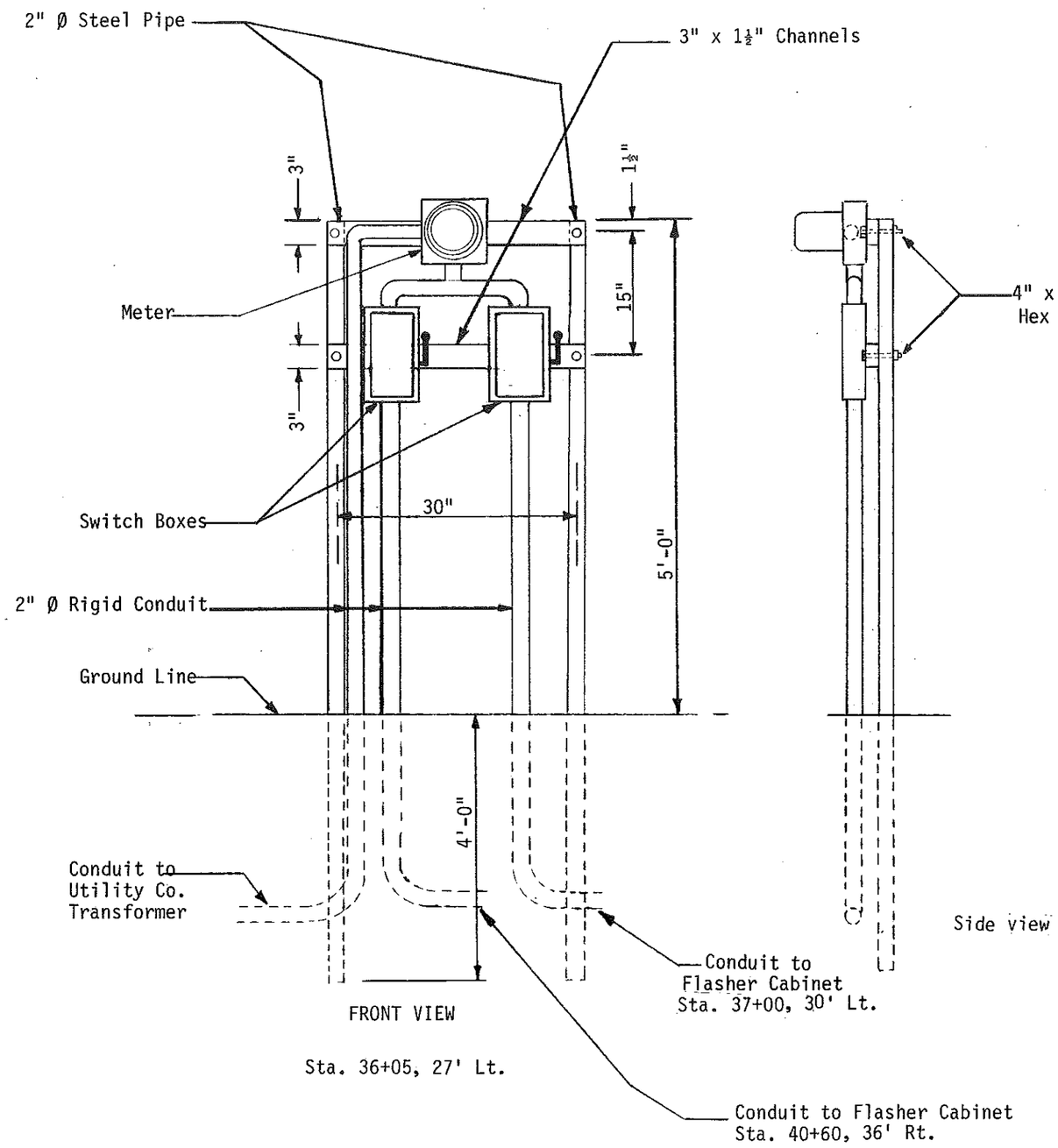
Sign No. 1
Area = .75 S.F.
Sta. 37+28 Rt., 37+31 Lt.,
38+02 Lt., 38+05 Rt.,
40+80 Rt., and 40+90 Lt.

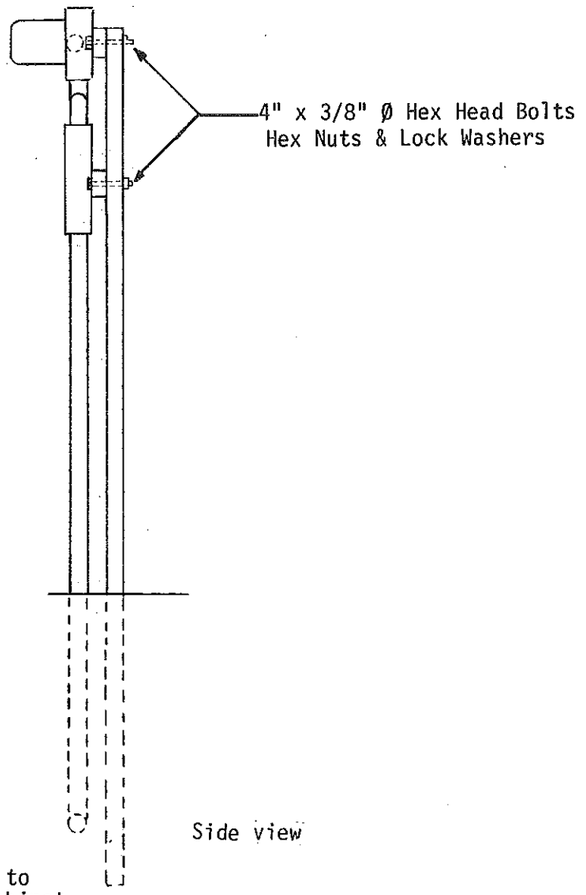


TRAFFIC CONTROL SYSTEM

Flashing Beacon Details
Sta. 37+28 Rt. & 38+02 Lt.
Sta. 40+80 Rt. & 40+90 Lt.
10th Avenue SW (ND 6)
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	100





TRAFFIC CONTROL SYSTEM
Feed Point Details
Flashing Beacons

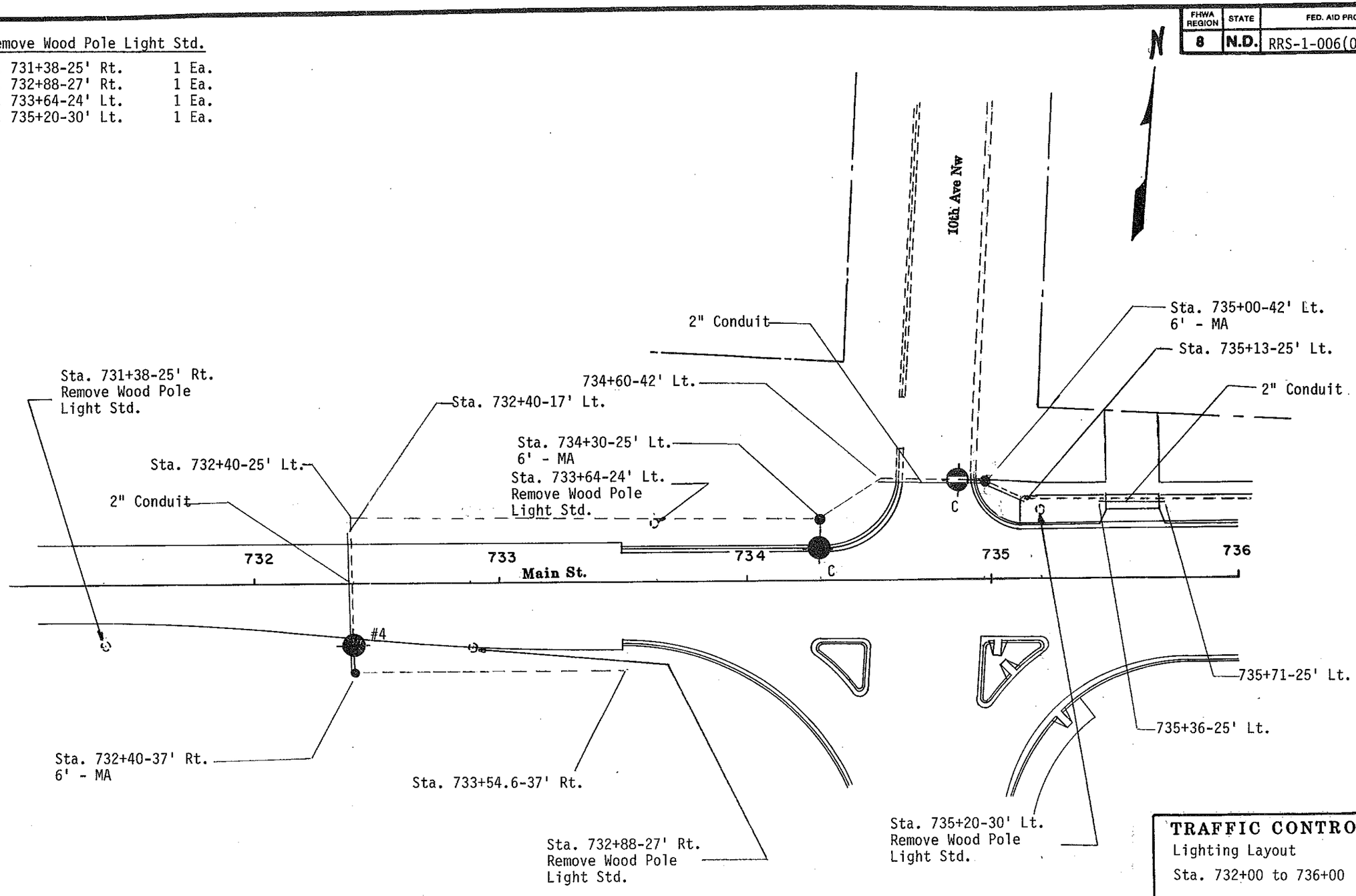
10th Ave. S.W. (ND Hwy. 6)
Mandan, ND

512645

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	101

Remove Wood Pole Light Std.

Sta. 731+38-25' Rt. 1 Ea.
Sta. 732+88-27' Rt. 1 Ea.
Sta. 733+64-24' Lt. 1 Ea.
Sta. 735+20-30' Lt. 1 Ea.



TRAFFIC CONTROL SYSTEM

Lighting Layout

Sta. 732+00 to 736+00

Main St.

10th Ave sw (ND Hwy 6)

Mandan N.D.

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	RRS-1-006(005)066	102

STATION	CONDUIT RUNS		CABLE TRENCH	CABLE RUNS	
	Length	Size	Length	Length	Type
Sta. 733+55-37.0' Rt. to 732+40-37.0' Rt.			114	244 122	2-No.6 RHW 1-No.6 THW
Sta. 732+40-37.0' Rt. to 732+40-17.0' Lt.	53	2"		116 58	2-No.6 RHW 1 No.6 THW
Sta. 732+40-17.0' Lt. to 732+40-25' Lt.			8	16 8	2-No.6 RHW 1-No.6 THW
Sta. 732+40-25.0' Lt. to 734+30-25.0' Lt.			189	394 197	2-No.6 RHW 1-No.6 THW
Sta. 734+30-25.0' Lt. to 734+60-42.0' Lt.			33	82 41	2-No.6 RHW 1-No.6 THW
Sta. 734+60-42.0' Lt. to 735+00-42.0' Lt.	39	2"		88 44	2-No.6 RHW 1-No.6 THW
Sta. 735+00-42.0' Lt. to 735+13-25.0' Lt.	20	2"		50 25	2-No.6 RHW 1-No.6 THW
Sta. 735+13-25.0' Lt. to 735+36-25.0' Lt.			23	46 23	2-No.6 RHW 2-No.6 THW
Sta. 735+36-25.0' Lt. to 735+71.-25.0' Lt.	35	2"		70 35	2-No.6 RHW 1-No.6 THW
Sta. 735+71-25.0' Lt. to 736+00-25.0' Lt.			29	58 29	2-No.6 RHW 1-No.6 THW

QUANTITIES

Concrete Foundation Highway Lighting	Cable Trench Type I	Underground Conductor No.6 Type RHW	Underground Conductor No.6 Type THW	2" Dia. Rigid Conduit	H.P. Sodium Vapor Luminaire 200 Watt	Light Standard 6 Ft. MA 45.5 Ft. Pole	H.P. Sodium Vapor Luminaire 250 Watt	Remove Wood Pole Light Standard	
EA	LF	LF	LF	LF	EA	EA	EA	EA	
1	396	1164	582	147	1	1	2	4	

NO.	STATION	OFFSET	WATTAGE	CIRCUIT	IES-TYPE	POLE HT.
4	732+40	37' Rt.	250	A	MSC-III	45.5
G	734+30	25' Lt.	250	A	MSC-III	40
C	735+00	42' Lt.	200	A	MSC-III	40

TRAFFIC CONTROL SYSTEM
Lighting Quantities
Sta. 732+00 to 736+00

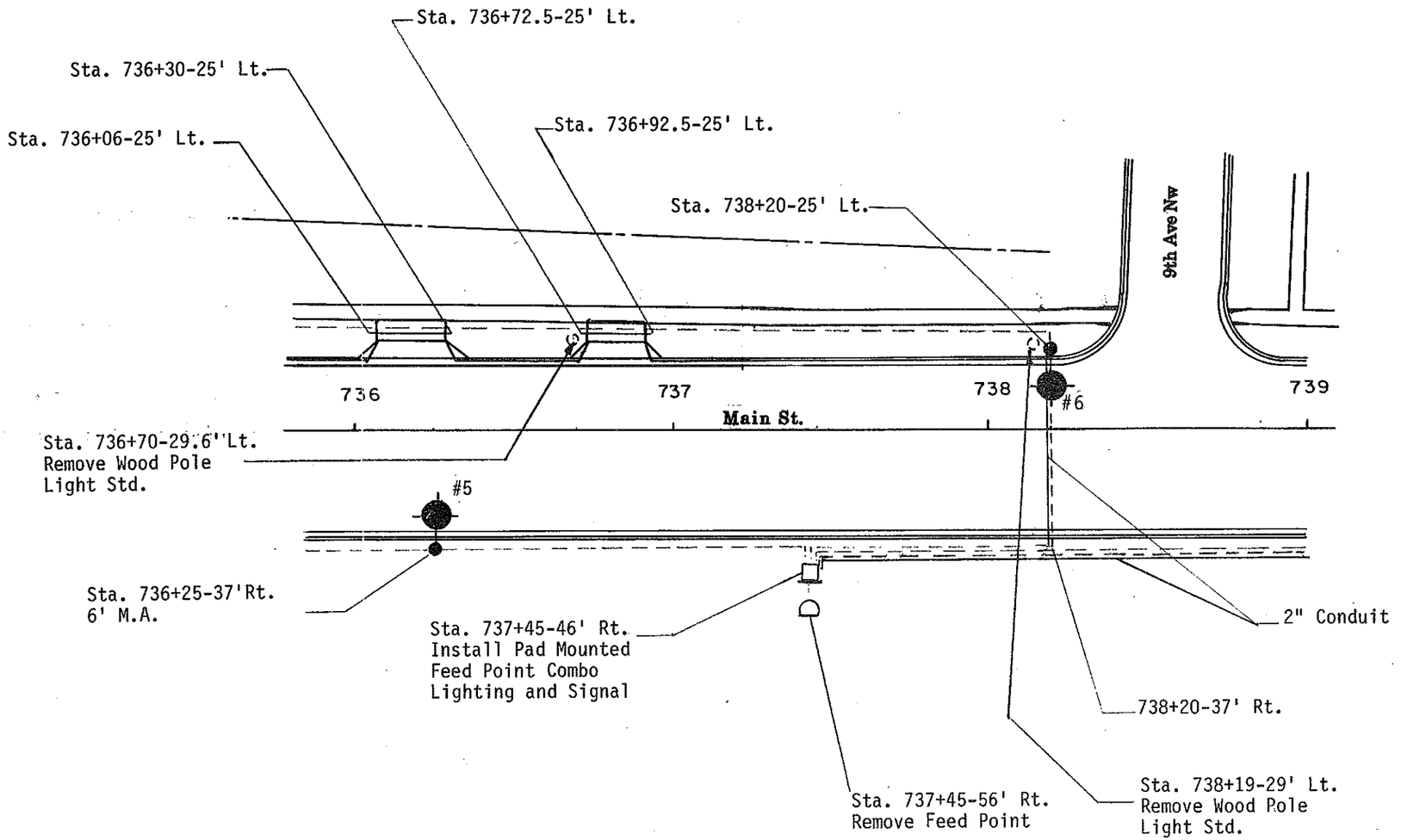
Main St.

Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	103

Remove Wood Pole Light Std.

Sta. 736+70-29.6' Lt. 1 Ea.
Sta. 738+19-29' Lt. 1 Ea.



TRAFFIC CONTROL SYSTEM

Lighting Layout

Sta. 736+00 to 739+00

Main St.

10th Ave sw (ND Hwy 6)
Mandan N.D.

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	RRS-1-006-(005)066	104

STATION	CONDUIT RUNS		CABLE TRENCH	CABLE RUNS	
	Length	Size	Length	Length	Type
Sta. 736+00-25.0' Lt. to 736+06-25.0' Lt.			6	12 6	2-No.6 RHW 1-No.6 THW
Sta. 736+06-25.0' Lt. to 736+30-25.0' Lt.	24	2"		48 24	2-No.6 RHW 1-No.6 THW
Sta. 736+30-25.0' Lt. to 736+73-25.0' Lt.			43	86 43	2-No.6 RHW 1-No.6 THW
Sta. 736+73-25.0' Lt. to 736+93-25.0' Lt.	20	2"		40 20	2-No.6 RHW 1-No.6 THW
Sta. 736+93-25.0' Lt. to 738+20-25.0' Lt.			126	268 134	2-No.6 RHW 1-No.6 THW
Sta. 738+20-25.0' Lt. to 738+20-37.0' Rt.	61	2"		132 66	2-No.6 RHW 1-No.6 THW
Sta. 736+00-37.0' Rt. to 736+25-37.0' Rt.			24	64 32	2-No.6 RHW 1-No.6 THW
Sta. 736+25-37.0' Rt. to 737+45-37.0' Rt.			119	254 127	2-No.6 RHW 1-No.6 THW
Sta. 737+45-37.0' Rt. to 737+45-46.0' Rt.			8	114 57	6-No.6 RHW 3-No.6 THW
Sta. 737+45-37.0' Rt. to 738+20-37.0' Rt.			75	300 150	4-No.6 RHW 2-No.6 THW
Sta. 738+20-37.0' Rt. to 739+00-37.0' Rt.			80	160 80	2-No.6 RHW 1-No.6 THW
Sta. 737+45-46' Rt. to 737+45-37' Rt. to 739+00-37' Rt.	163	2"		522 174	3-No.8 RHW 1-No.6 THW

	QUANTITIES										
Underground Conductor No.8 Type RHW	Concrete Foundation Highway Lighting	Cable Trench Type I	Underground Conductor No.6 Type RHW	Underground Conductor No.6 Type THW	2" Dia. Rigid Conduit	Light Standard 6 Ft. MA 40 Ft. Mt. Ht.	H.P. Sodium Vapor Luminaire 250 Watt	Feed Point Combo Lighting & Signal Pad Mounted	Concrete Foundation Feed Point - Type B	Remove Wood Pole Light Standard	Remove Feed Point
LF	EA	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA
522	2	521	1478	913	268	2	2	1	1	2	1

NO.	STATION	OFFSET	WATTAGE	CIRCUIT	IES-TYPE	POLE HT.
5	736+25	37' Rt.	250	A	MSC-III	40
6	738+20	25' Rt.	250	A	MSC-III	40

TRAFFIC CONTROL SYSTEM

Lighting Quantities

Sta. 736+00 to 739+00

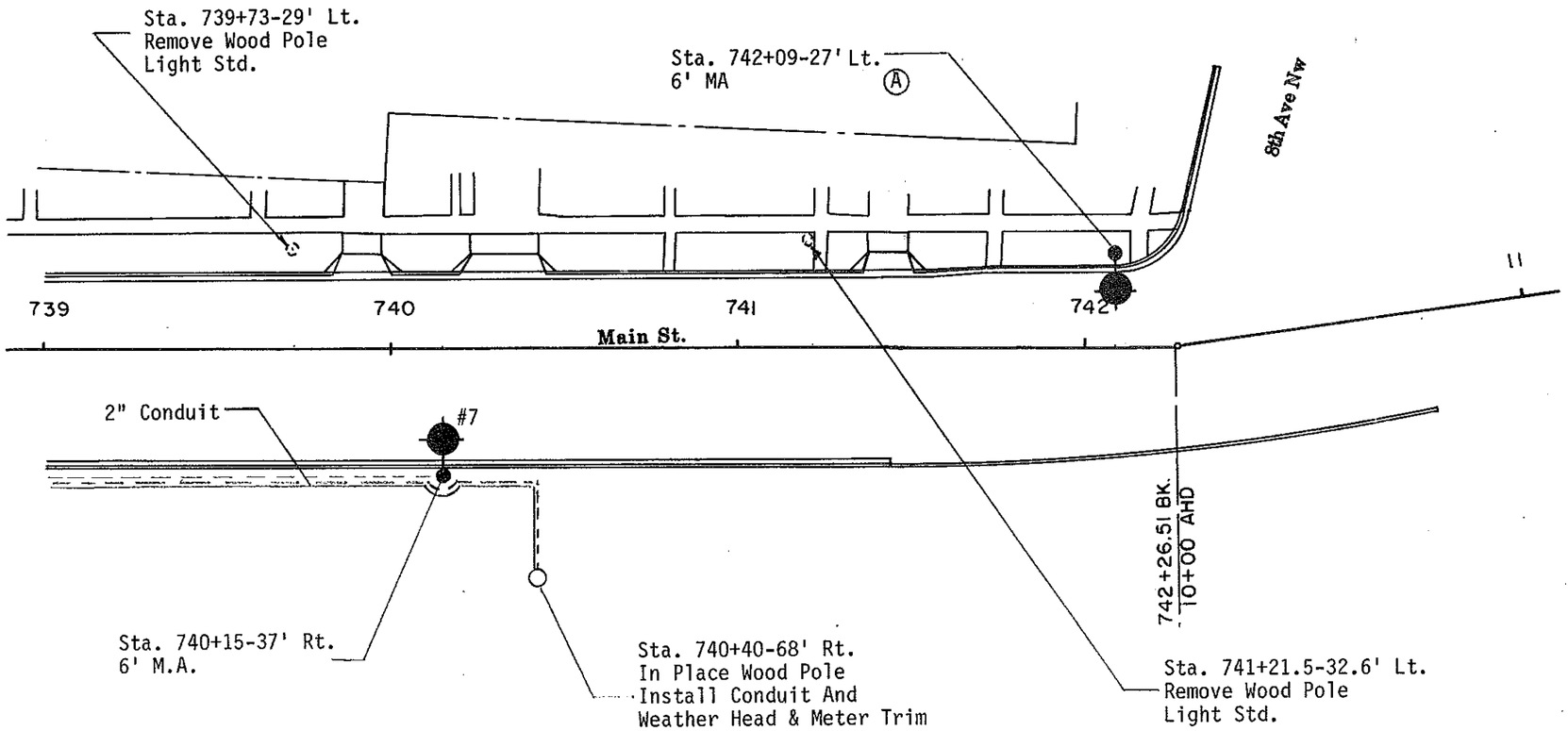
Main St.

Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	105

Remove Wood Pole Light Std.

Sta. 739+73-29' Lt. 1 Ea.
Sta. 741+21.5-32.6' Lt. 1 Ea.



Ⓐ The contractor shall locate the existing conductor and salvage sufficient wire to make the connection to provide continuity

TRAFFIC CONTROL SYSTEM

Lighting Layout

739+00 to 11+00

Main Av.

10th Ave sw (ND Hwy 6)
Mandan N.D.

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	RRS-1-006(005)066	106

STATION	CONDUIT RUNS		CABLE TRENCH	CABLE RUNS	
	Length	Size	Length	Length	Type
Sta. 739+00-37.0' Rt. to 740+15-37.0' Rt.			114	244 122	2-No.6 RHW 1-No.6 THW
Sta. 739+00-37.0' Rt. to 740+40-68' Rt.	25	2"	55	504 177	3-No.8 RHW 1-No.6 THW

QUANTITIES

Concrete Foundation Highway Lighting	Cable Trench Type I	Underground Conductor No.6 Type RHW	Underground Conductor No.6 Type THW	Light Standard 6 Ft. MA 40 F Mt. Ht.	H.P. Sodium Vapor Luminaire 250 Watt	Remove Wood Pole Light Standard	Underground Conductor No.8 Type RHW	2 Inch Dia. Rigid Conduit	
EA	LF	LF	LF	EA	EA	EA	LF	LF	
2	114	244	299	2	2	2	504	195	

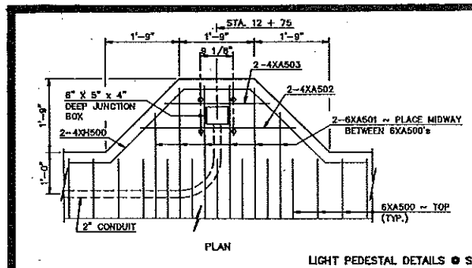
NO.	STATION	OFFSET	WATTAGE	CIRCUIT	IES-TYPE	POLE HT.
7	740+15 742+09	37' Rt. 27' Lt.	250 250	A	MSC-III MSC-III	40 40

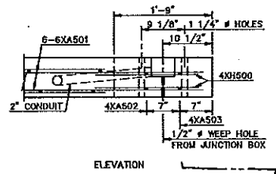
TRAFFIC CONTROL SYSTEM
Lighting Quantities
Sta. 739+00 to 742+25.51

Main Av

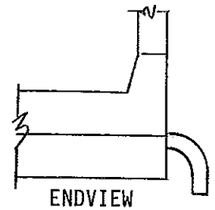
Mandan, ND

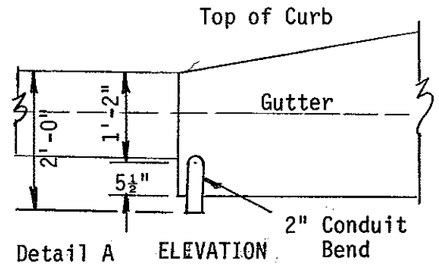
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	107

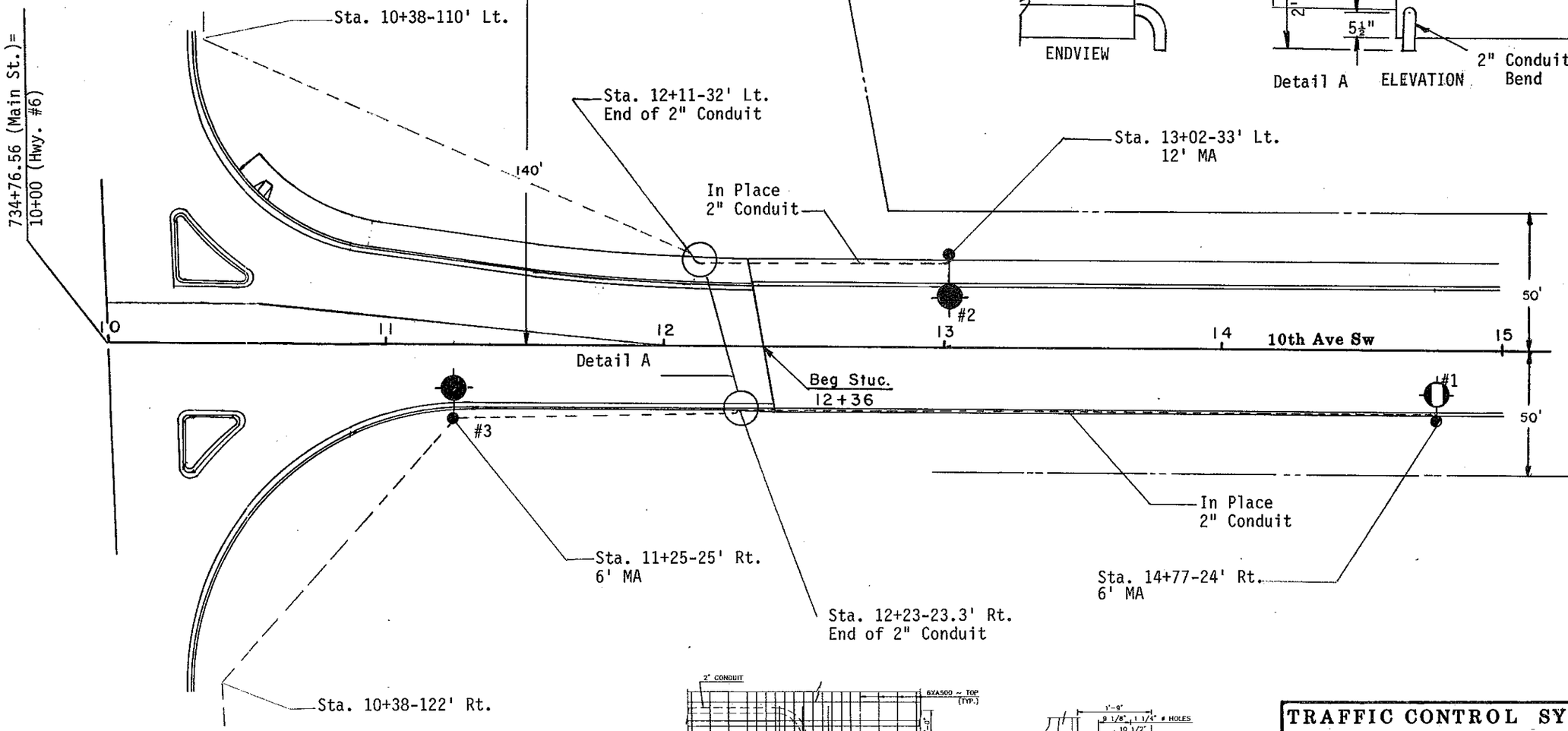


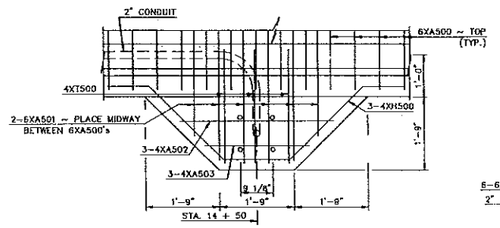


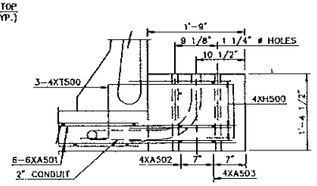
LIGHT PEDESTAL DETAILS @ STA. 13+02











LIGHT PEDESTAL DETAILS @ STA. 14+77

TRAFFIC CONTROL SYSTEM

Lighting Layout

Sta. 10+00 to 15+00

10th Ave sw (ND Hwy 6)
Mandan N.D.

512845

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	RRS-1-006(005)066	103

STATION	CONDUIT RUNS		CABLE TRENCH	CABLE RUNS	
	Length	Size	Length	Length	Type
Sta. 14+77-24.0' Rt.				516	2-No.6 RHW
to 12+23-23.3' Rt.				258	1-No.6 THW
Sta. 12+23-23.3' Rt.			97	210	2-No.6 RHW
to 11+25-25.0' Rt.				105	1-No.6 THW
Sta. 11+25-25.0' Rt.			129	274	2-No.6 RHW
to 10+38-122. Rt.				137	1-No.6 THW
Sta. 13+02-33.0' Lt.				190	2-No.6 RHW
to 12+11-32.0' Lt.				95	1-No.6 THW
Sta. 12+11-32.0' Lt.			190	380	2-No.6 RHW
to 10+38-110.' Lt.				190	1-No.6 THW

QUANTITIES									
Concrete Foundation Highway Lighting	Cable Trench Type I	Underground Conductor No.6- Type RHW	Underground Conductor No.6- Type THW	Light Standard 6 Ft. MA 40 Ft. Mt. Ht.	Light Standard 12 Ft. MA 40 Ft. Mt. Ht.	H.P. Sodium Vapor Luminaire - 200 Watt	H.P. Sodium Vapor Luminaire 250 Watt		
EA	LF	LF	LF	EA	EA	EA	EA		
1	416	1570	785	2	1	1	2		

NO.	STATION	OFFSET	WATTAGE	CIRCUIT	IES-TYPE	POLE HT.
1	14+77	24' Rt.	200	A	MSC-III	40
2	13+02	33' Lt.	250	A	MSC-III	40
3	11+25	25' Rt.	250	A	MSC-III	40

TRAFFIC CONTROL SYSTEM

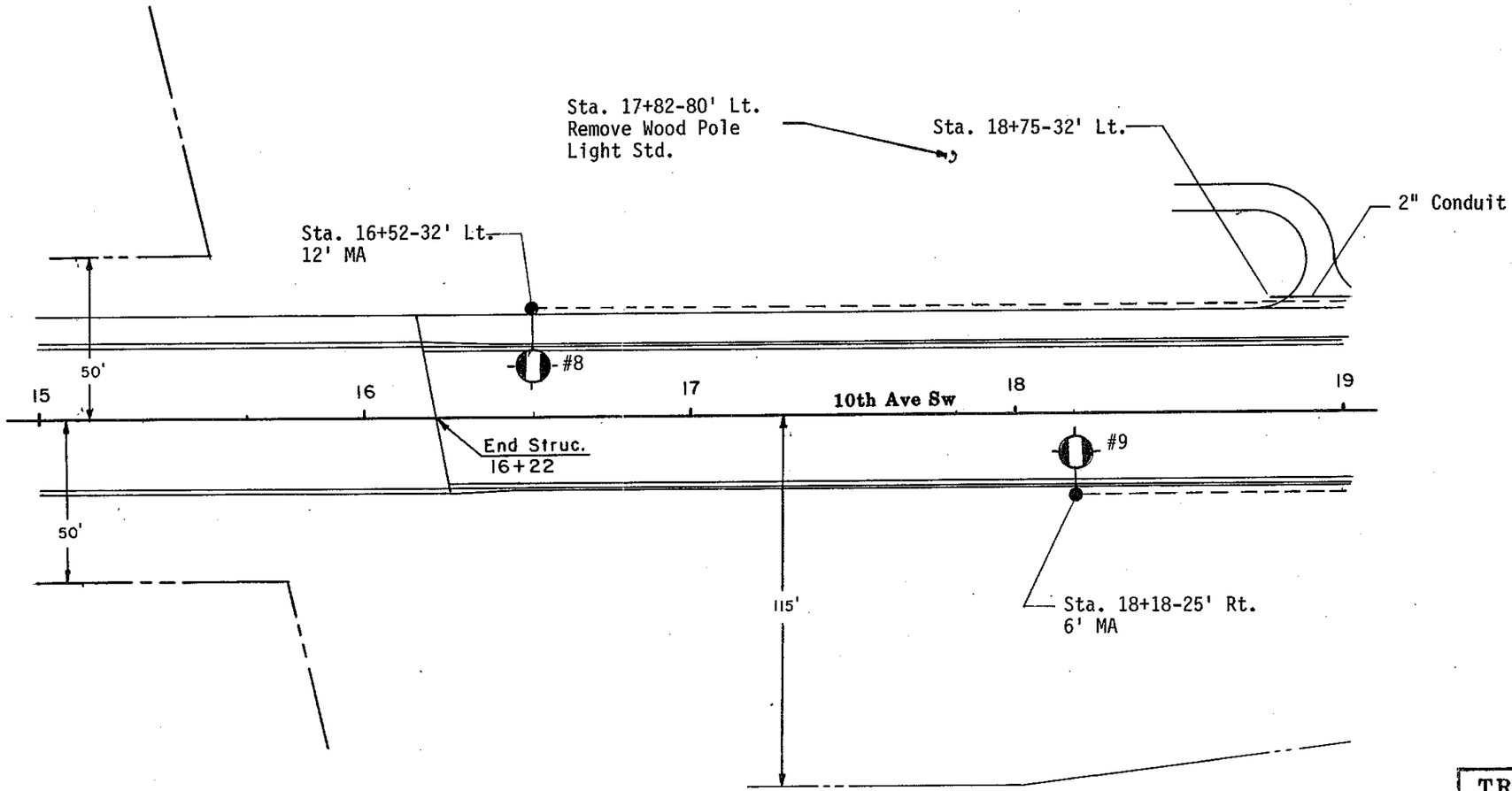
Lighting Quantities
Sta. 10+00 to 15+00

10th Ave. S.W. (ND #6)
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	109

Remove Wood Pole Light Std.

Sta. 17+82-80' Lt. 1 Ea.



TRAFFIC CONTROL SYSTEM

Lighting Layout

Sta. 15+00 to 19+00

10th Ave sw (ND Hwy 6)
Mandan N.D.

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	RRS-1-006(005)066	110

STATION	CONDUIT RUNS		CABLE TRENCH	CABLE RUNS	
	Length	Size	Length	Length	Type
Sta. 16+52-32.0' Lt.			222	460	2-No.6 RHW
to 18+75-32.0' Lt.				230	1-No.6 THW
Sta. 18+75-32.0' lt.	25	2		50	2-No.6 RHW
to 19+00-32.0' Lt.				25	1-No.6 THW
Sta. 18+18-25.0' Rt.			81	178	2-No.6 RHW
to 19+00-25.0' Rt.				89	1 No.6 THW

QUANTITIES

Concrete Foundation Highway Lighting	Cable Trench Type I	Underground Conductor No.6 Type RHW	Underground Conductor No.6 Type THW	2 Inch Dia. Rigid Conduit	Light Standard 6 Ft. MA 40 Ft. Mt. Ht.	Light Standard 12 Ft. MA 40 Ft. Mt. Ht.	H.P. Sodium Vapor Luminaire 200 Watt	Remove Wood Pole Light Standard	
EA	LF	LF	LF	LF	EA	EA	EA	EA	
2	303	688	344	25	1	1	2	1	

NO.	STATION	OFFSET	WATTAGE	CIRCUIT	IES-TYPE	POLE HT.
8	16+52	32' Lt.	200	B	MSC-III	40
9	18+18	25' Rt.	200	B	MSC-III	40

TRAFFIC CONTROL SYSTEM
Lighting Quantities
Sta. 15+00 - 19+00

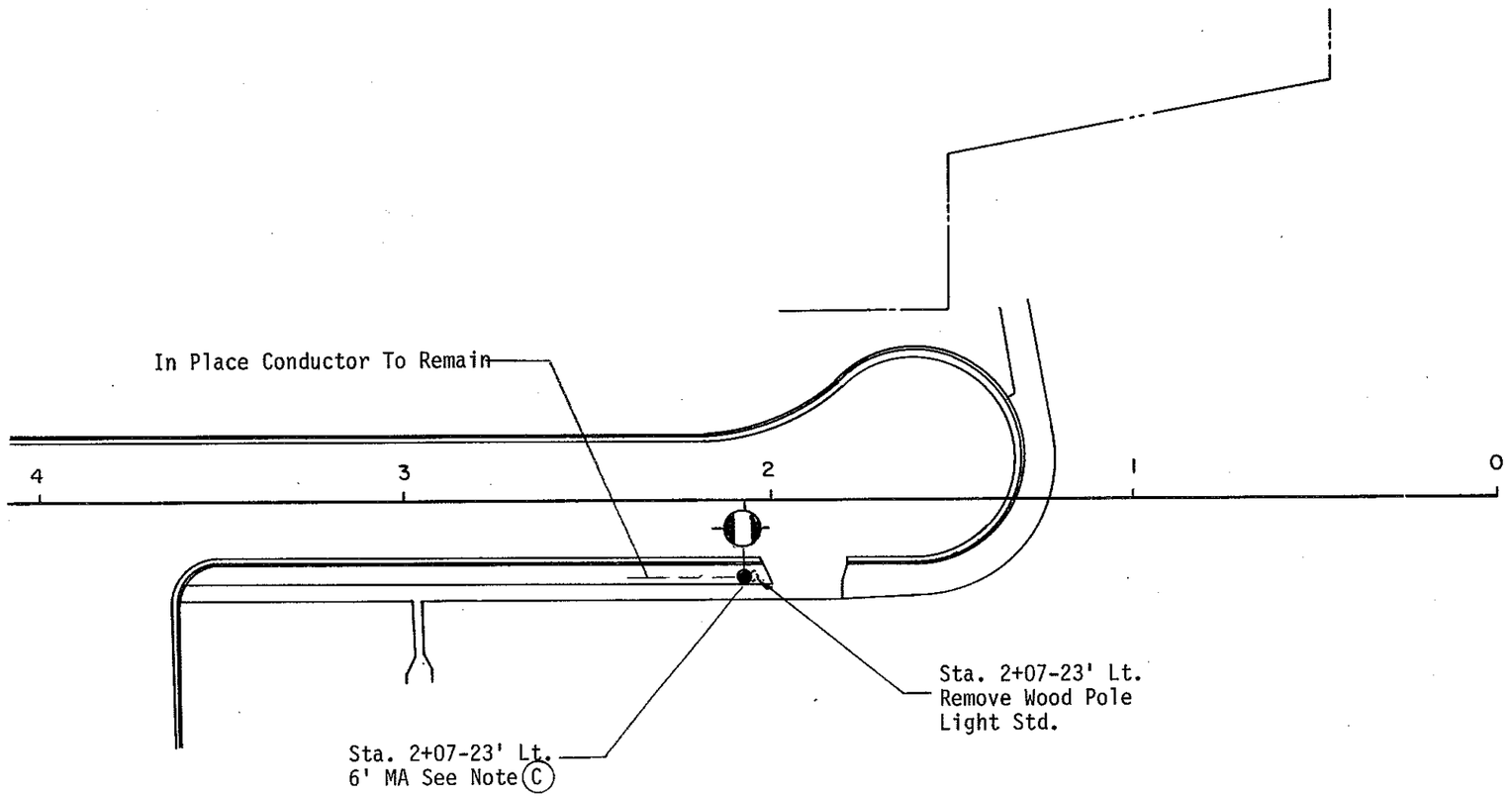
10th Ave. S.W. (ND Hwy. 6)
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	111

Remove Wood Pole Light Std.

Sta. 2+07-23' Lt. 1 Ea.

Note: (C) The contractor shall locate the in place conductors and salvage sufficient cable to make the necessary connections to provide continuity.



TRAFFIC CONTROL SYSTEM

Lighting Layout

1st St. sw
Mandan N.D.

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	RRS-1-006(005)066	112

STATION	CONDUIT RUNS		CABLE TRENCH	CABLE RUNS	
	Length	Size	Length	Length	Type

QUANTITIES									
Light Standard 6' MA 40 Ft. Mt. Ht.	H.P. Sodium Vapor Luminaire 200 Watt	Remove Wood Pole Light Std.	Concrete Foundation Highway Lighting						
EA	EA	EA	EA						
1	1	1	1						

NO.	STATION	OFFSET	WATTAGE	CIRCUIT	TYPE	POLE HT.
	2+07	23' Lt.	200		V	40

TRAFFIC CONTROL SYSTEM

Lighting Quantities

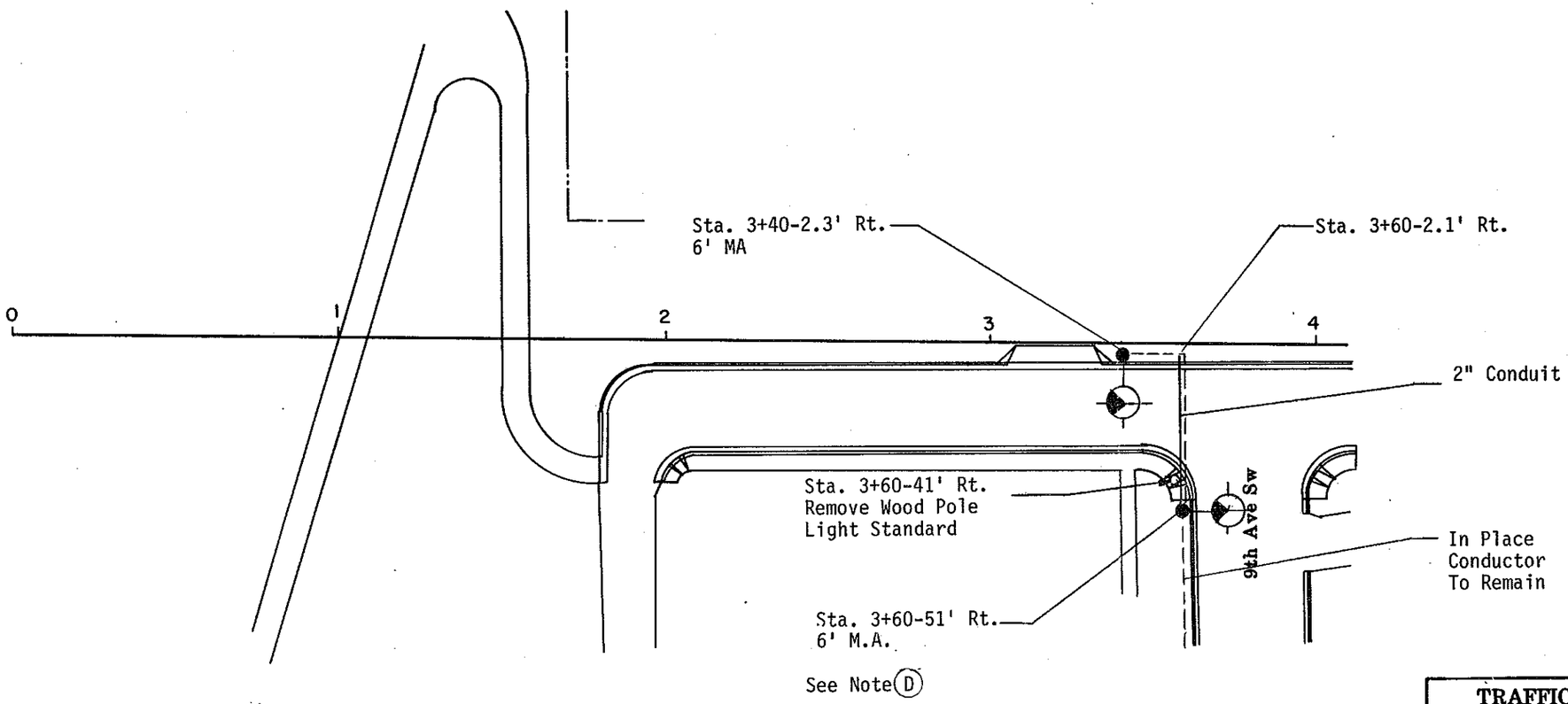
1st St. S.W.
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	113

Note (D): The contractor shall locate the in place conductor and salvage sufficient cable to make the necessary connections to provide continuity.

Remove Wood Pole Light Std.

Sta. 3+60-41' Rt. 1 EA



TRAFFIC CONTROL SYSTEM

Lighting Layout

1st St. sw & 9th Ave sw
Mandan N.D,

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	RRS-1-006(005)066	114

STATION	CONDUIT RUNS		CABLE TRENCH	CABLE RUNS	
	Length	Size	Length	Length	Type
Sta. 3+40-2.3' Rt. to 3+60-2.1' Rt.			19	48 24	2-No.6 RHW 1-No.6 THW
Sta. 3+60-2.1' Rt. to 3+60-51' Rt.	48	2"		118 59	2-No.6 RHW 1-No.6 THW

QUANTITIES									
Concrete Foundation Highway Lighting	Cable Trench Type I	Underground Conductor No.6 Type RHW	2" Dia. Rigid Conduit	Light Standard 6' MA 40 Ft. Mt. Ht.	H.P. Sodium Vapor Luminaire 100 Watt	Light Standard 6' M.A. 30 Ft. Mt. Ht.	Underground Conductor No.6 Type THW	Remove Wood Pole Light Standard	
EA	LF	LF	LF	EA	EA	EA	LF	EA	
2	19	166	48	1	2	1	83	1	

NO.	STATION	OFFSET	WATTAGE	CIRCUIT	IES-TYPE	POLE HT.
	3+40 3+60	2.3' Rt. 51' Rt.	100 100		MSC-II MSC-II	40 30

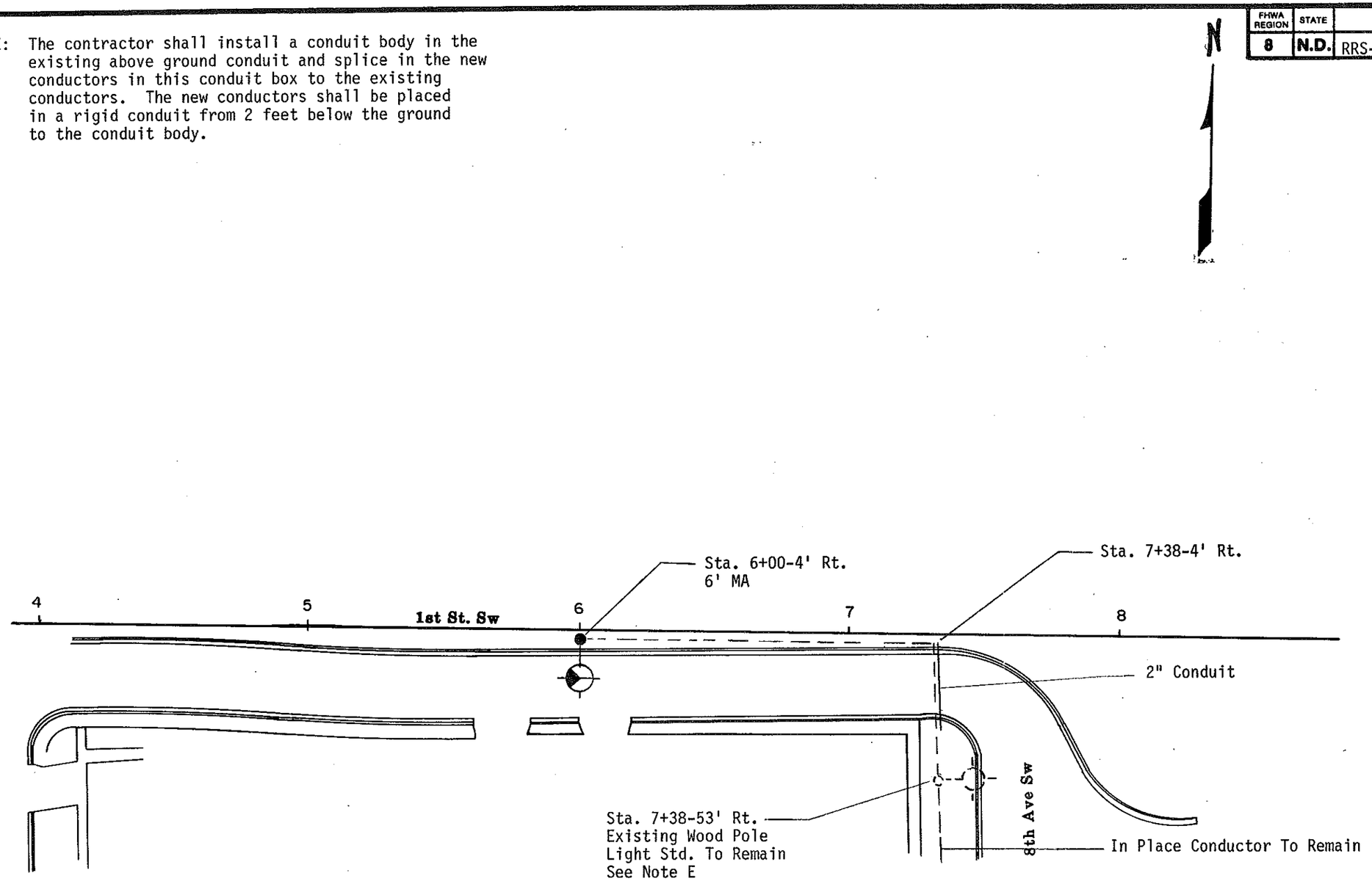
TRAFFIC CONTROL SYSTEM

Lighting Quantities

1st St. S.W. & 9th Ave S.W.
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	115

Note E: The contractor shall install a conduit body in the existing above ground conduit and splice in the new conductors in this conduit box to the existing conductors. The new conductors shall be placed in a rigid conduit from 2 feet below the ground to the conduit body.



TRAFFIC CONTROL SYSTEM

Lighting Layout

1st St. sw & 8th Ave sw
Mandan N.D.

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	RRS-1-006(005)066	116

STATION	CONDUIT RUNS		CABLE TRENCH	CABLE RUNS	
	Length	Size	Length	Length	Type
Sta. 6+00-4' Rt.			138	284	2-No. 6 RAW
To 7+38-4' Rt.				142	1-No. 6 THW
Sta. 7+38-4' Rt.	48	2"		118	2-No. 6 RHW
To 7+38-53' Rt				59	1-No. 6 THW

QUANTITIES									
Concrete Foundation Highway Lighting	Cable Trench Type I	Underground Conductor No. 6 Type RHW	2 Inch Dia. Rigid Conduit	Light Standard 6FT. M.A. 40 FT. MT. HT.	H. P. Soduim Vapor Luminaire 100 WATT	Underground Conductor No. 6 Type THW			
EA	LF	LF	LF	EA	EA	LF			
1	138	402	48	1	1	201			

NO.	STATION	OFFSET	WATTAGE	CIRCUIT	IES-TYPE	POLE HT.
	6+00	4' Rt	100		MSC-II	40

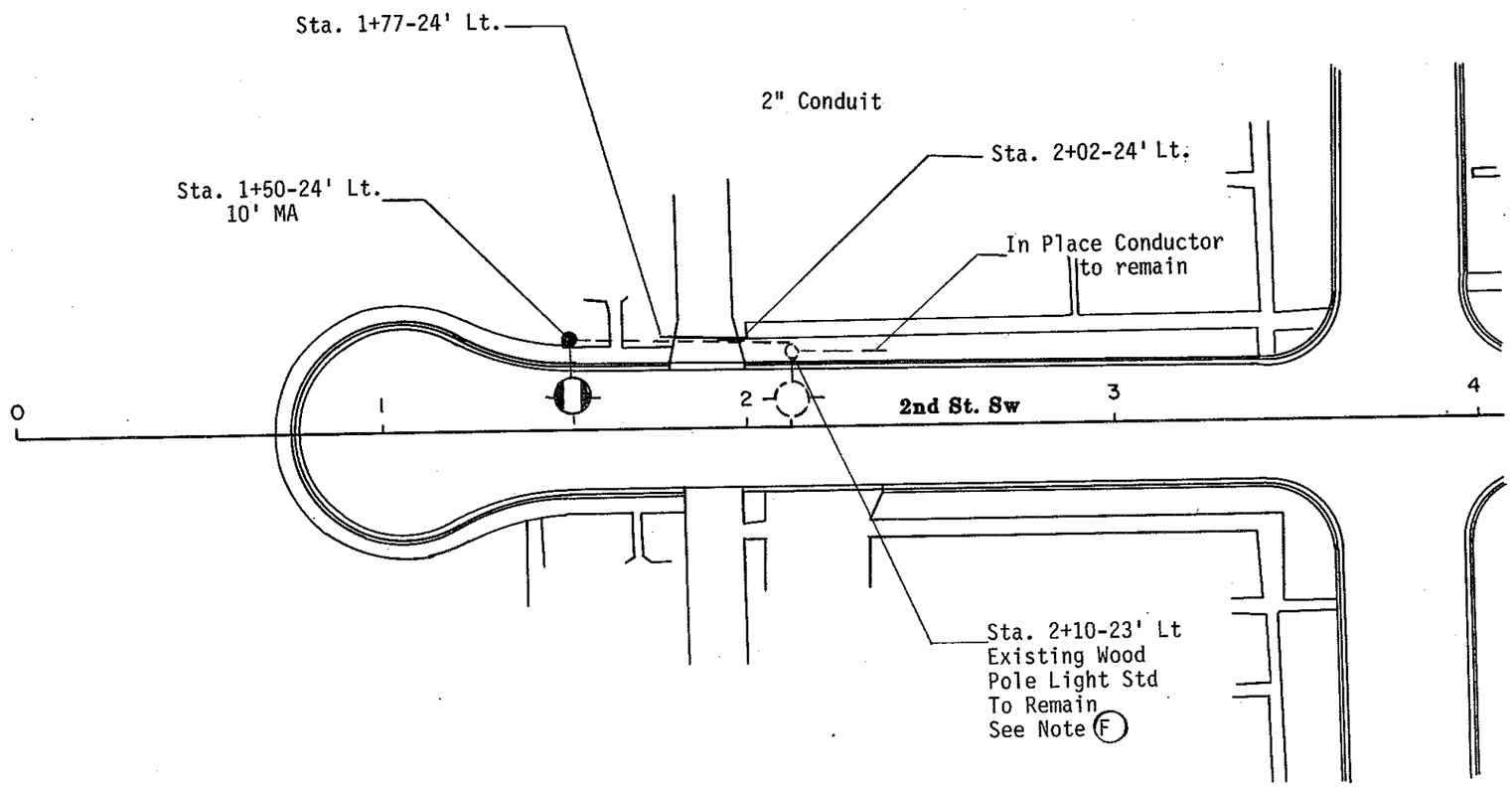
TRAFFIC CONTROL SYSTEM
Lighting Quantities

1st St SW & 8th Ave. SW

Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)006	117

NOTE (F) The contractor shall install a conduit body in the existing above ground conduit and splice the new conductors in this conduit body to the existing conductors. The new conductor shall be placed in a rigid conduit from 2 feet below the ground to conduit body



TRAFFIC CONTROL SYSTEM

Highway Layout

2nd St. sw & 10th Ave sw
Mandan N.D.

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	RRS-1-006(005)066	118

STATION	CONDUIT RUNS		CABLE TRENCH	CABLE RUNS	
	Length	Size	Length	Length	Type
Sta. 1+50-24' Lt.			26	62	2 - No. 6 RHW
To 1+77-24' Lt.				31	1 - No. 6 THW
Sta. 1+77-24' Lt.	25	2"		50	2 - No. 6 RHW
to 2+02-24' Lt.				25	1 - No. 6 THW
Sta. 2+02-24' Lt.			7	36	2 - No. 6 RHW
to 2+10-23' Lt.				18	1 - No. 6 THW

QUANTITIES

Concrete Foundation Highway Lighting	Cable Trench Type I	Underground Conductor No. 6 Type RHW	2 inch Dia. Rigid Conduit	Light Std. 10 FT. M.A. 40 FT. MT. HT.	H. P. Soduim Vapor Luminaire 200 WATT	Underground Conductor No. 6 Type THW			
EA	LF	LF	LF	EA	EA	LF			
1	33	148	25	1	1	74			

NO.	STATION	OFFSET	WATTAGE	CIRCUIT	*TYPE	POLE HT.
	1+50	24' Lt	200		V	40

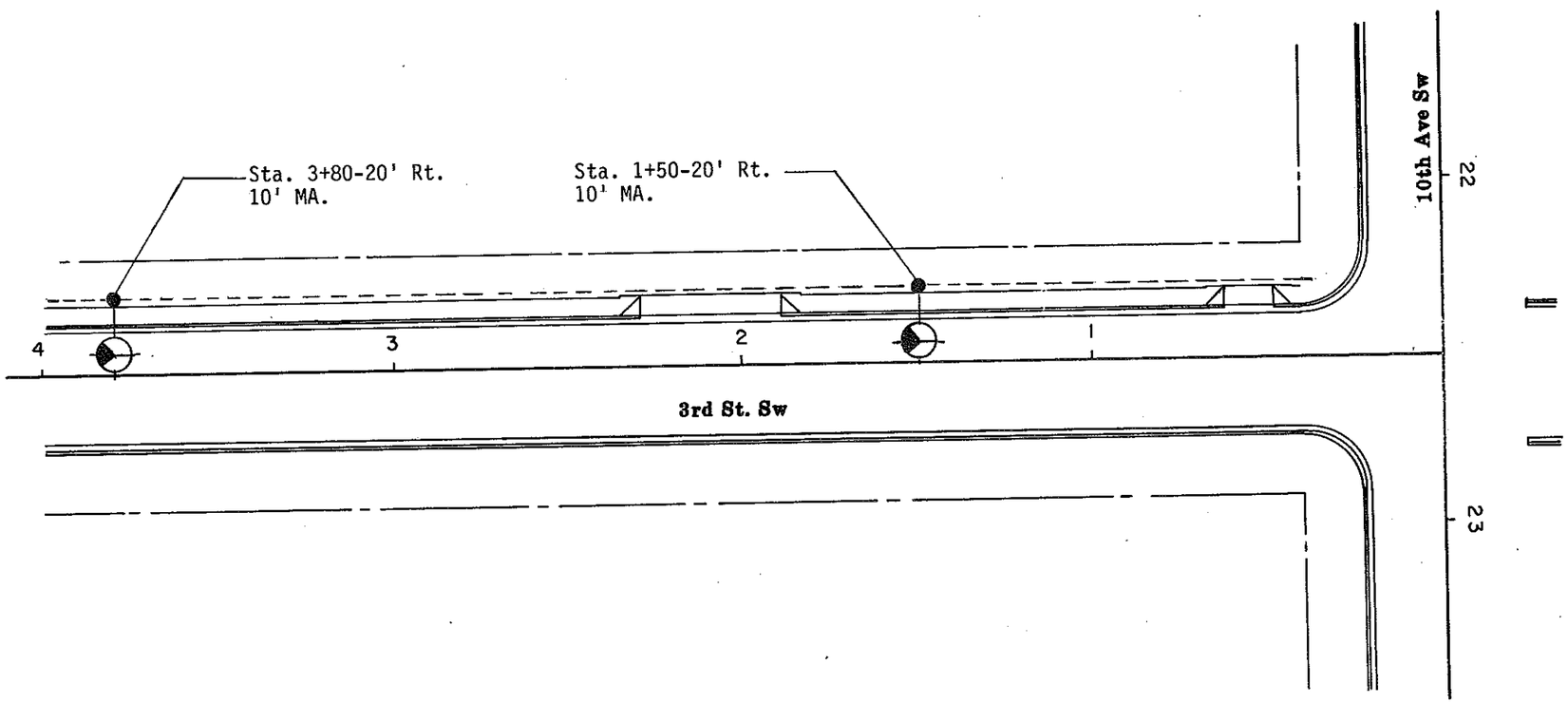
TRAFFIC CONTROL SYSTEM

Lighting Quantities

2nd St SW & 10th Ave SW

Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	119



TRAFFIC CONTROL SYSTEM

Lighting Layout

3rd St. sw & 10th Ave sw
Mandan N.D.

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	RRS-1-006(005)066	120

STATION	CONDUIT RUNS		CABLE TRENCH	CABLE RUNS	
	Length	Size	Length	Length	Type
Sta. 4+00-20' Rt.			19	54	2-No. 6 RHW
to 3+80-20' Rt.				27	1-No. 6 THW
Sta. 3+80-20' Rt.			228	428	2-NO. 6 RHW
to 1+to-20' Rt.				214	1-No. 6 THW
Sta. 1+50-20' Rt.			109	234	2-No. 6 RHW
to 0+40-20' Rt.				117	1-No. 6 THW

QUANTITIES									
Concrete Foundation Highway Lighting	Cable Trench Type I	Underground Conductor No. 6 Type RHW	Underground Conductor No. 6 Type THW	Light Standard 10 FT. MA. 40 FT. MT. HT.	H.P. Sodium Vapor Luminaire 100 WATT				
EA	LF	LF	LF	EA	EA				
2	356	716	358	2	2				

NO.	STATION	OFFSET	WATTAGE	CIRCUIT	IES-TYPE	POLE HT.
	3+80	20' Rt.	100		MSC-II	40
	1+50	20' Rt.	100		MSC-II	40

TRAFFIC CONTROL SYSTEM

Lighting Quantities

3rd St SW & 10th Ave SW

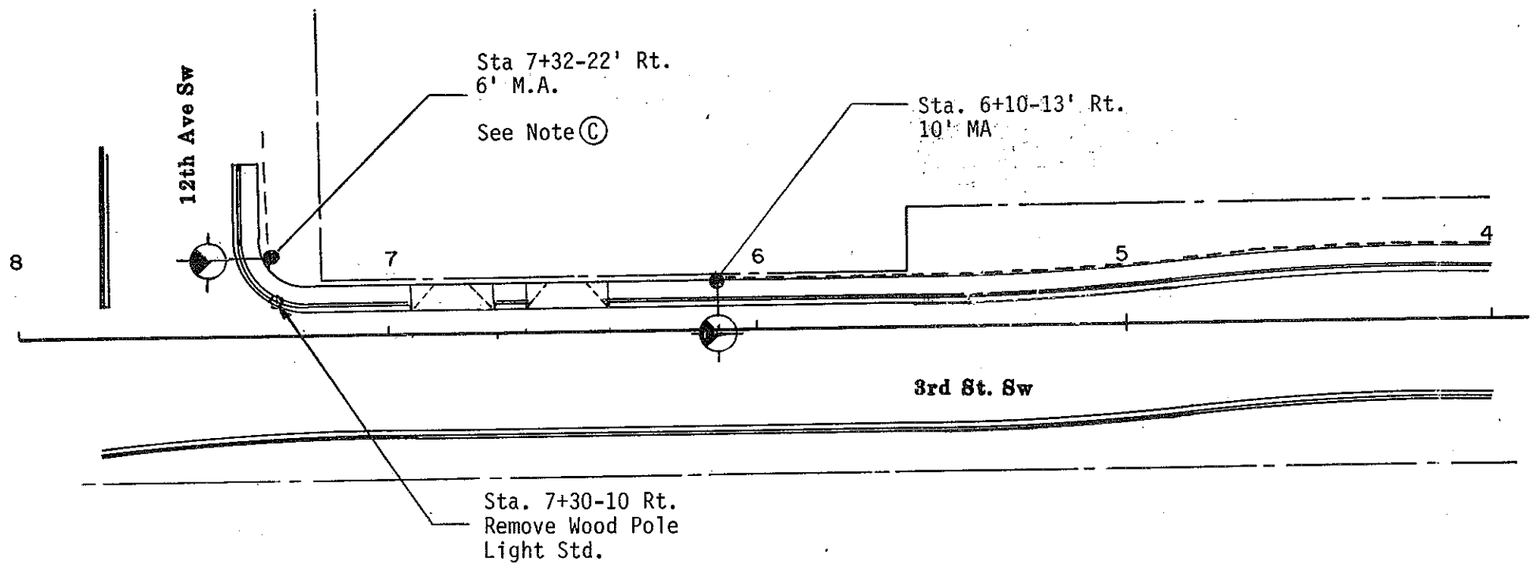
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	12.1

NOTE Ⓒ: The contractor shall locate the inplace conductors and salvage sufficient cable to make the necessary conections to provide continuity.

Remove Wood Pole Light Std.
Sta. 7+30-10 Rt. 1 EA

N



TRAFFIC CONTROL SYSTEM
Lighting Layout

3rd St. sw & 12th Ave sw
Mandan N.D.

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	RRS-1-006(005)066	122

STATION	CONDUIT RUNS		CABLE TRENCH	CABLE RUNS	
	Length	Size	Length	Length	Type
Sta. 6+10-13' Rt. to 4+00-20' Rt.			210	434 217	2-No. 6 RHW 1-No. 6 THW

QUANTITIES									
Concrete Foundation Highway Lighting	Cable Trench Type I	Underground Conductor No. 6 Type RHW	Underground Conductor No. 6 Type THW	Light Standard 10' MA 40 FT. MT. HT.	H.P. Sodium Vapor Luminaire 100 WATT	Light Standard 6' M.A. 30 Ft. Mt. Ht.	Remove Wood Pole Light Standard		
EA	LF	LF	LF	EA	EA	EA	EA		
2	210	434	217	1	2	1	1		

NO.	STATION	OFFSET	WATTAGE	CIRCUIT	IES-TYPE	POLE HT.
	6+10	13' Rt.	100		MSC-II	40
	7+32	22' Rt.	100		MSC-II	30

TRAFFIC CONTROL SYSTEM

Lighting Quantities

3rd St Sw & 12th Ave SW

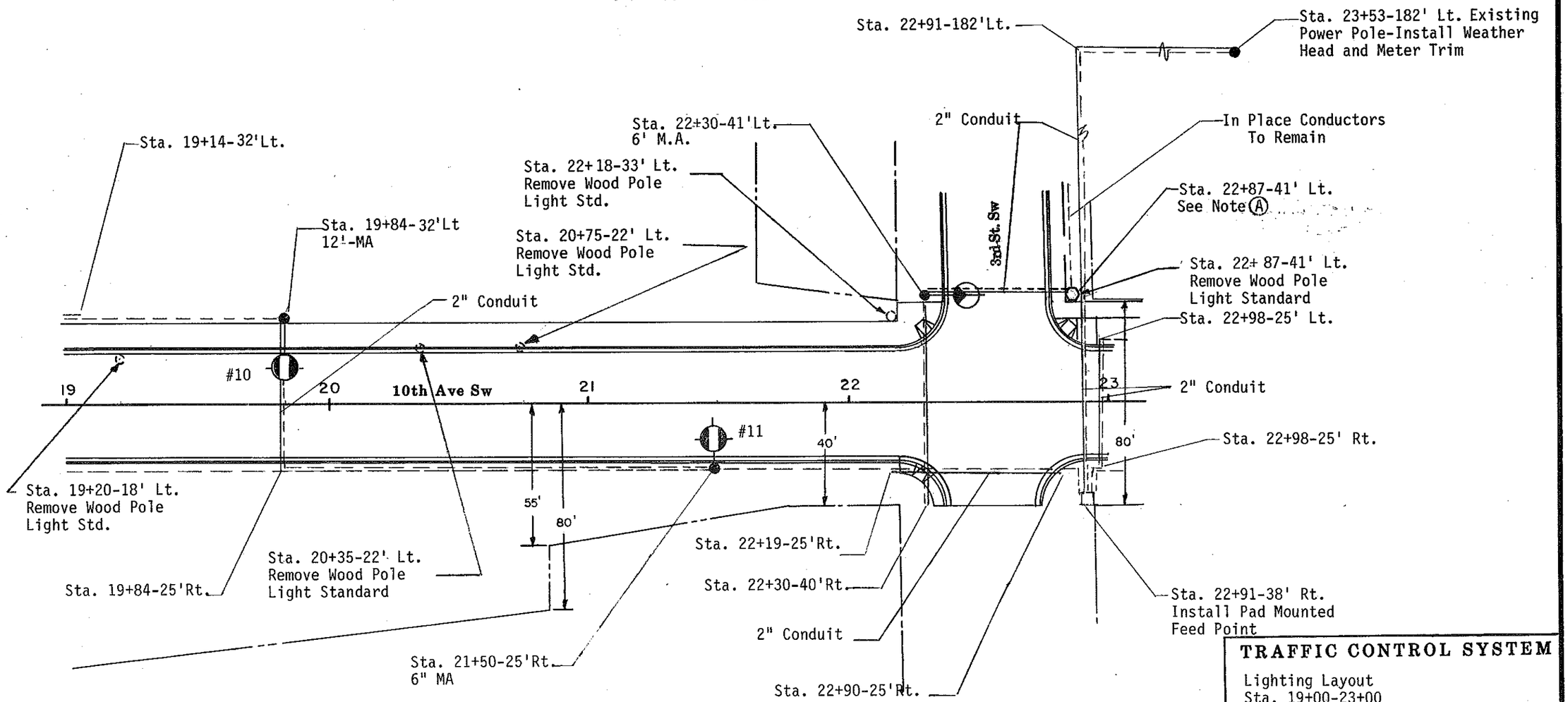
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	123

Remove Wood Pole Light Std.

Sta. 19+20-18'Lt.	1 EA
Sta. 20+35-22'Lt.	1 EA
Sta. 20+75-22'Lt.	1 EA
Sta. 22+18-33'Lt.	1 EA
Sta. 22+87-41'Lt.	1 EA

NOTE (A) The contractor shall locate and splice the inplace conductors to provide continuity. The splice shall be waterproof and approved by the Engineer. The contractor shall be responsible for any damage to the existing underground conductor and shall replace any damaged conductor at his own expense.



TRAFFIC CONTROL SYSTEM

Lighting Layout
Sta. 19+00-23+00

10th Ave sw (ND Hwy 6)
Mandan N.D.

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	RSS-1-006(005)066	124

STATION	CONDUIT RUNS Length	CONDUIT RUNS Size	CABLE TRENCH Length	CABLE RUNS Length	CABLE RUNS Type
Sta. 19+00-32.0' Lt.	14	2"		28	2-No. 6 RHW
to 19+14-32.0' Lt.				14	1-No. 6 THW
Sta. 19+14-32.0' Lt.			69	154	2-No. 6 RHW
to 19+84-32.0' Lt.				77	1-No. 6 THW
Sta. 19+84-32.0' Lt.	56	2"		122	2-NO. 6 RHW
to 19+84-25.0' Rt.				61	1-No. 6 THW
Sta. 19+00-25.0' Rt.			84	168	2-No. 6 RHW
to 19+84-25.0' Rt.				84	1-No. 6 THW
Sta. 19+84-25.0' Rt.			165	692	4-No. 6 RHW
to 21+50-25.0' Rt.				346	2-No. 6 THW
Sta. 21+50-25.0' Rt.			68	152	2-No. 6 RHW
to 22+19-25.0' Rt.				76	1-No. 6 THW
Sta. 22+19-25.0' Rt.				142	2-No. 6 RHW
to 22+90-25.0' Rt	71	2"		71	1-No. 6 THW
Sta. 22+90-25.0' Rt.			1	2	2-No. 6 RHW
to 22+91-25.0' Rt.				1	1-No. 6 THW
Sta. 22+91-25.0' Rt.			12	46	2-No. 2 RHW
to 22+91-38.0' Rt.				92	4-No. 6 RHW
				69	3-No. 6 THW
Sta. 23+53-182' Lt.	84	2"		261	3-No. 8 RHW (1)
to 22+91-182' Lt.					
Sta. 22+91-182' Lt.					
to 22+91-38.0' Rt.	219	2"		690	3-No. 8 RHW (1)
Sta. 22+91-25.0' Rt.				14	2-No. 2 RHW
to 22+98-25.0' RT			7	14	2-No. 6 RHW
				14	2-NO. 6 THW
Sta. 22+98-25.0' Lt.			2	4	2-No. 2 RHW
to 23+00-25.0' Lt.				2	1-No. 6 THW
Sta. 22+98-25.0' Rt.	50	2"		100	2-No. 2 RHW
to 22+98-25.0' Lt.				50	1-No. 6 THW
Sta. 22+30-40' Rt.	137	2"		306	2-No. 6 RHW
to 22+30-41' Lt.				153	1-No. 6 THW
to 22+87-41' Lt.					
Sta. 22+98-25' Rt.			2	4	2-No. 6 RHW
to 23+00-25' Rt.				2	1-No. 6 THW

QUANTITIES

H.P. Sodium Vapor Luminaire 100 Watt	Light Standard 6 Ft. M.A. 30 Ft. Mt. Ht.	Underground Conductor No 2 Type RHW	Concrete Foundation Feed Point-Type B	Concrete Foundation Highway Lighting	Cable Trench Type I	Underground Conductor No. 6 Type RHW	Underground Conductor No. 6 Type THW	Underground Conductor No. 8 Type RHW	2 inch Dia. Rigid Conduit	Light Standard 6FT. M.A. 40 FT MT HT	Light Standard 12 FT. M.A. 40 FT MT HT	H.P. Soduim Vapor Luminaire 200 Watt	Remove Wood Pole Light Standards	Feed Point Type II Pad Mounted
EA	EA	LF	EA	EA	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA
1	1	164	1	3	410	1876	1020	951	631	1	1	2	5	1

NO.	STATION	OFFSET	WATTAGE	CIRCUIT	IES-TYPE	POLE HT.
10	19+84	32' Lt.	200	B	MSC-III	40
11	21+50	25' Rt.	200	B	MSC-III	40
	22+30	41' Lt.	100		MSC-II	30

(1) Used for feeder wire for power supply to feed point cabinet

TRAFFIC CONTROL SYSTEM

Lighting Quantites
Sta 19+00 to 23+00

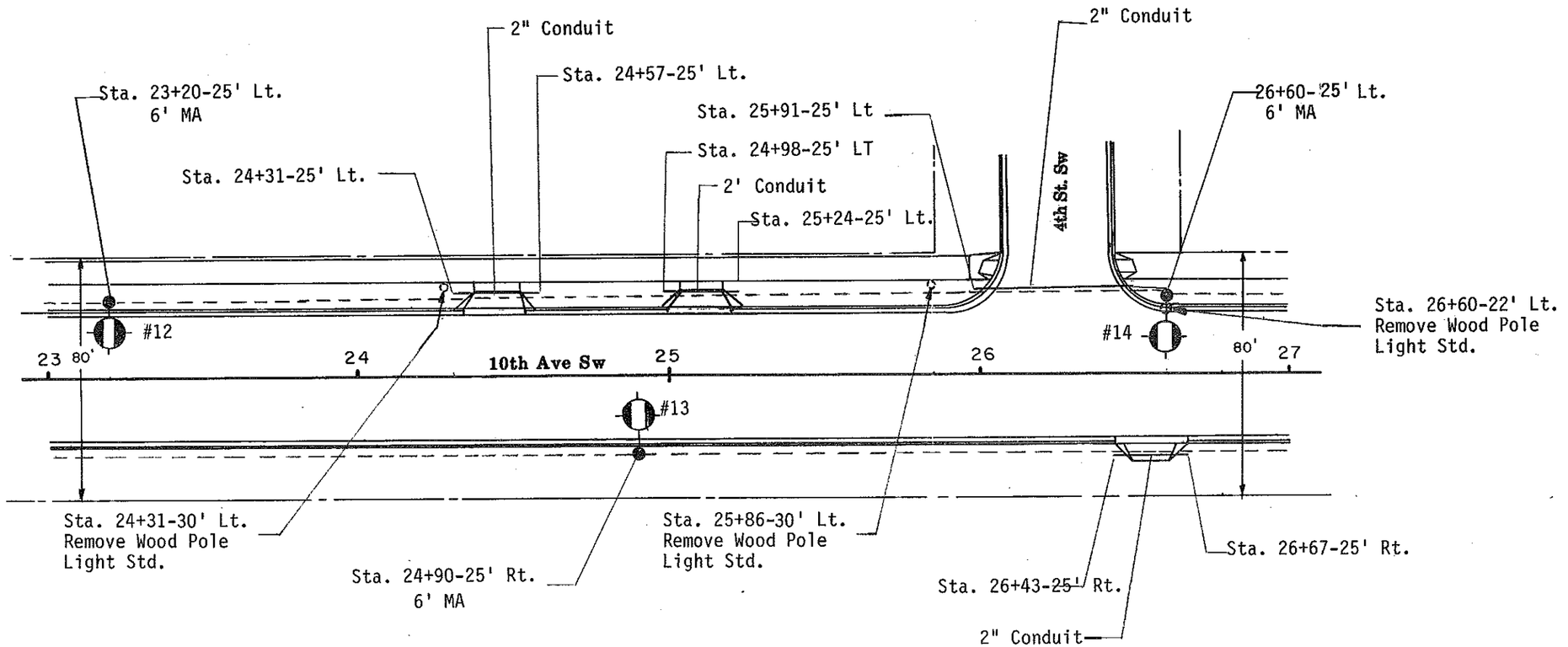
10th Ave SW (ND Hwy 6)

Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	125

Remove Wood Pole Light Std

Sta. 24+31-30' Lt. 1 EA
Sta. 25+86-30' Lt. 1 EA
Sta. 26+60-22' Lt. 1 EA



TRAFFIC CONTROL SYSTEM

Lighting Layout

Sta. 23+00 - 27+00

10th Ave sw (ND Hwy 6)
Mandan N.D.

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	F-RRS-1-006(005)066	126

STATION	CONDUIT RUNS Length	CONDUIT RUNS Size	CABLE TRENCH Length	CABLE RUNS Length	CABLE RUNS Type
RRS-1-006(005)066					
Sta. 23+00-25.0' Lt.			14	28	2-No. 2 RHW
to 23+14-25.0' Lt.				14	1-No. 6 THW
Sta. 23+00-25.0' Rt.			14	28	2-No. 6 RHW
to 23+14-25.0 Rt.				14	1-No. 6 THW
F-1-006(005)066					
Sta. 23+14-25.0' Lt.			5	26	2-No. 2 RHW
to 23+20-25.0' Lt.				13	1-No. 6 THW
Sta. 23+20-25.0' Lt.			110	236	2-No. 2 RHW
to 24+31-25.0' Lt.				118	1-No. 6 THW
Sta. 24+31-25.0' Lt.	26	2"		52	2-No. 6 RHW
to 24+57-25.0' Lt.				26	1-No. 6 THW
Sta. 24+57-25.0' Lt.			41	82	2-No. 2 RHW
to 24+98-25.0' Lt.				41	1-No. 6 THW
Sta. 24+98-25.0' Lt.	26	2"		52	2-No. 2 RHW
to 25+24-25.0' Lt.				26	1-No. 6 THW
Sta. 25+24-25.0' Lt.			67	134	2-No. 2 RHW
to 25+91-25.0' Lt.				67	1-No. 6 THW
Sta. 25+91-25.0' Lt.	68	2"		146	2-No. 2 RHW
to 26+60-25.0' Lt.				73	1-No. 6 THW
Sta. 26+60-25.0' Lt.			39	94	2-No. 2 RHW
to 27+00-25.0' Lt.				47	1-No. 6 THW
Sta. 23+14-25.0' Rt.			175	366	2-No. 6 RHW
to 24+90-25.0' Rt.				183	1-No. 6 THW
Sta. 24+90-25.0' Rt.			152	320	2-No. 6 RHW
to 26+43-25.0' Rt.				160	1-No. 6 THW
Sta. 26+43-25.0' Rt.	24	2"		48	2-No. 6 RHW
to 26+67-25.0' Rt.				24	1-No. 6 THW
Sta. 26+67-25.0' Rt.			33	66	2-No. 6 RHW
to 27+00-25.0' Rt				33	1-No. 6 THW

QUANTITIES

	Concrete Foundation Highway Lighting	Cable Trench Type I	Underground Conductor No. 6 Type RHW	Underground Conductor No. 6 Type THW	2 inch Dia. Rigid Conduit	Light Standard 6 FT. M.A. 40 FT. MT. HT.	H.P. Sodium Vapor Luminaire 200 WATT	Remove Wood Pole Light Standard	Underground Conductor No. 2 Type RHW	
	EA	LF	LF	LF	LF	EA	EA	EA	LF	
RRS		28	28	28					28	
F	3	622	780	811	144	3	3	3	842	

NO.	STATION	OFFSET	WATTAGE	CIRCUIT	IES-TYPE	POLE HT.
12	23+20	25' Lt.	200	C	MSC-III	40
13	24+90	25' Rt.	200	B	MSC-III	40
14	26+60	25' Lt.	200	C	MSC-III	40

TRAFFIC CONTROL SYSTEM

Lighting Quantities

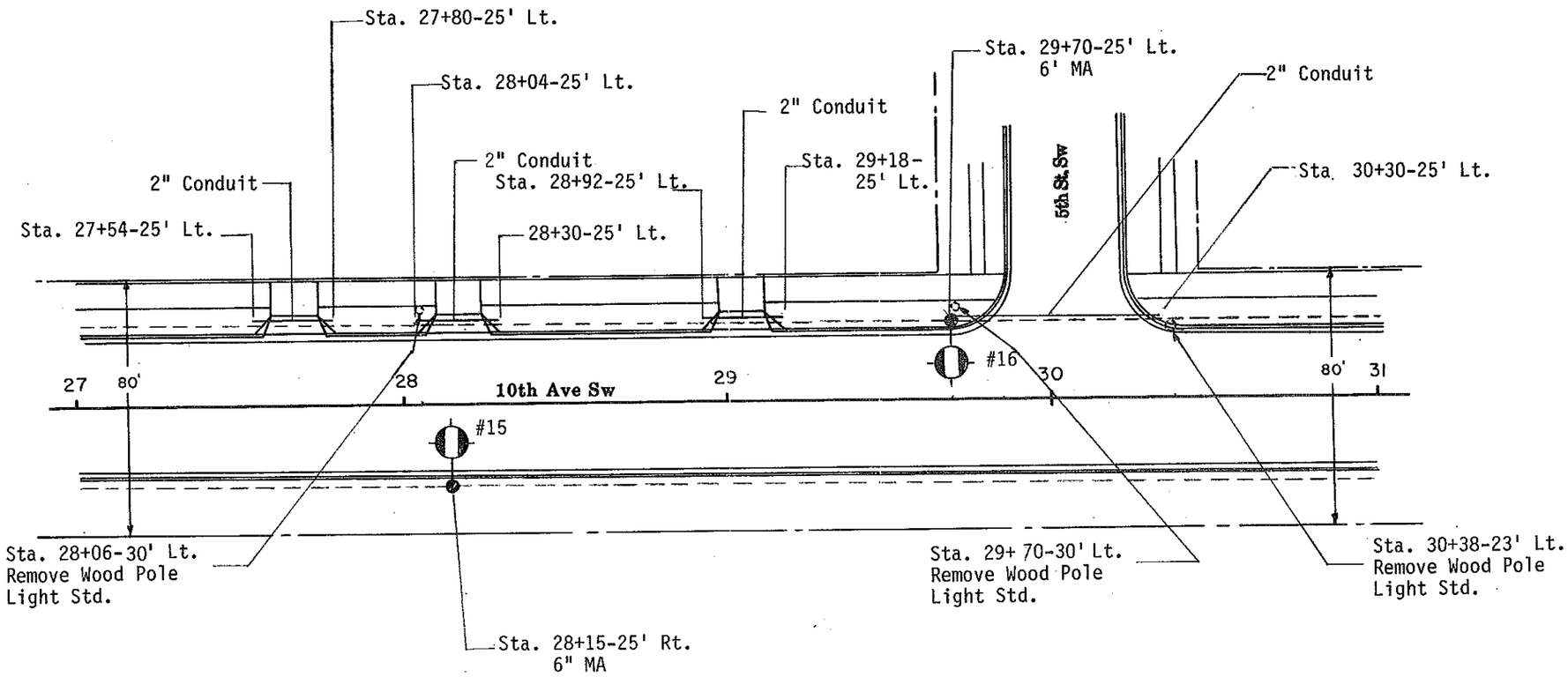
Sta. 23+00 - 27+00

10th Ave SW (ND HwY 6)

Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	127

Remove Wood Pole Light Std.
Sta. 28+06-30' Lt.
Sta. 29+70-30' Lt.
Sta. 30+38-23' Lt.



TRAFFIC CONTROL SYSTEM

Lighting Layout

Sta. 27+00 - 31-00

10th Ave sw (ND Hwy 6)
Mandan N.D.

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	F-1-006(005)066	128

STATION	CONDUIT RUNS		CABLE TRENCH	CABLE RUNS	
	Length	Size	Length	Length	Type
Sta 27+00-25.0'Lt to 27+54-25.0' Lt			54	108 54	2-No. 2 RHW 1-No. 6 THW
Sta 27+54-25.0' Lt to 27+80-25.0' Lt	26	2"		52 26	2-No. 2 RHW 1-No. 6 THW
Sta 27+80-25.0' Lt to 28+04-25.0' Lt			24	48 24	2-No. 2 RHW 1-No. 6 THW
Sta 28+04-25.0' Lt to 28+30-25.0' Lt	26	2"		52 26	2-No. 2 RHW 1-No. 6 THW
Sta 28+04-25.0' Lt to 28+92-25.0' Lt			62	124 62	2-No. 2 RHW 1-No. 6 THW
Sta 28+18-25.0' Lt to 29+18-25.0' Lt	26	2"		52 26	2-No. 2 RHW 1-No. 6 THW
Sta 29+18-25.0' Lt to 29+70-25.0' Lt			51	118 59	2-No. 2 RHW 1-No. 6 THW
Sta 29+70-25.0' Lt to 30+30-25.0' LT	59	2"		128 64	2-No. 4 RHW 1-No. 6 THW
Sta 30+00-25.0' Lt to 31+00-25.0' Lt			70	140 70	2-No. 4 RHW 1-No. 6 THW
Sta 27+00-25.0' RT to 28+15-25.0' Rt			114	244 122	2-No. 6 RHW 1-No. 6 THW
Sta 28+15-25.0' Rt to 31+00-25.0' Rt			284	584 292	2-No. 6 RHW 1-No. 6 THW

QUANTITIES

Concrete Foundation Highway Lighting	Cable Trench Type I	Underground Conductor No. 6 Type RHW	Underground Conductor No. 6 Type THW	2 Inch Dia Rigid Conduit	Light Standard 6 Ft. M.A. 40 Ft. MT HT	H.P. Sodium Vapor Luminaire - 200 Watt	Remove Wood Pole Light Standard	Underground Conductor No. 2 Type RHW	Underground Conductor No. 4 Type RHW
EA	LF	LF	LF	LF	EA	EA	EA	LF	LF
2	659	1650	825	137	2	2	2	554	268

NO.	STATION	OFFSET	WATTAGE	CIRCUIT	IES-TYPE	POLE HT.
15	28+15	25' Rt	200	B	MSC - III	40
16	29+70	25' Lt	200	C	MSC - III	40

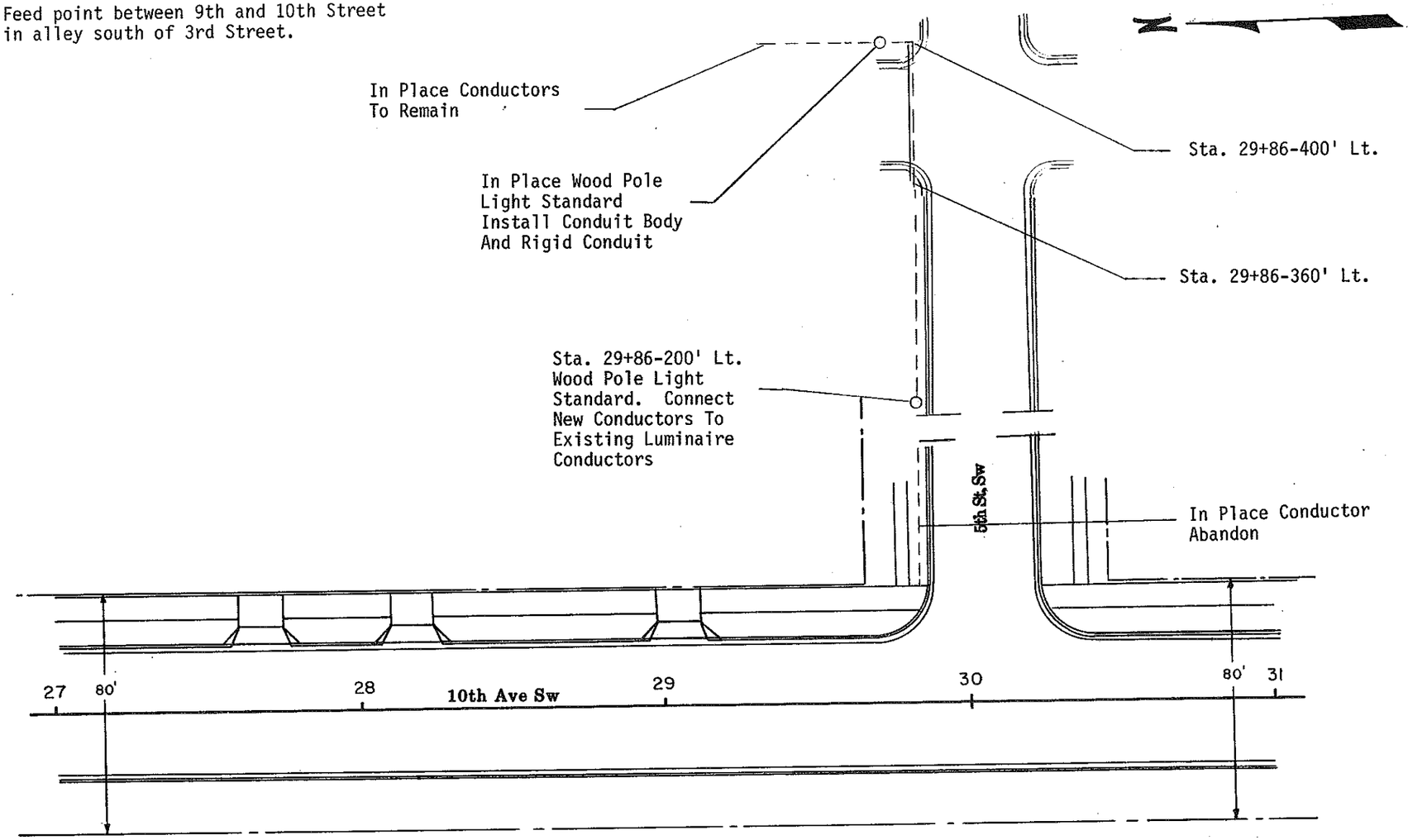
TRAFFIC CONTROL SYSTEM

Lighting Layout
Sta 27+00 to 31+00

10th Ave SW (ND Hwy 6)
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	129

NOTE: Feed point between 9th and 10th Street in alley south of 3rd Street.



TRAFFIC CONTROL SYSTEM

Lighting Layout

10th Ave sw (ND Hwy 6)
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	130

STATION	CONDUIT RUNS		CABLE TRENCH	CABLE RUNS	
	Length	Size	Length	Length	Type
Sta. 29+86-200' Lt. to 29+86-360' Lt.			159	507	3 No. 6 RHW
Sta. 29+86-360' Lt. to 29+86-400' Lt.	40	2"		120	3 No. 6 RHW
Sta. 29+86-400' Lt. to 29+76-400' Lt.			9	57	3 No. 6 RHW

Quantities									
Cable Trench Type I	Underground Conductor No. 6 Type RHW	2 Inch Rigid Conduit							
LF	LF	LF							
168	684	40							

TRAFFIC CONTROL SYSTEM

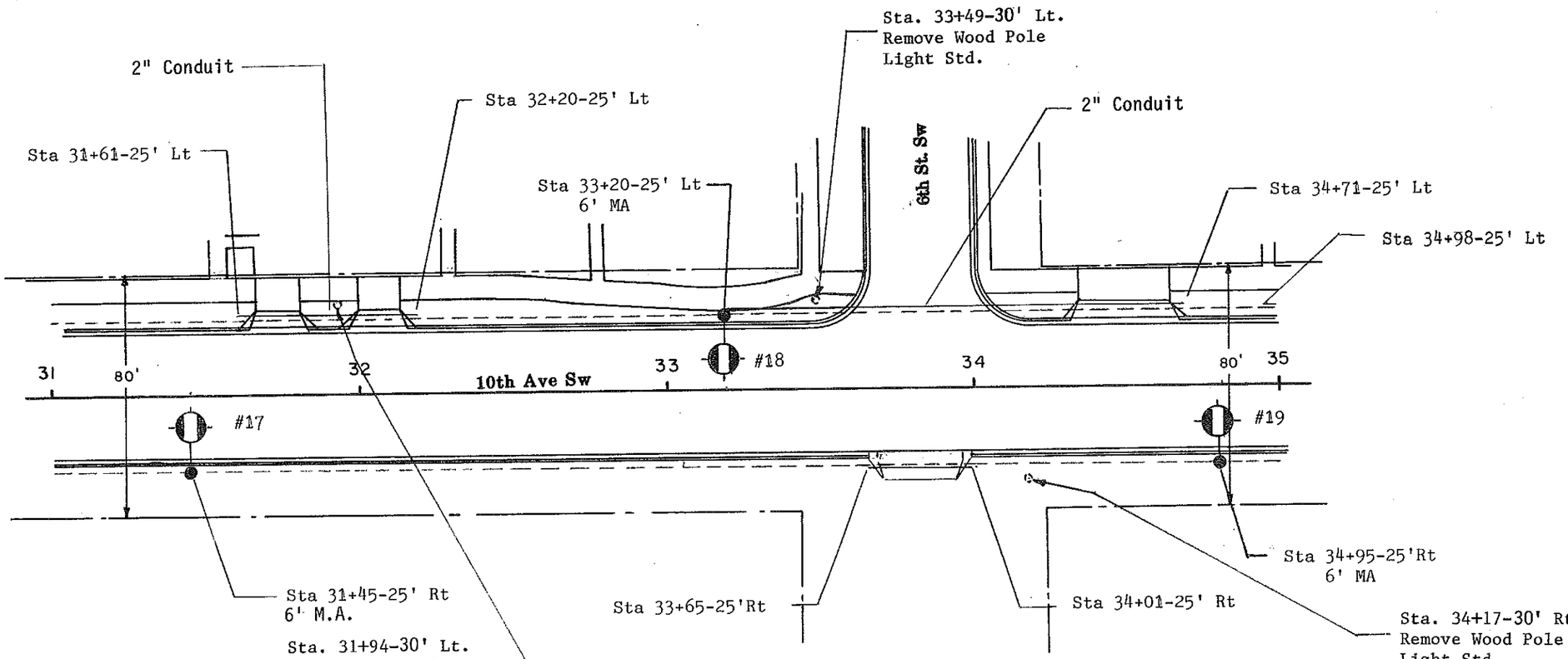
Lighting Quantities
5th St. S.W. to 9th Ave. S.W.

10th Ave. S.W. (N.D. Hwy. #6)
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	13!

REMOVE WOOD POLE LIGHT STD

Sta 31+94-30' Lt 1 EA
Sta 33+49-30' Lt 1 EA
Sta 34+17-30' Rt 1 EA



TRAFFIC CONTROL SYSTEM

Lighting Layout

Sta 31+00-35+00

10th Ave sw (ND Hwy 6)

Mandan N.D.

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	F-1-006(005)066	132

STATION	CONDUIT RUNS		CABLE TRENCH	CABLE RUNS	
	Length	Size	Length	Length	Type
Sta. 31+00-25.0' Lt. To 31-61-25.0' Lt.			61	122 61	2-No. 4 - RHW 1-No. 6 THW
Sta 31+61-25.0' Lt to 32+20-25.0' Lt	59	2"		118 59	2-No. 4 RHW 1-No. 6 THW
Sta 32+20-25.0' Lt to 33+20-25.0' Lt			99	214 107	2-No. 4 RHW 1-No. 6 THW
Sta 33+20-25.0' Lt to 34+71-25.0' Lt	150	2"		310 155	2-No. 4 RHW 1-No. 6 THW
Sta 34+71-25.0' Lt to 34+98-25.0' LT			27	54 27	2-No. 4 RHW 1-No. 6 THW
Sta 34+98-25.0' Lt to 35+00-25.0' Lt	2	2"		4 2	2-No. 4 RHW 1-No. 6 THW
Sta 31+00-25.0' Rt to 31+45-25.0' Rt			44	104 52	2-No. 6 RHW 1-No. 6 THW
Sta 31+45-25.0' Rt to 33+65-25.0' RT			219	454 227	2-No. 6 RHW 1-No. 6 THW
Sta 33+65-25.0' Rt to 34+01-25.0' Rt	36	2"		72 36	2-No. 6 RHW 1-No. 6 THW
Sta 34+01-25.0' Rt to 34+95-25.0' Rt			93	202 101	2-No. 6 RHW 1-No. 6 THW
Sta 34+95-25.0' Rt to 35+00-25.0' Rt			4	24 12	2-No. 6 RHW 1-No. 6 THW

QUANTITIES

Concrete Foundation Highway Lighting	Cable Trench Type I	Underground Conductor No. 6 Type RHW	Underground Conductor No. 6 Type THW	2 Inch Dia Rigid Conduit	Light Standard 6 Ft MA 40 Ft MT. HT.	H.P. Sodium Vapor Luminaire 200 Watt	Remove Wood Pole Light Standard	Underground Conductor No. 4 Type RHW	
EA	LF	LF	LF	LF	EA	EA	EA	EA	
3	547	856	839	247	3	3	3	822	

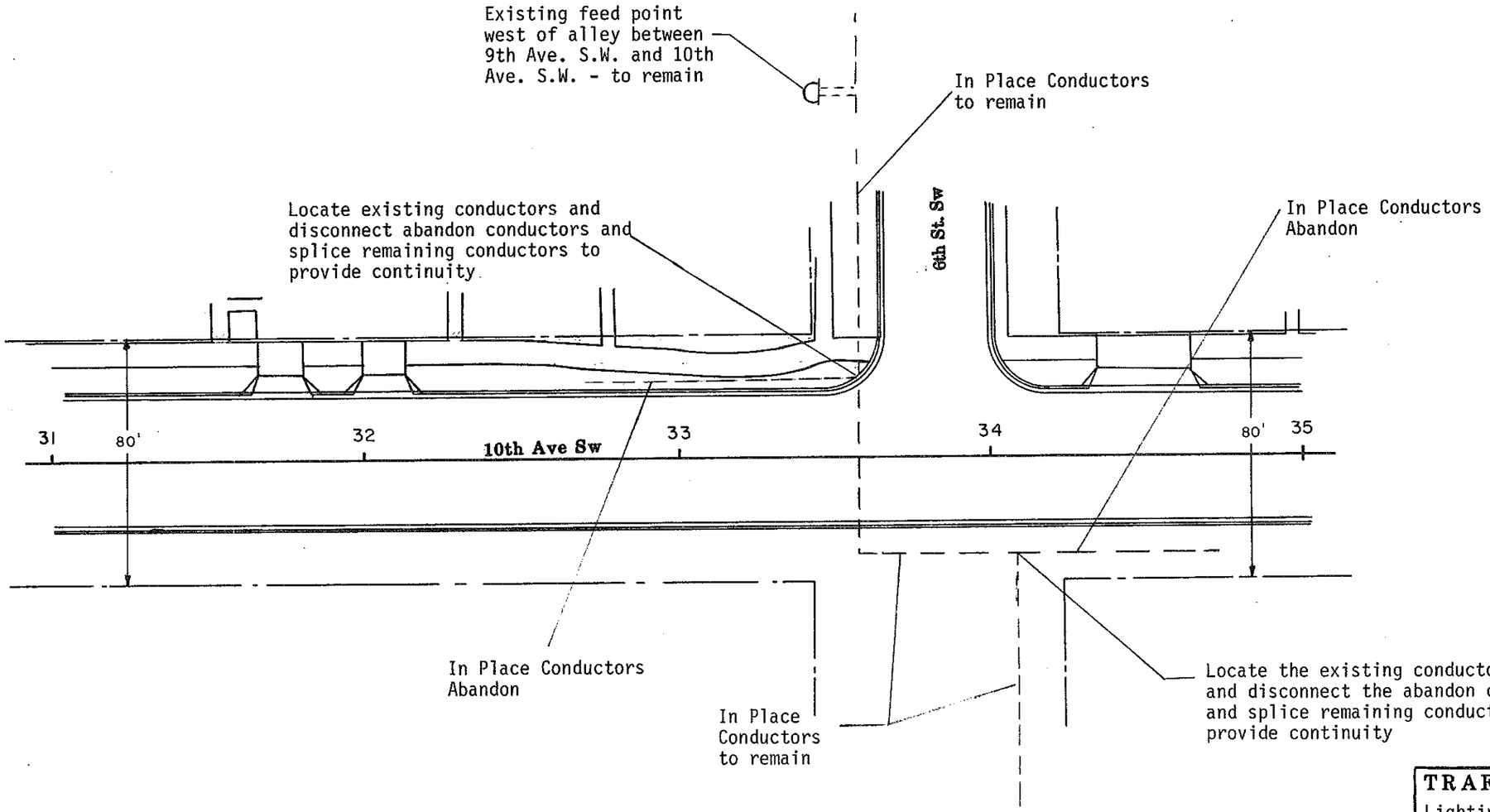
NO.	STATION	OFFSET	WATTAGE	CIRCUIT	IES-TYPE	POLE HT.
17	31+45	25' Rt	200	B	MSC-III	40
18	33+20	25' Lt	200	C	MSC-III	40
19	34+95	25' Rt	200	B	MSC-III	40

TRAFFIC CONTROL SYSTEM

Lighting Quantities
Sta 31+00 to 35+00

10th Ave SW (ND Hwy 6)
Mandan , ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	133



TRAFFIC CONTROL SYSTEM

Lighting Layout

10th Ave sw (ND Hwy 6)

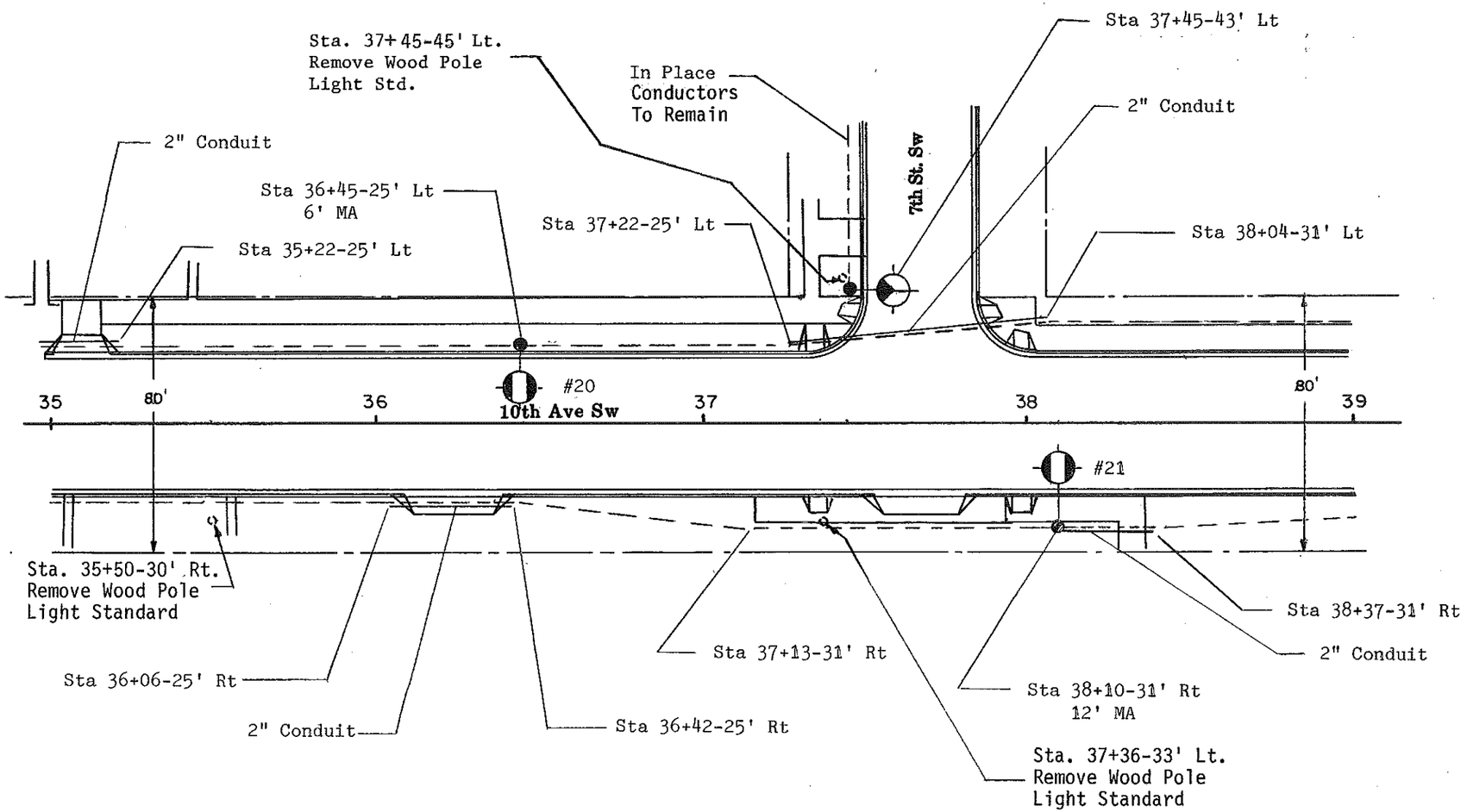
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	134

REMOVE WOOD POLE LIGHT STD

Sta 35+50-30' Rt 1 EA
Sta 37+36-33' Rt 1 EA
Sta 37+45-45' Lt. 1 EA

(A) The contractor shall locate the in place conductors and salvage sufficient cable to make the necessary connections to provide continuity.



TRAFFIC CONTROL SYSTEM

Lighting Layout
Sta. 35+00 - 39+00

10th Ave sw (ND Hwy 6)
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO	SHEET NO.
8	N.D.	F-1-006(005)066	135

STATION	CONDUIT RUNS		CABLE TRENCH	CABLE RUNS	
	Length	Size	Length	Length	Type
Sta.35+00-25.0' Lt. to 35+22-25.0' Lt.	22	2"		44 22	2-No.4 RHW 1-No.6 THW
Sta. 35+22-25.0' Lt. to 36+45-25.0' Lt.			122	260 130	2-No.4 RHW 1-No.6 THW
Sta. 36+45-25.0' Lt. to 37+22-25.0' Lt.			76	168 84	2-No.4 RHW 1-No.6 THW
Sta. 37+22-25.0' Lt. to 38+04-31.0' Lt.	82	2"		164 82	2-No.4 RHW 1-No.6 THW
Sta. 38+04-31.0' Lt. to 39+00-31.0' Lt.			96	192 96	2-No.4 RHW 1-No.6 THW
Sta. 35+00-25.0' Rt. to 36+06-25.0' Rt.			106	212 106	2-No.6 RHW 1-No.6 THW
Sta. 36+06-25.0' Rt. to 36+42-25.0' Rt.	36	2"		72 36	2-No.6 RHW 1-No.6 THW
Sta. 36+42-25.0' Rt. to 37+13-31.0' Rt.			71	142 71	2-No.6 RHW 1-No.6 THW
Sta. 37+13-31.0' Rt. to 38+10-31.0' Rt.			96	208 104	2-No.6 RHW 1-No.6 THW
Sta. 38+10-31.0' Rt. to 38+37-31.0' Rt.	26	2"		62 31	2-No.6 RHW 1-No.6 THW
Sta. 38+37-31.0' Rt. to 39+00-25.0' Rt.			63	126 63	2-No.6 RHW 1-No.6 THW

QUANTITIES

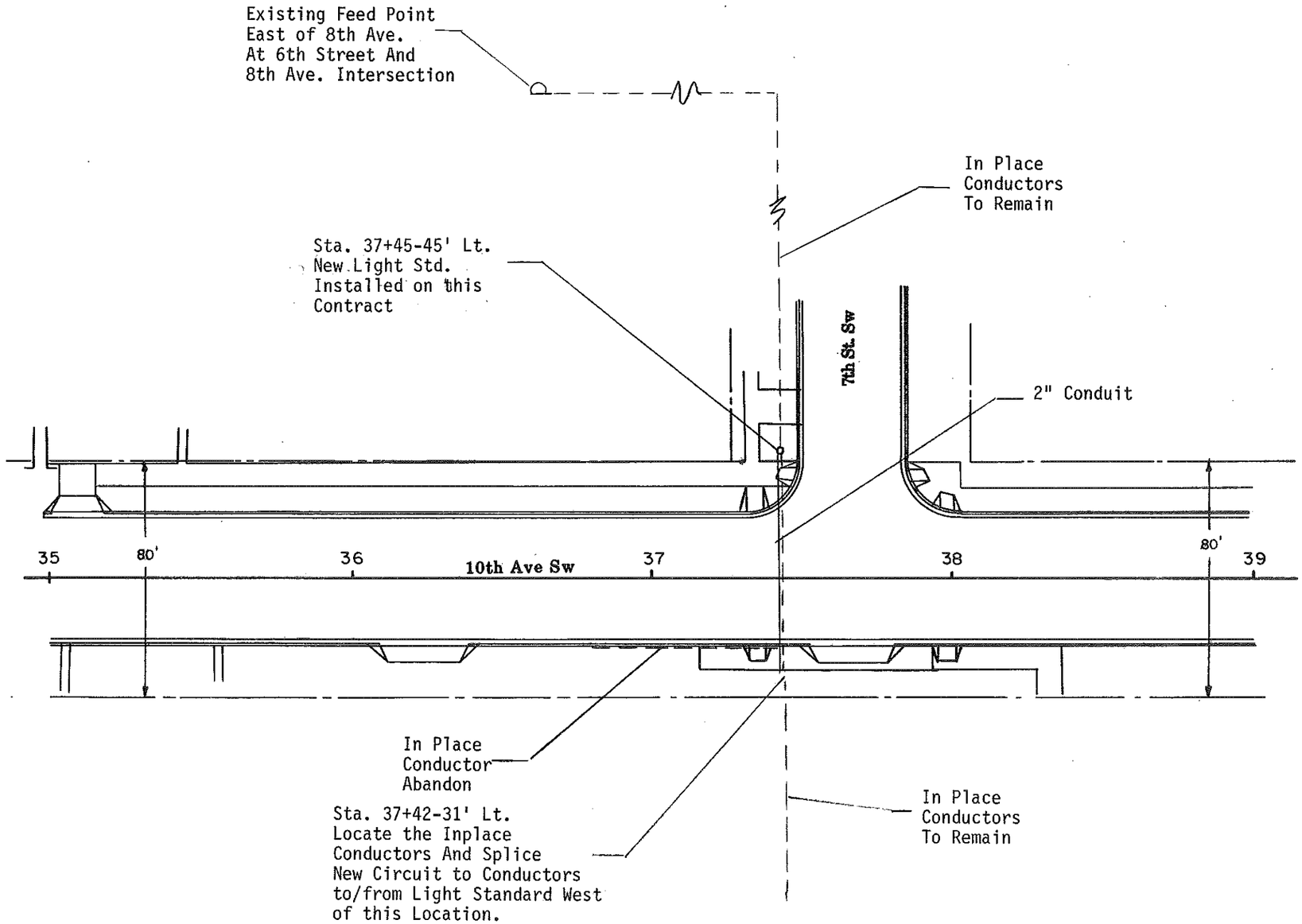
Remove Wood Pole Light Standard	Concrete Foundation Highway Lighting	Cable Trench Type I	Underground Conductor No. 6 Type RHW	Underground Conductor No. 6 Type THW	2" Dia. Rigid Conduit	Light Standard 6 Ft. MA 40 Ft. Mt. Ht.	Light Standard 12 Ft. MA 40 Ft. Mt. Ht.	H.P. Sodium Vapor Luminaire 200 Watt	H.P. Sodium Vapor Luminaire 100 Watt	Underground Conductor No. 4 Type RHW	Light Standard 6 Ft. M.A. 30 Ft. Mt. Ht.
EA	EA	LF	LF	LF	LF	EA	EA	EA	EA	LF	EA
3	3	630	822	825	166	1	1	2	1	828	1

NO.	STATION	OFFSET	WATTAGE	CIRCUIT	IES-TYPE	POLE HT.
20	36+45	25' Lt.	200	C	MSC-III	40
21	38+10	31' Rt.	200	B	MSC-III	40
	37+45	43' Lt.	100		MSC-II	30

TRAFFIC CONTROL SYSTEM
Lighting Quantities
Sta. 35+00 to 39+00

10th Ave. S.W. (ND Hwy 6)
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	136

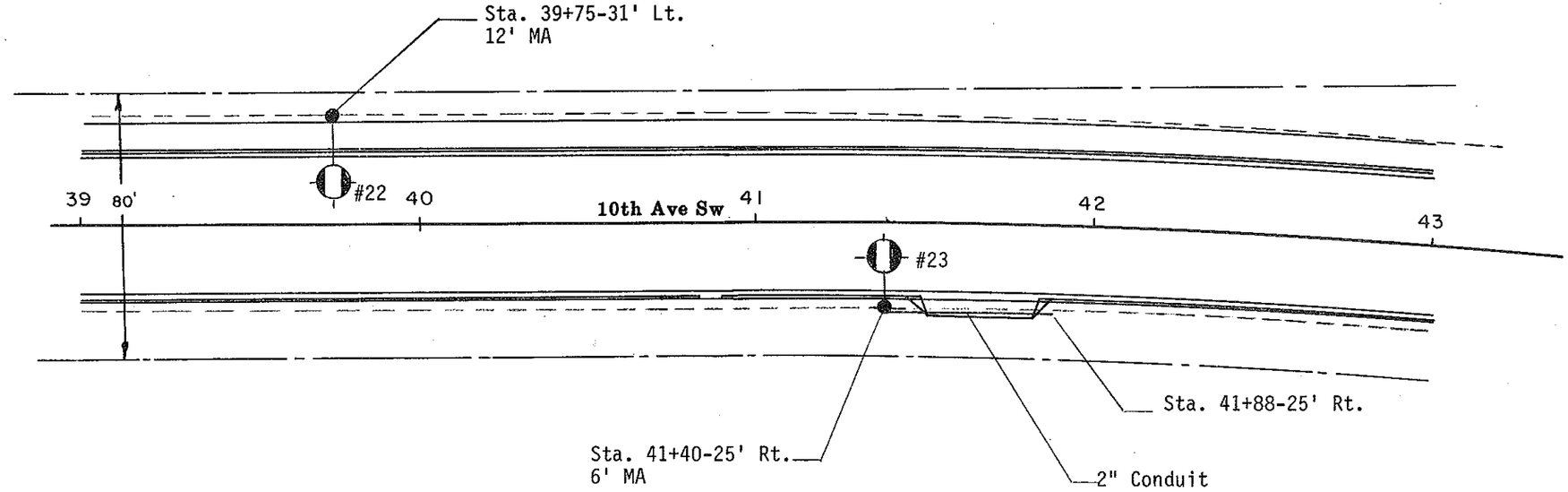


TRAFFIC CONTROL SYSTEM

Lighting Layout

10th Ave sw (ND Hwy 6)
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	137



TRAFFIC CONTROL SYSTEM

Lighting Layout

Sta. 39+00-43+00

10th Ave sw (ND Hwy 6)

Mandan N.D.

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	F-1-006(005)066	138

STATION	CONDUIT RUNS		CABLE TRENCH	CABLE RUNS	
	Length	Size	Length	Length	Type
Sta. 39+00-31.0' Lt.			74	164	2-No. 4 RHW
to 39+75-31.0' Lt.				82	1-No. 6 THW
Sta. 39+75-31.0' Lt.			324	664	2-No. 6 RHW
to 43+00-31.0' Lt.				332	1-No. 6 THW
Sta. 39+00-25.0' Rt.			239	494	2-No.6 RHW
to 41+40-25.0' Rt.				247	1-No.6 THW
Sta. 41+40-25.0' Rt.	47	2"		104	2-No.6 RHW
to 41+88-25.0' Rt.				52	1-No.6 THW
Sta. 41+88-25.0' Rt.			112	224	2-No.6 RHW
to 43+00-25.0' Rt.				112	1-No.6 THW

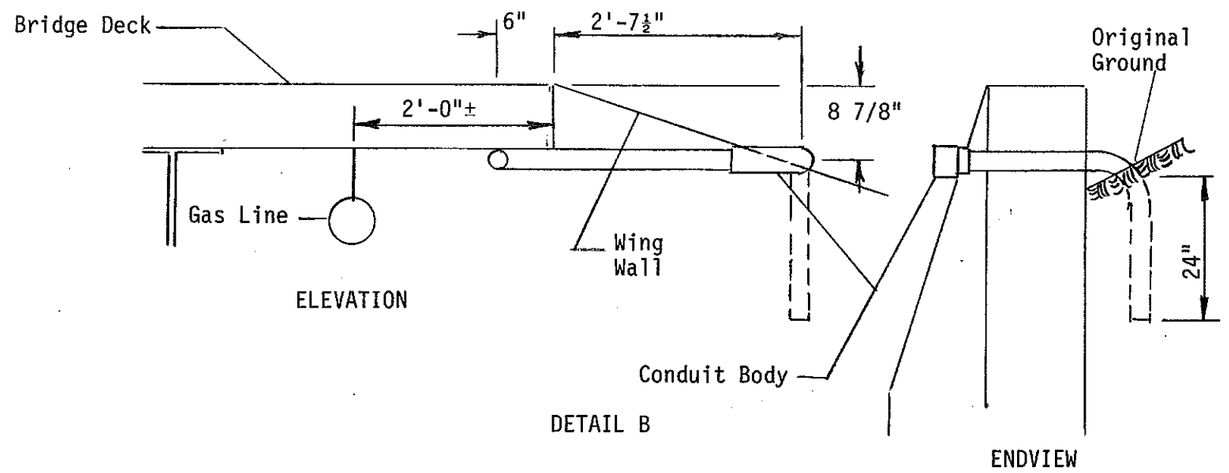
QUANTITIES									
Concrete Foundation Highway Lighting	Cable Trench Type I	Underground Conductor No. 6 Type RHW	Underground Conductor No. 6 Type THW	2" Dia. Rigid Conduit	Light Standard 6 Ft. MA 40 Ft. Mt. Ht.	Light Standard 12 Ft. MA 40 Ft. Mt. Ht.	H.P. Sodium Vapor Luminaire 200 Watt	Underground Conductor No. 4 Type RHW	
EA	LF	LF	LF	LF	EA	EA	EA	LF	
2	749	1486	825	47	1	1	2	164	

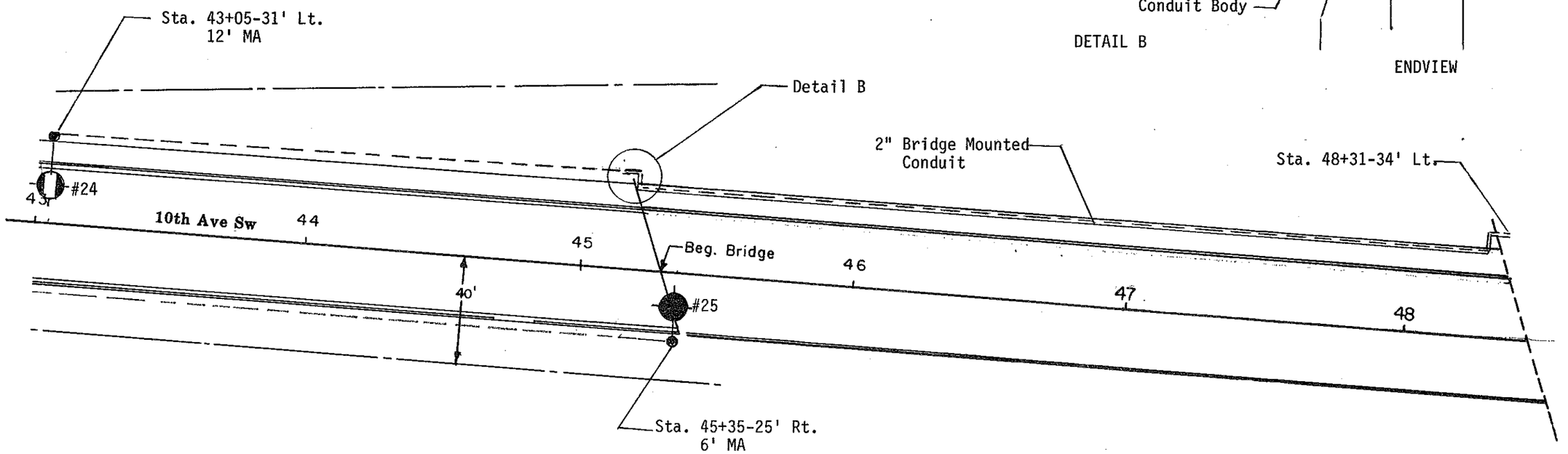
NO.	STATION	OFFSET	WATTAGE	CIRCUIT	IES-TYPE	POLE HT.
22	39+75	31' Lt.	200	C	MSC-III	40
23	41+40	25' Rt.	200	B	MSC-III	40

TRAFFIC CONTROL SYSTEM
Lighting Quantities
Sta. 39+00 to 43+00

10th Ave. S.W. (ND Hwy 6)
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	139





TRAFFIC CONTROL SYSTEM

Lighting Layout

Sta. 43+00 - 48+31

10th Ave sw (N.D. Hwy.6)
Mandan N.D.

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	F-1-006(005)066	140

STATION	CONDUIT RUNS		CABLE TRENCH	CABLE RUNS	
	Length	Size	Length	Length	Type
Sta. 43+00-31.0' Lt. to 43+05-31.0' Lt.			4	24 12	2-No. 6 RHW 1-No. 6 THW
Sta. 43+05-31.0' Lt to 45+67-34.0' Lt			261	538 269	2-No. 6 RHW 1-No. 6 THW
Sta. 45+67-34.0' Lt to 48+31-34.0' Lt.	274 (2)	2"		548 274	2-No. 6 RHW 1-No. 6 THW
Sta. 43+00-25.0' Rt. to 45+35-25.0' Rt.			234	484 242	2-No. 6 RHW 1-No. 6 THW

QUANTITIES									
Concrete Foundation Highway Lighting	Cable Trench Type I	Underground Conductor No. 6 Type RHW	Underground Conductor No. 6 Type THW	2 inch Dia. Rigid Conduit Bridge Mounted	Light Standard 12 FT M.A. 40 FT MT HT	Light Standard 6 FT M.A. 50 FT MT HT	H.P. Sodium Vapor Luminaire 200 WATT	H.P. Sodium Vapor Luminaire 250 WATT	
EA	LF	LF	LF	LF	EA	EA	EA	EA	
2	499	1594	797	274	1	1	1	1	

NO.	STATION	OFFSET	WATTAGE	CIRCUIT	IES-TYPE	POLE HT.
24	43+05	31' Lt.	200	C	MSC-III	40
25	45+35	25' Rt.	250	B	MSC-III	50

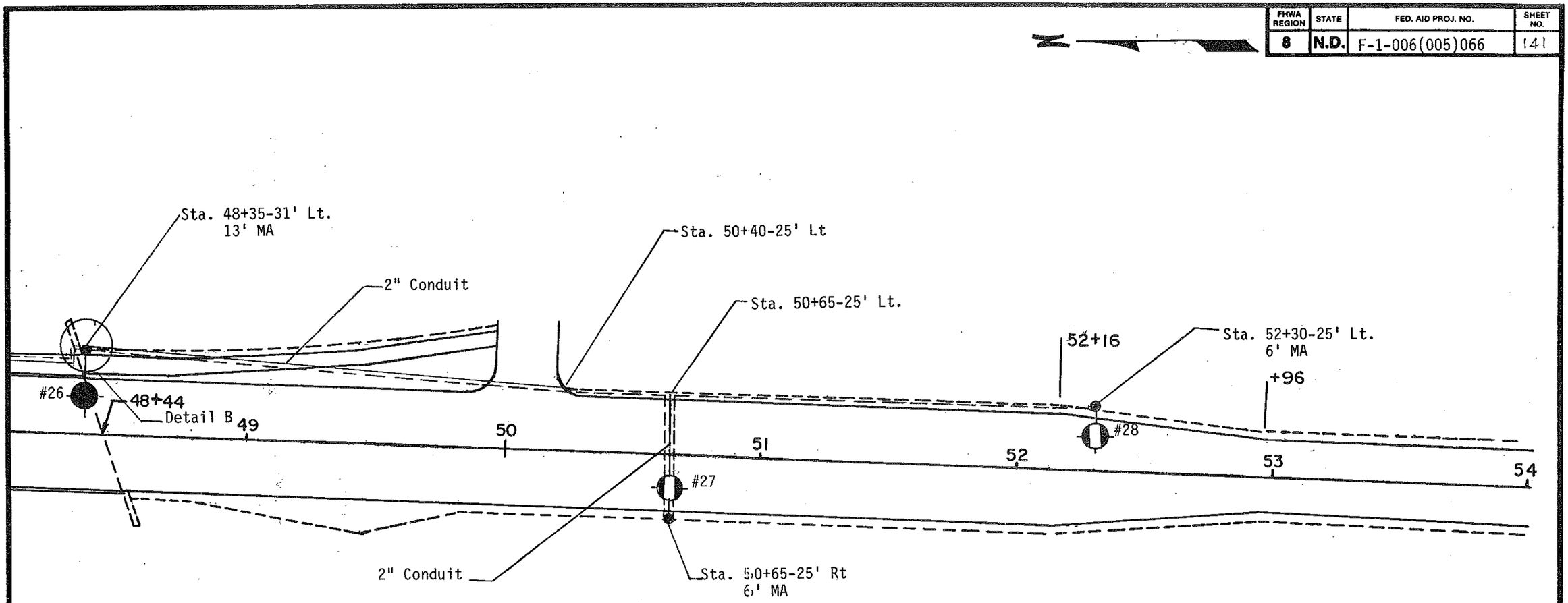
(2) This conduit is Bridge Mounted

TRAFFIC CONTROL SYSTEM

Lighting Quantities
Sta. 43+00 - 48+31

10th Ave. S.W. (ND Hwy. 6)
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	141



TRAFFIC CONTROL SYSTEM

Lighting Layout

Sta. 48+31 - 54+00

10th Ave sw (N.D.Hwy.6)

Mandan N.D.

512645

STATION	CONDUIT RUNS		CABLE TRENCH	CABLE RUNS	
	Length	Size	Length	Length	Type
Sta 48+31-34.0'Lt to 48+35 -31.0'Lt	4	2"		18 9	2- No. 6 RHW 1- No. 6 THW
Sta 48+35-31.0' Lt to 50+40-25.0' Lt	204	2"		418 209	2- No. 6 RHW 1- No. 6 THW
Sta 50+40-25.0' Lt to 50+65-25.0' Lt			25	50 25	2- No. 6 RHW 1- No. 6 THW
Sta 50+65-25.0' Lt to 50+65-25.0' Rt	49	2"		216 108	4- No. 6 RHW 2- No. 6 THW
Sta 50+65-25.0' Lt to 50+65-25.0' Rt			164	344 172	2- No. 6 RHW 1- No. 6 THW

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	F-1-006(005)066	142

QUANTITIES									
Concrete Foundation Highway Lighting	Cable Trench Type I	Underground Conductor No. 6 Type RHW	Underground Conductor No. 6 Type THW	2 Inch Dia Rigid Conduit	Light Standard 6 Ft. M.A. 42 Ft. Pole - Breakaway	Light Standard 12 Ft. M.A. 50 Ft. MT. HT.	H.P. Sodium Vapor Luminaire 200 Watt	H.P. Sodium Vapor Luminaire 250 Watt	
EA	LF	LF	LF	LF	EA	EA	EA	EA	
3	189	1046	523	257	2	1	2	1	

NO.	STATION	OFFSET	WATTAGE	CIRCUIT	IES-TYPE	POLE HT.
26	48+35	31' Lt	250	C	MSC - III	50
27	50+65	25' Rt	200	C	MSC - III	42 (A)
28	52+30	25' Lt	200	C	MSC - III	42 (A)

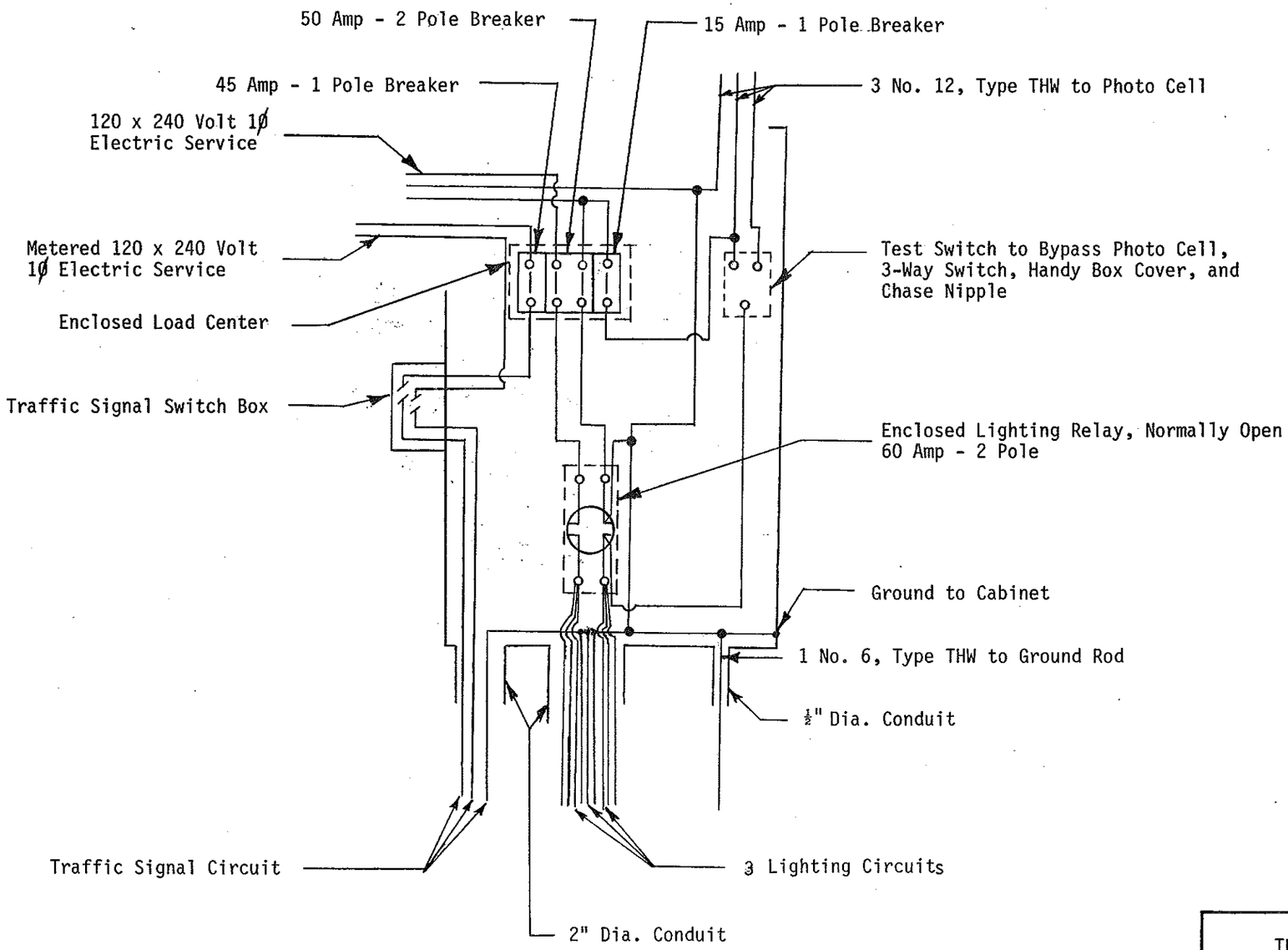
(A) Breakaway Base

TRAFFIC CONTROL SYSTEM

Lighting Layout
Sta 48+31 to 54+00

10th Ave SW (ND Hwy 6)
Mandan, ND

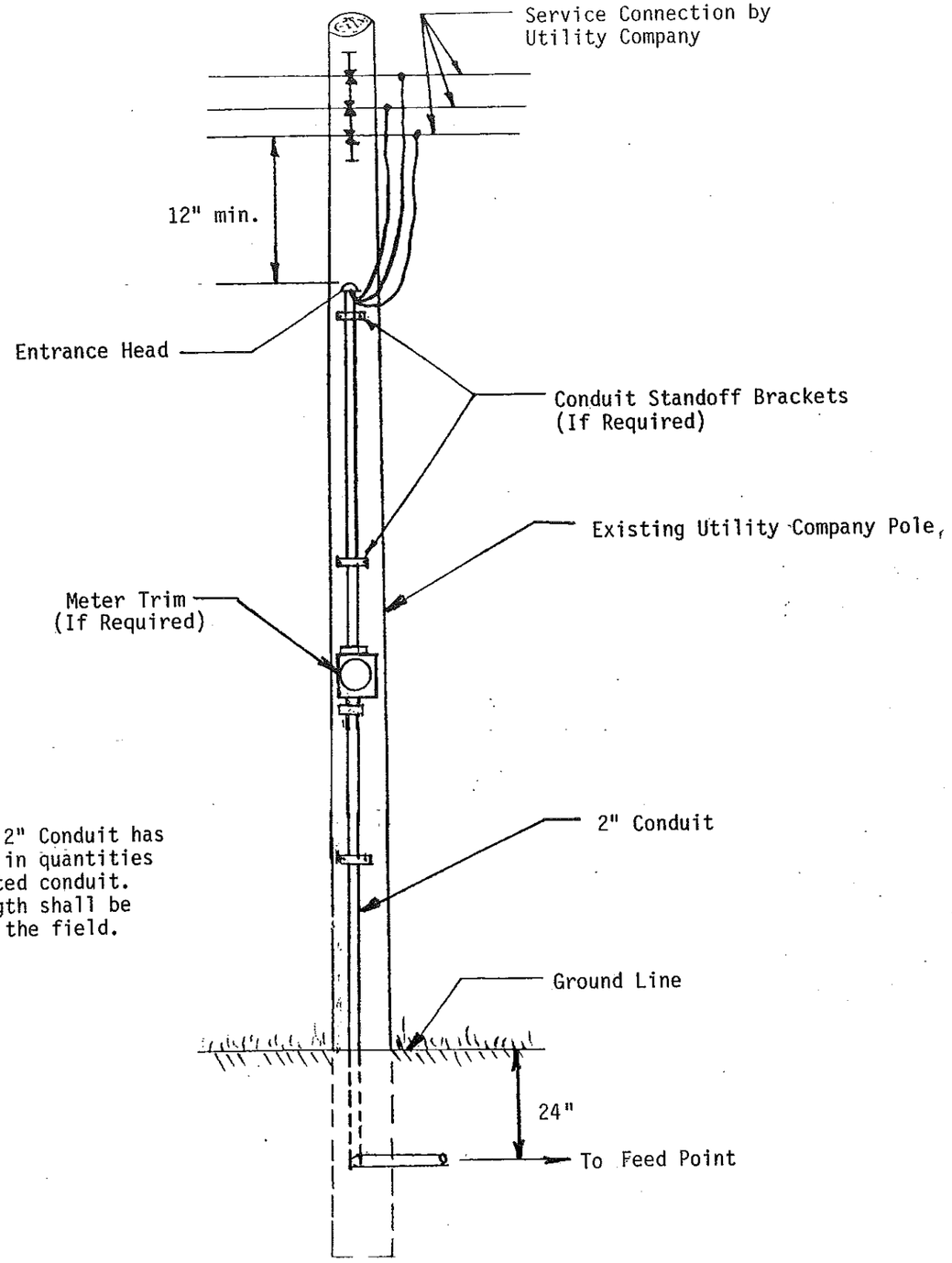
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	143



TRAFFIC CONTROL SYSTEM

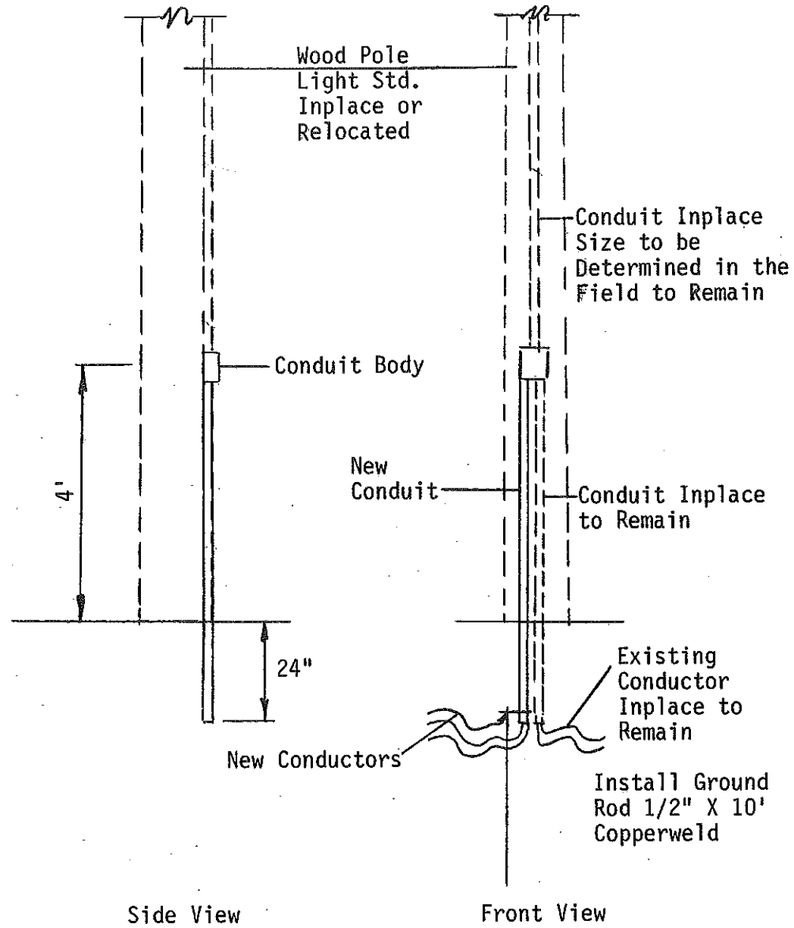
Combination Lighting & Signal
Pad Mtd. Feed Point Detail
Sta. 737+45-46' Rt.

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	F-RRS-1-006(005)066	144



NOTE: 25' of 2" Conduit has been provided in quantities for pole mounted conduit. The exact length shall be determined in the field.

Sta. 740+40-68' Rt.
Sta. 23+53+82' Lt.



Revision Detail
for existing light stds.

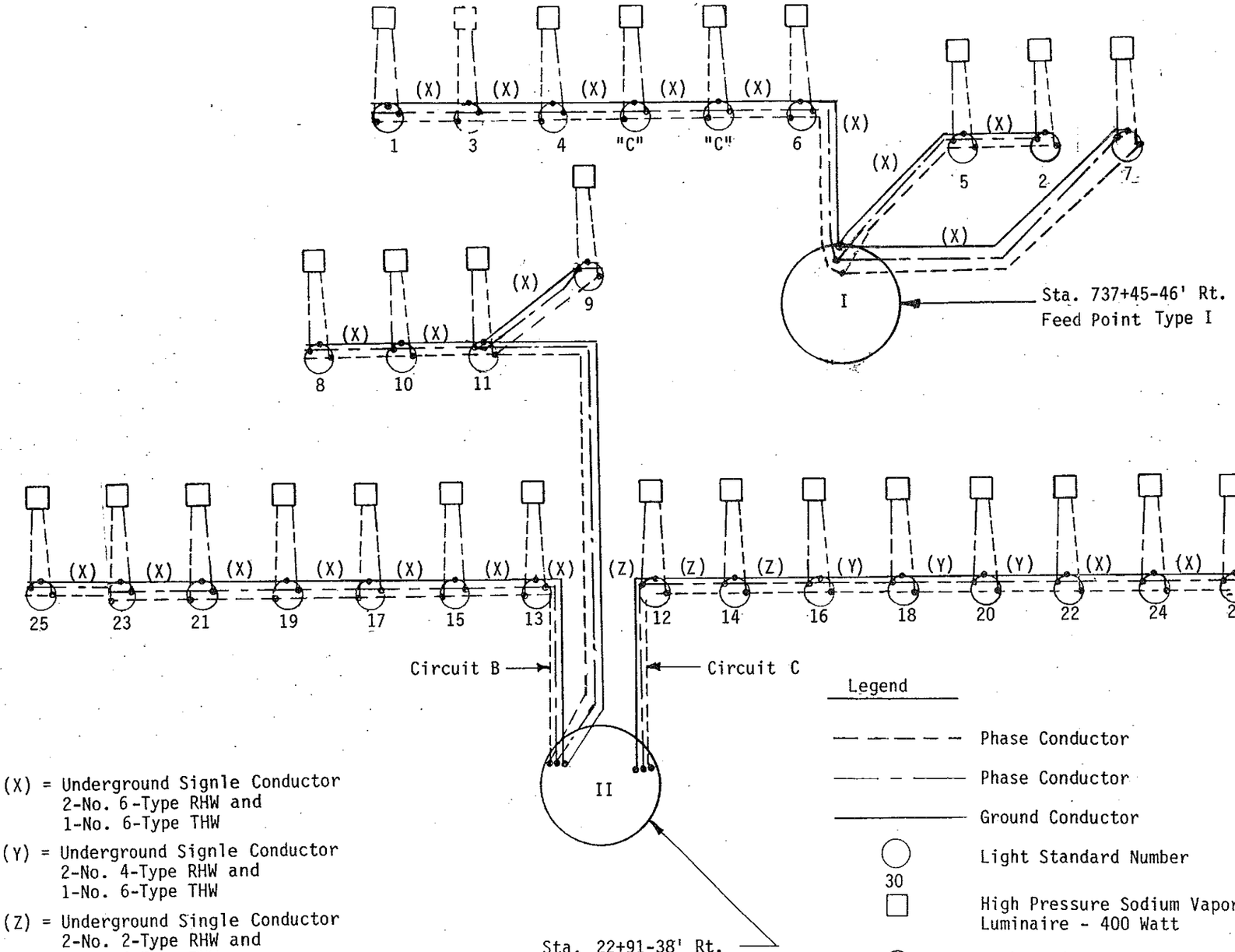
TRAFFIC CONTROL SYSTEM

Conduit Installation Details
Feeder Line and Light Std.
Pole Connection

10th Ave. S.W. (ND Hwy. #6)

Mandan, ND

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	F-RRS-1-006(005)066	145



(X) = Underground Signle Conductor
2-No. 6-Type RHW and
1-No. 6-Type THW

(Y) = Underground Signle Conductor
2-No. 4-Type RHW and
1-No. 6-Type THW

(Z) = Underground Single Conductor
2-No. 2-Type RHW and
1-No. 6-Type THW

Legend

- Phase Conductor
- Phase Conductor
- Ground Conductor
- 30 — Light Standard Number
- High Pressure Sodium Vapor Luminaire - 400 Watt
- "C" — Combonation Signal and Light Standard
- Existing Light Standard

TRAFFIC CONTROL SYSTEM

Lighting System Schematic
Feed Point I and
Feed Point II

Main Street & 10th Ave. S.W.
(ND Hwy. #6)
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	146

SIGN SUMMARY - PERFORATED TUBE

STATION	ASSEMBLY NUMBER	SIGN AREA FLAT SHEET TYPE 2	SIGN AREA FLAT SHEET TYPE 3 OR 4	SIGN SUPPORT POST LENGTHS 1ST	2ND	3RD	4TH	SIZE	SIGN SUPPORT SLEEVE LENGTH 1ST	2ND	3RD	4TH	SIZE	ANCHOR LNG.	SIZE	NO	TOTAL SUPPORT WEIGHT	RESET SIGN PAN.	RESET SUP.	MAX. LNG. FOR SUP. SIZE
729+60RT	ROUTE MK																	1	1	
731+95RT	7 RS	1.50		8.8				2.00						4.0	2.25	1	32.23			19.5
732+00LT	LANDFIL																	1	2	
732+28LT	9 RS	5.00		9.8				2.25						4.0	2.50	1	39.60			10.8
732+60RT	ROUTE MK																	1	2	
733+50LT	7 RS	1.50		8.8				2.00						4.0	2.25	1	32.23			19.5
733+33LT	391 RM	4.00																1	1	
733+33LT	I-94BSLP																	1	1	
733+50RT	7 RS	1.50		8.8				2.00						4.0	2.25	1	32.23			19.5
734+35LT	7 RS	1.50		8.8				2.00						4.0	2.25	1	32.23			19.5
734+50LT	SIGN A	1.50		8.8				2.00						4.0	2.25	1	32.23			19.5
735+35LT	SIGN A	1.50		8.8				2.00						4.0	2.25	1	32.23			19.5
735+32RT	4 RS		3.90	9.8				2.00						4.0	2.25	1	34.89			10.4
735+80RT	7 RS	1.50		8.8				2.00						4.0	2.25	1	32.23			19.5
736+49LT	67 GS	5.00		9.3				2.25						4.0	2.50	1	38.21			10.2
736+37RT	TRUCK RT																	1	1	
737+52LT	399 RM	6.19		10.0				2.19						4.0	2.19	1	47.90			10.8
738+20LT	442SNS			8.3				2.00						4.0	2.25	1	31.02	1		11.4
738+38LT	1 RS																	1	1	
738+52RT	441SNS																	1	1	
10+00LT	441SNS	4.50		8.3				2.00						4.0	2.25	1	31.02			11.4
10+05LT	1 RS		5.18	9.8				2.25						4.0	2.50	1	39.60			10.5
10+15RT	441SNS	4.50		8.3				2.00						4.0	2.25	1	31.02			11.4
734+30LT	10 RS	7.50		MAST ARM MOUNTED																
734+30LT	399 RM	6.19		MAST ARM MOUNTED																
734+30LT	438SNS	1.50		STANDARD MOUNTED																
734+44RT	438SNS	1.50		STANDARD MOUNTED																
735+00LT	438SNS	1.50		STANDARD MOUNTED																
735+09RT	438SNS	1.50		STANDARD MOUNTED																
735+09RT	9 RS	5.00		MAST ARM MOUNTED																
3+81LT	441SNS																	1	1	
4+00RT	441SNS																	1	1	
7+37RT	441SNS																	1	1	
7+80LT	441SNS	4.50		8.3				2.00						4.0	2.25	1	31.02			11.4
3+35LT	19 WS		6.25	9.7				2.19						4.0	2.19	1	47.02			10.3
3+47RT	19 WS		6.25	9.7				2.19						4.0	2.19	1	47.02			10.3
SUBTOTAL NO. 1		68.88	21.58														643.97	12	13	

BASIS OF ESTIMATE

Sign Support Lengths

The sign support lengths have been calculated using the following information:

VERTICAL CLEARANCE

Signs Viewed from Mainline 84"

Signs Viewed from Crossing

TRAFFIC CONTROL SYSTEM
Sign Summary

Main Street
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	147

SIGN SUMMARY - PERFORATED TUBE

STATION	ASSEMBLY NUMBER	SIGN AREA FLAT TYPE 2	SIGN AREA SHEET TYPE 3 OR 4	POST LENGTHS 1ST	2ND	3RD	4TH	SIZE	SLEEVE LENGTH 1ST	2ND	3RD	4TH	SIZE	ANCHOR LNG.	ANCHOR UNIT SIZE	ANCHOR UNIT NO	TOTAL SUPPORT WEIGHT	RESET SIGN PAN.	RESET SUP.	MAX. LNG. FOR SUP. SIZE
10+75RT	4 RS		3.90	9.8				2.00						4.0	2.25	1	34.89			10.4
11+86LT	8 RS	3.00		9.3				2.00						4.0	2.25	1	33.44			12.8
11+88RT	8 RS	3.00		9.3				2.00						4.0	2.25	1	33.44			12.8
16+45RT	8 RS	3.00		9.3				2.00						4.0	2.25	1	33.44			12.8
16+45LT	8 RS	3.00		9.3				2.00						4.0	2.25	1	33.44			12.8
17+68RT	9 RS	5.00																	1	
18+68RT	19 WS			9.7				2.19						4.0	2.19	1	47.02	1		10.3
19+10LT	7 RS	1.50		8.8				2.00						4.0	2.25	1	32.23			19.5
19+10RT	7 RS	1.50		8.8				2.00						4.0	2.25	1	32.23			19.5
20+00LT	9 RS			9.8				2.25						4.0	2.50	1	39.60	1		10.8
22+15RT	19 WS																	1	1	
22+33LT	442SNS																	1	1	
22+36LT	1 RS																	1	1	
22+85LT	19 WS																	1	1	
22+70RT	1 RS		5.18																1	
SUBTOTAL NO.	2	20.00	9.08														319.73	6	6	
TOTAL		88.88	30.66														963.70	18	19	

TRAFFIC CONTROL SYSTEM
Sign Summary

Main Street
Mandan, ND

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	140

SIGN SUMMARY - PERFORATED TUBE

STATION	ASSEMBLY NUMBER	SIGN AREA FLAT TYPE 2	SIGN AREA SHEET TYPE 3 OR 4	SIGN 1ST	SUPPORT 2ND	POST 3RD	LENGTHS 4TH	SIZE	SIGN 1ST	SUPPORT 2ND	SLEEVE LENGTH 3RD	4TH	SIZE	ANCHOR LNG.	UNIT SIZE	NO	TOTAL SUPPORT WEIGHT	RESET SIGN PAN.	RESET SUP.	MAX. LNG. FOR SUP. SIZE
23+43LT	SIGN 8	10.00		9.8	9.8			2.25						4.0	2.50	2	79.20			10.2
23+43RT	9 RS																	1	1	
25+84LT	442SNS			8.3				2.00						4.0	2.25	1	31.02	1		11.4
26+06LT	1 RS		5.18																1	
26+24RT	442SNS																	1	1	
26+50LT	14 RS	4.00		9.3				2.00						4.0	2.25	1	33.44			9.9
26+66LT	19 WS			9.7				2.19						4.0	2.19	1	47.02	1		10.3
29+76LT	442SNS			8.3				2.00						4.0	2.25	1	31.02	1		11.4
29+83LT	1 RS		5.18																1	
30+05RT	442SNS																	1	1	
30+30LT	14 RS	4.00		9.3				2.00						4.0	2.25	1	33.44			9.9
31+94LT	9 RS			9.8				2.25						4.0	2.50	1	39.60	1		10.8
33+50LT	442SNS			8.3				2.00						4.0	2.25	1	31.02	1		11.4
33+61LT	1 RS																	1	1	
34+01RT	1 RS																	1	1	
34+15LT	14 RS	4.00		9.3				2.00						4.0	2.25	1	33.44			9.9
34+17RT	442SNS																	1	1	
34+88RT	19 WS			9.7				2.19						4.0	2.19	1	47.02	1		10.3
37+28RT	20 WS		9.00	MAST ARM MOUNTED																
37+47LT	442SNS			8.3				2.00						4.0	2.25	1	31.02	1		11.4
37+46LT	1 RS																	1	1	
37+85LT	14 RS	4.00		9.3				2.00						4.0	2.25	1	33.44			9.9
37+89RT	1 RS		5.18																1	
37+85LT	9 RS																	1	1	
37+92RT	442SNS			8.3				2.00						4.0	2.25	1	31.02	1		11.4
38+02LT	20 WS		9.00	MAST ARM MOUNTED																
40+80RT	20 WS		9.00	MAST ARM MOUNTED																
40+90LT	20 WS		9.00	MAST ARM MOUNTED																
40+25LT	19 WS			9.7				2.19						4.0	2.19	1	47.02	1		10.3
41+19LT	9 RS																	1	1	
41+86RT	1 RS																	1	1	
43+38LT	19 WS																	1	1	
TOTAL		26.00	51.54														548.74	20	14	

TRAFFIC CONTROL SYSTEM

Sign Summary

Main Street
Mandan, ND

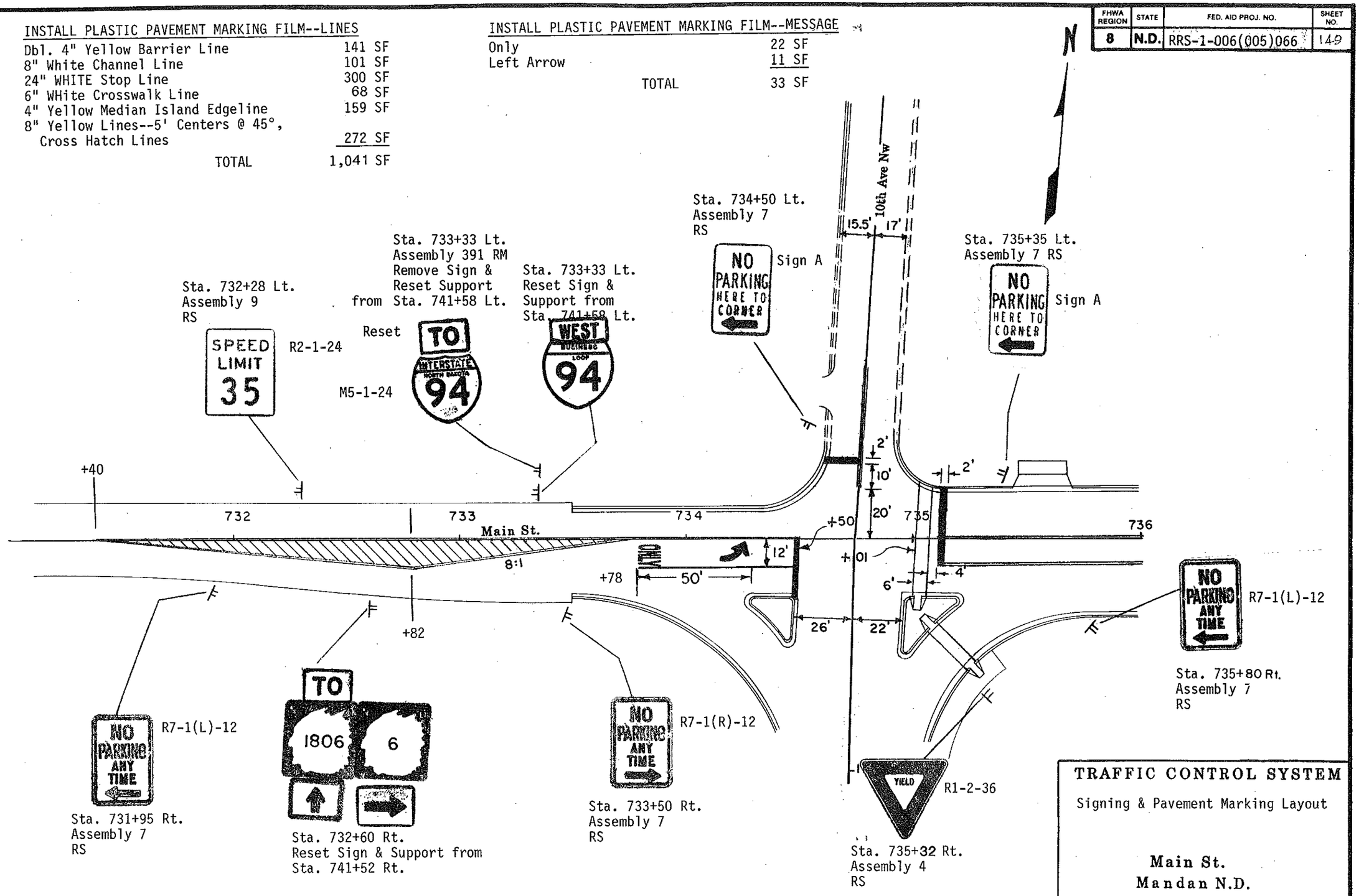
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	149

INSTALL PLASTIC PAVEMENT MARKING FILM--LINES

Dbl. 4" Yellow Barrier Line	141 SF
8" White Channel Line	101 SF
24" WHITE Stop Line	300 SF
6" WHite Crosswalk Line	68 SF
4" Yellow Median Island Edgeline	159 SF
8" Yellow Lines--5' Centers @ 45°, Cross Hatch Lines	272 SF
TOTAL	1,041 SF

INSTALL PLASTIC PAVEMENT MARKING FILM--MESSAGE

Only	22 SF
Left Arrow	11 SF
TOTAL	33 SF



TRAFFIC CONTROL SYSTEM

Signing & Pavement Marking Layout

Main St.
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	150

N

In Place
Remove

STOP

Sta. 734+30 Lt.
Assembly 10 RS
Mast Arm Mtd.

R10-5a-30

LEFT TURN PROTECTED ON GREEN ARROW ONLY

Sta. 734+30 Lt.
Assembly 399 RM
Mast Arm Mtd.

M1-5-24

M6-1(L)-21

Sta. 733+50 Lt.
Assembly 7
RS

NO PARKING ANY TIME

R7-1-12

Sta. 734+35 Lt.
Assembly 7
RS

NO PARKING ANY TIME

R7-1-12

Sta. 732+00 Lt.
Reset Sign and Support
from Sta. 734+00 Lt.

Mandan Sanitary
Landfill
3 Miles West

10th Ave NW

9

Sta. 734+30 Lt.
Assembly 438 SNS
Signal Std. Mtd.

10th AV W

D3-36

Sta. 735+00 Lt.
Assembly 438 SNS
Signal Std. Mtd.

Main ST W

D3-36

In Place
Remove

Main ST W

In Place
Remove

10th AV W

Main ST W

732 733 734 735 736

Main St.

N D
6

Sta. 729+60 Rt.
Reset Sign and Support
from Sta. 735+05 Rt.

Sta. 734+44 Rt.
Assembly 438 SNS
Signal Std. Mtd.

D3-36

Main ST W

10th AV W

Main ST W

In Place
Remove

10th AV W

D3-36

Sta. 735+09 Rt.
Assembly 438 SNS
Signal Std. Mtd.

LEFT TURN YIELD ON GREEN

R10-12-24

Sta. 735+09 Rt.
Assembly 9 RS Mast Arm Mtd.

TRAFFIC CONTROL SYSTEM

Signing Layout

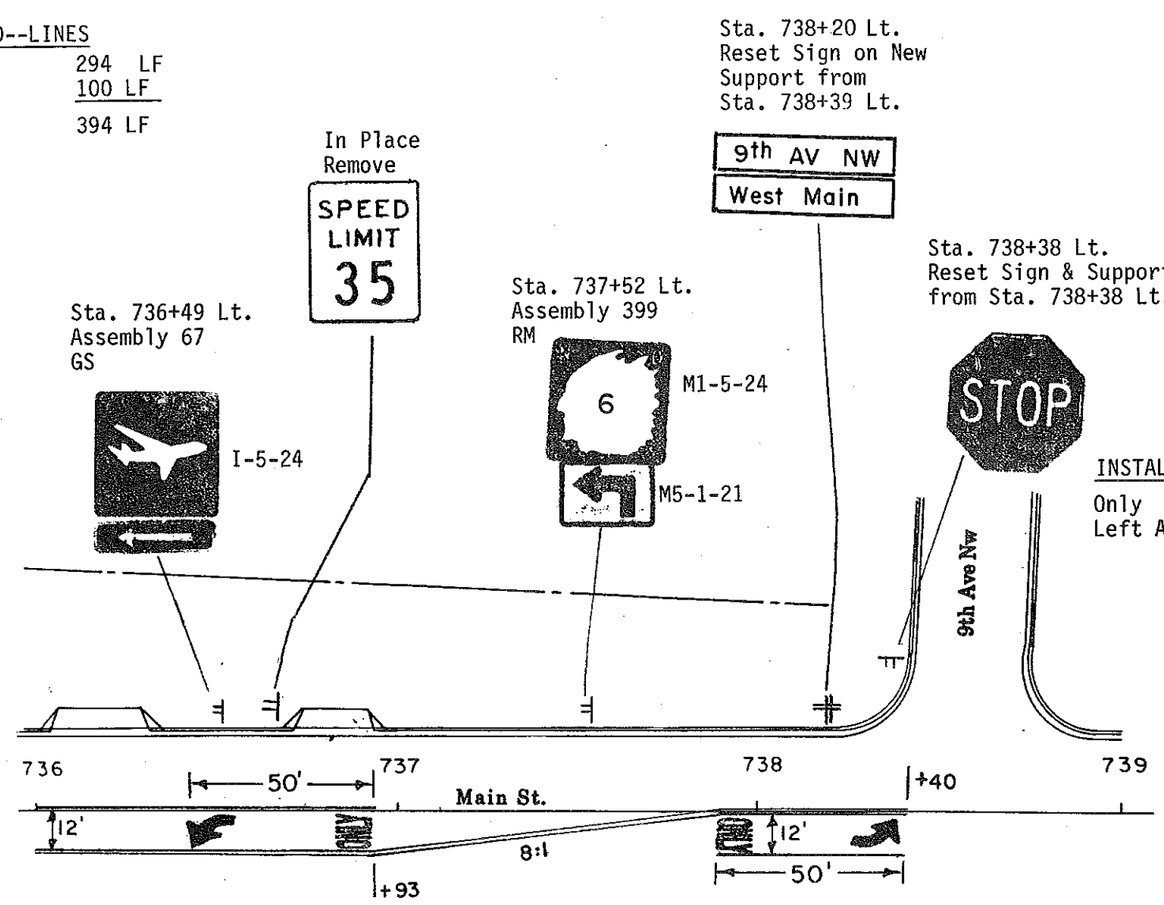
Mast Arm Mtd.

10th Ave sw (ND Hwy 6)
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	151

INSTALL PAVEMENT MARKING PAINTED--LINES

Dbl. 4" Yellow Barrier Lines	294 LF
8" White Channel Line	100 LF
TOTAL	394 LF



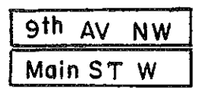
INSTALL PLASTIC PAVEMENT MARKING FILM-MESSAGES

Only	44 SF
Left Arrow	22 SF
TOTAL	66 SF

INSTALL PLASTIC PAVEMENT MARKING FILM--LINES

Dbl. 4" Yellow Barrier Lines	62 SF
8" White Channel Line	62 SF
TOTAL	124 SF

Sta. 736+37 Rt.
Reset Sign & Support from
Sta. 736+37 Rt.



Sta. 738+52 Rt.
Reset Sign & Support from
Sta. 738+52 Rt.

TRAFFIC CONTROL SYSTEM

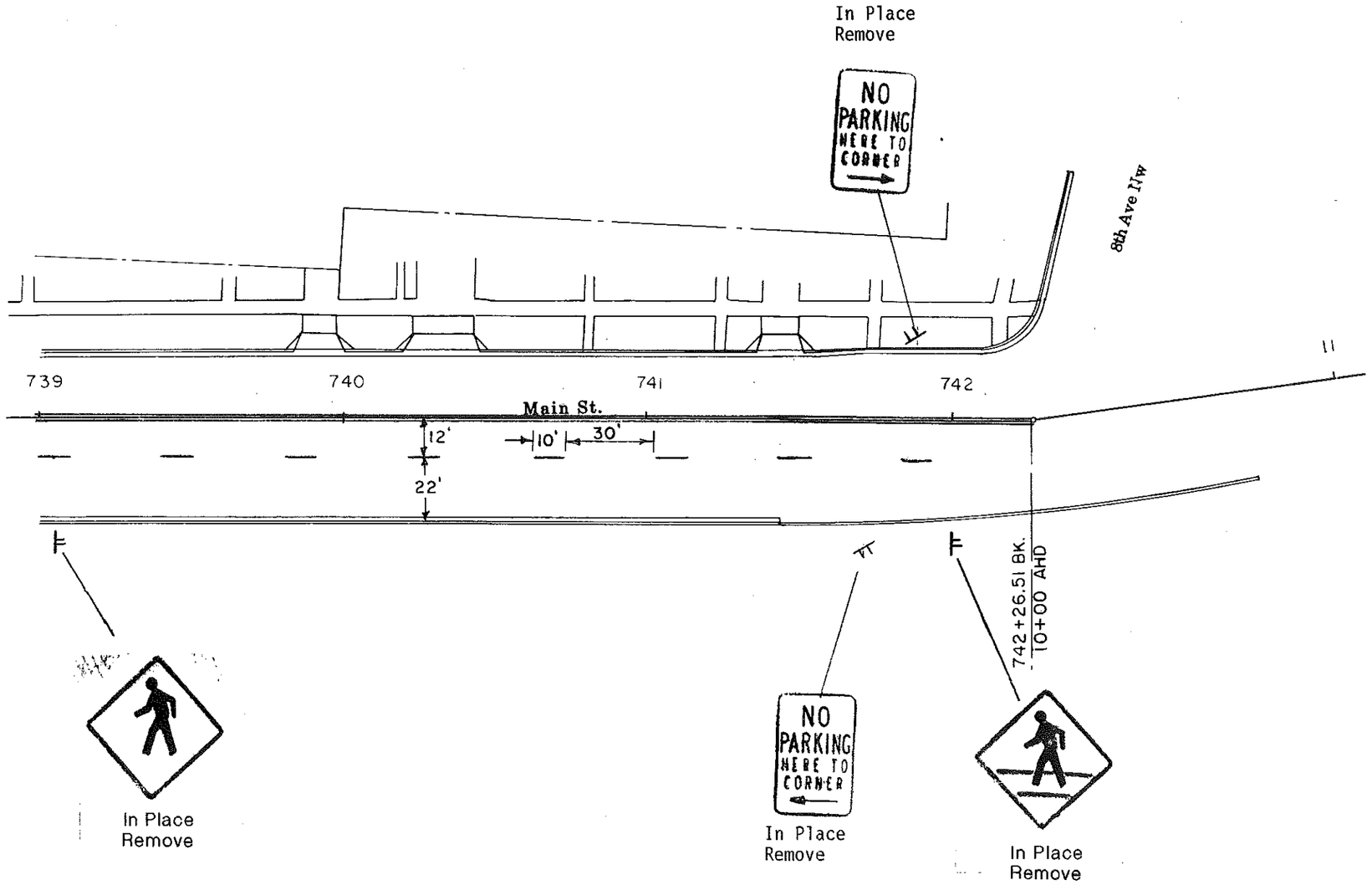
Signing & Pavement Marking Layout

Main St.
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	152

INSTALL PAVEMENT MARKING PAINTED LINES

Dbl. 4" Yellow Barrier Lines	654 LF
4" White Lane Lines, 10' Line, 30' Skip	80 LF
TOTAL	734 LF

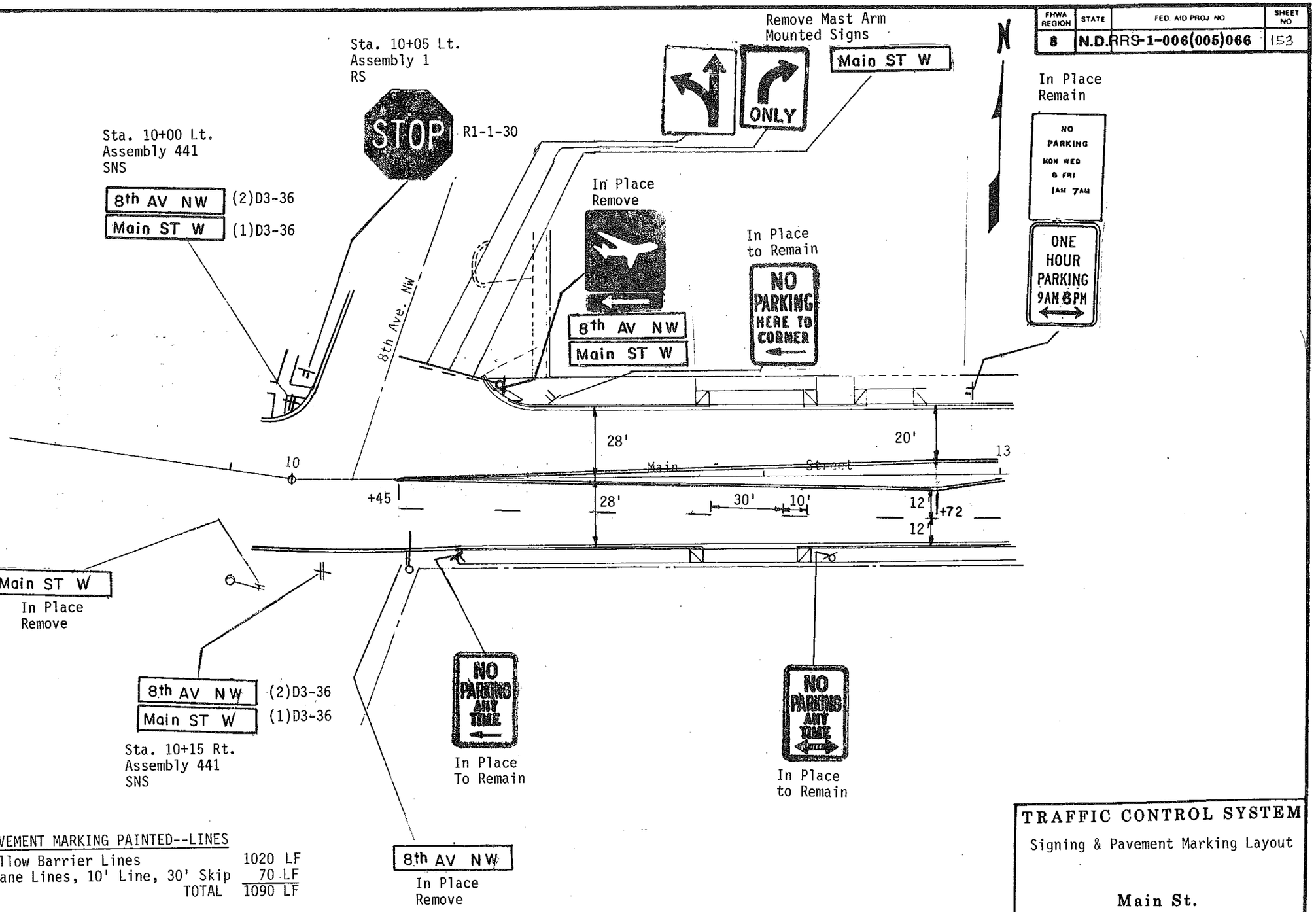


TRAFFIC CONTROL SYSTEM

Signing & Pavement Marking Layout

Main St.
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ NO	SHEET NO
8	N.D.	RRS-1-006(005)066	153



INSTALL PAVEMENT MARKING PAINTED--LINES

Dbl. 4" Yellow Barrier Lines	1020 LF
4" White Lane Lines, 10' Line, 30' Skip	70 LF
TOTAL	1090 LF

TRAFFIC CONTROL SYSTEM

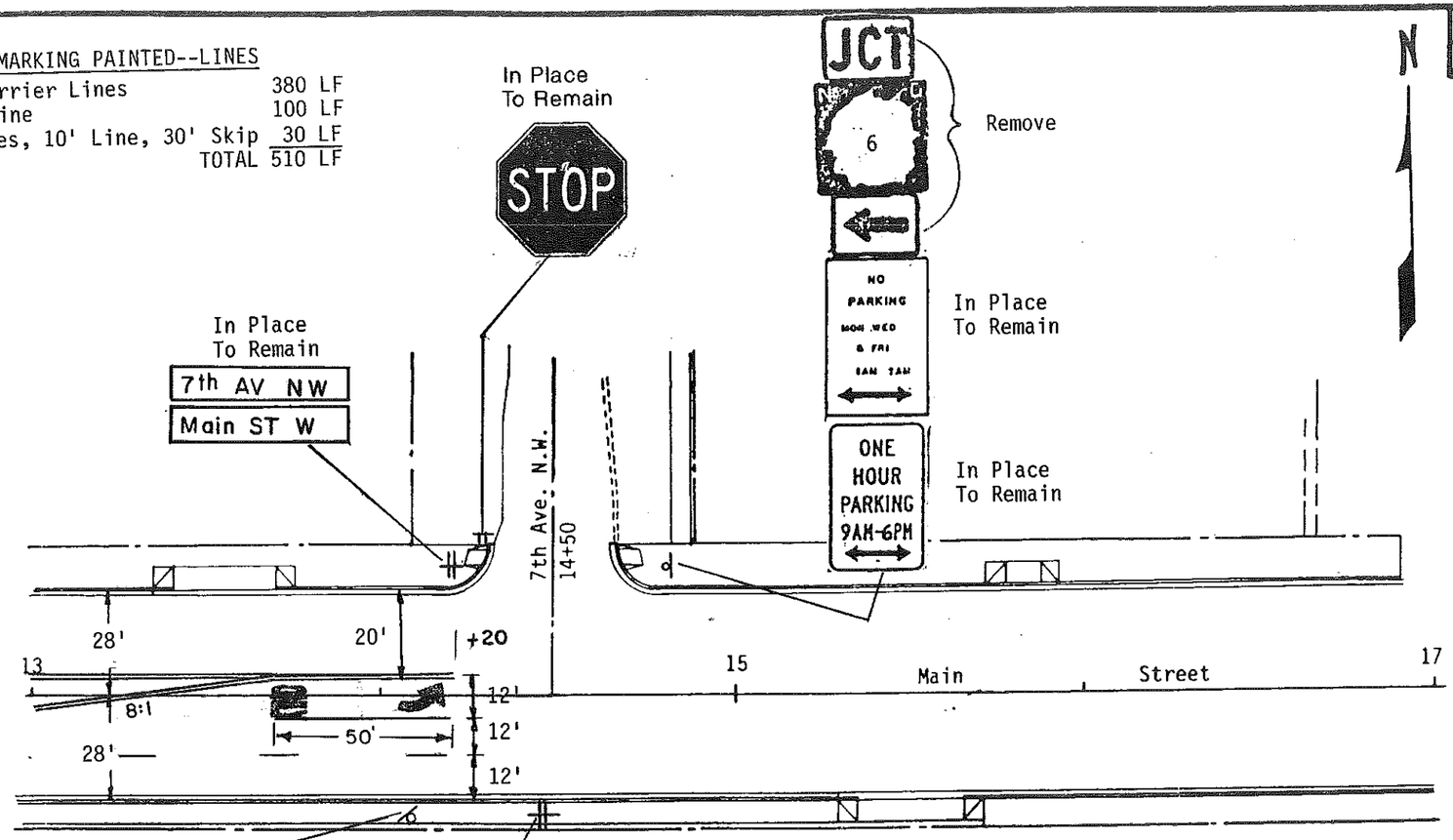
Signing & Pavement Marking Layout

Main St.
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO
8	N.D.	RRS-1-006(005)066	154

INSTALL PAVEMENT MARKING PAINTED--LINES

Dbl. 4" Yellow Barrier Lines	380 LF
8" White Chanel Line	100 LF
4" White Lane Lines, 10' Line, 30' Skip	30 LF
TOTAL	510 LF



In Place
To Remain

7th AV NW
Main ST W

In Place
To Remain

PLASTIC PAVEMENT MARKING FILM MESSAGE

Only	22 S.F.
Left Arrow	11 S.F.
TOTAL	33 S.F.

TRAFFIC CONTROL SYSTEM

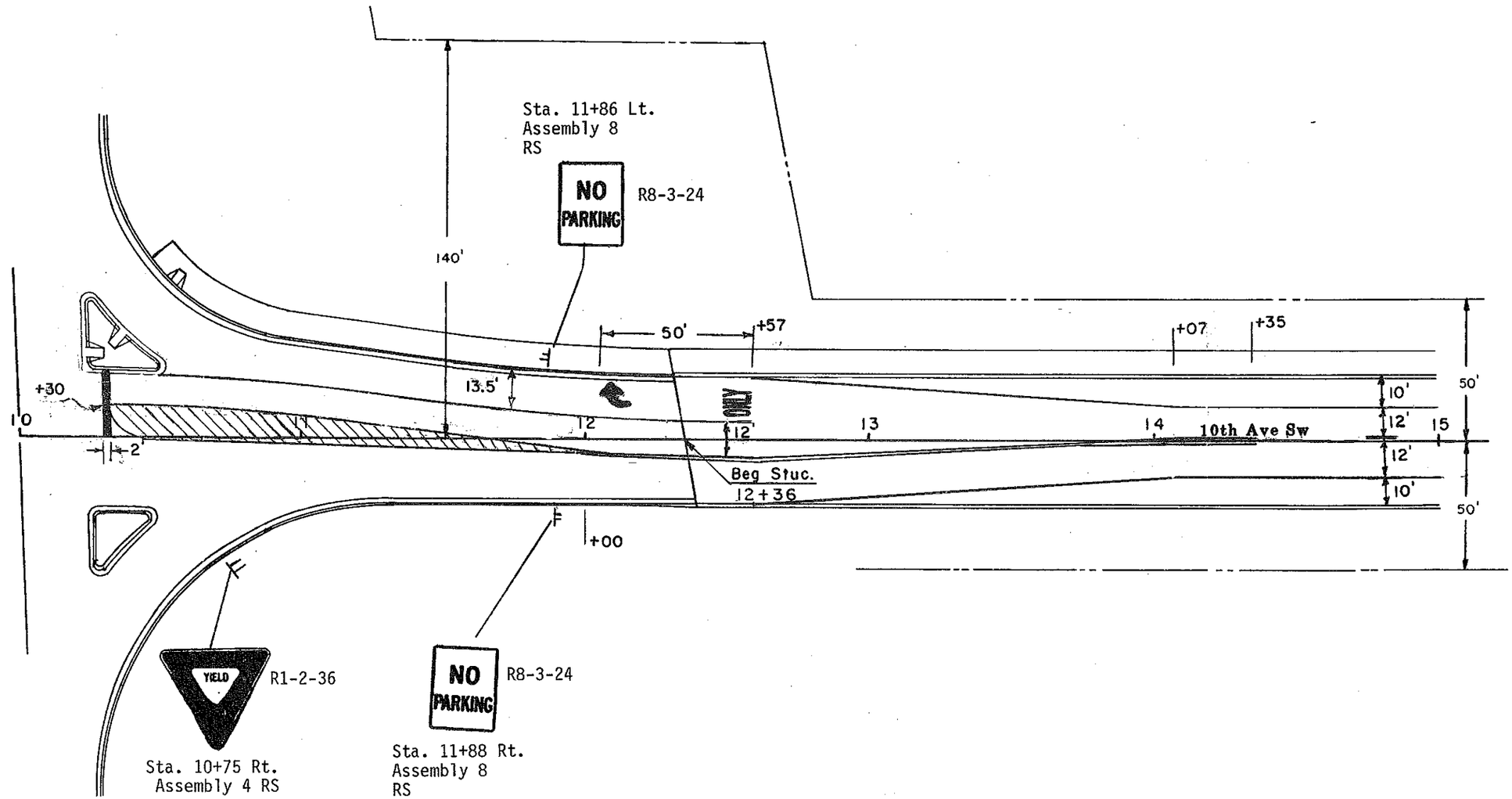
Signing & Pavement Marking Layout

Main St.
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	155

INSTALL PAVEMENT MARKING PAINTED--LINES

4" Yellow Lane Lines, 10' Line, 30' Skip	10 LF
Dbl. 4" Yellow Barrier Line (3" Between)	350 LF
4" White Edge Line	486 LF
TOTAL	846 LF



INSTALL PLASTIC PAVEMENT MARKING FILM LINES

8" White Channel Line	137 SF
Dbl. 4" Yellow Barrier Line	33 SF
4" Yellow Median Island Edgeline	120 SF
8" Yellow Lines--5' Ctr. @ 45, Cross Hatch Lines	101 SF
24" White Stop Line	48 SF
TOTAL	439 SF

INSTALL PLASTIC PAVEMENT MARKING FILM MESSAGE

Only	22 SF
Right Arrow	11 SF
	33 SF

TRAFFIC CONTROL SYSTEM

Signing & Pavement Marking Layout

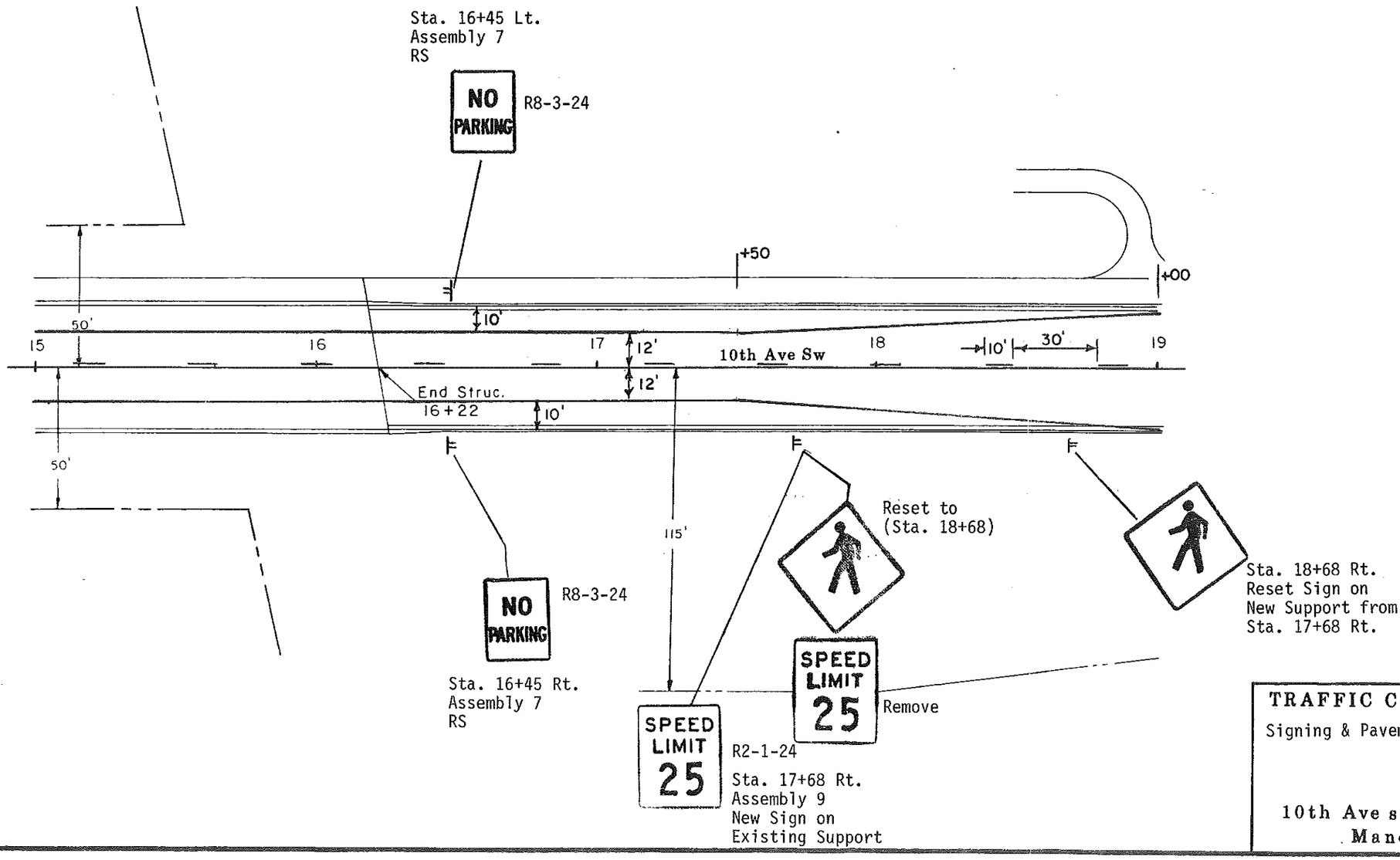
10th Ave sw (ND Hwy 6)
Mandan N.D.

512845

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	156

INSTALL PAVEMENT MARKING PAINTED--LINES

4" Yellow Lane Lines, 10' Line, 30' Skip	100 LF
4" White Edge Line	800 LF
TOTAL	900 LF



TRAFFIC CONTROL SYSTEM

Signing & Pavement Marking Layout

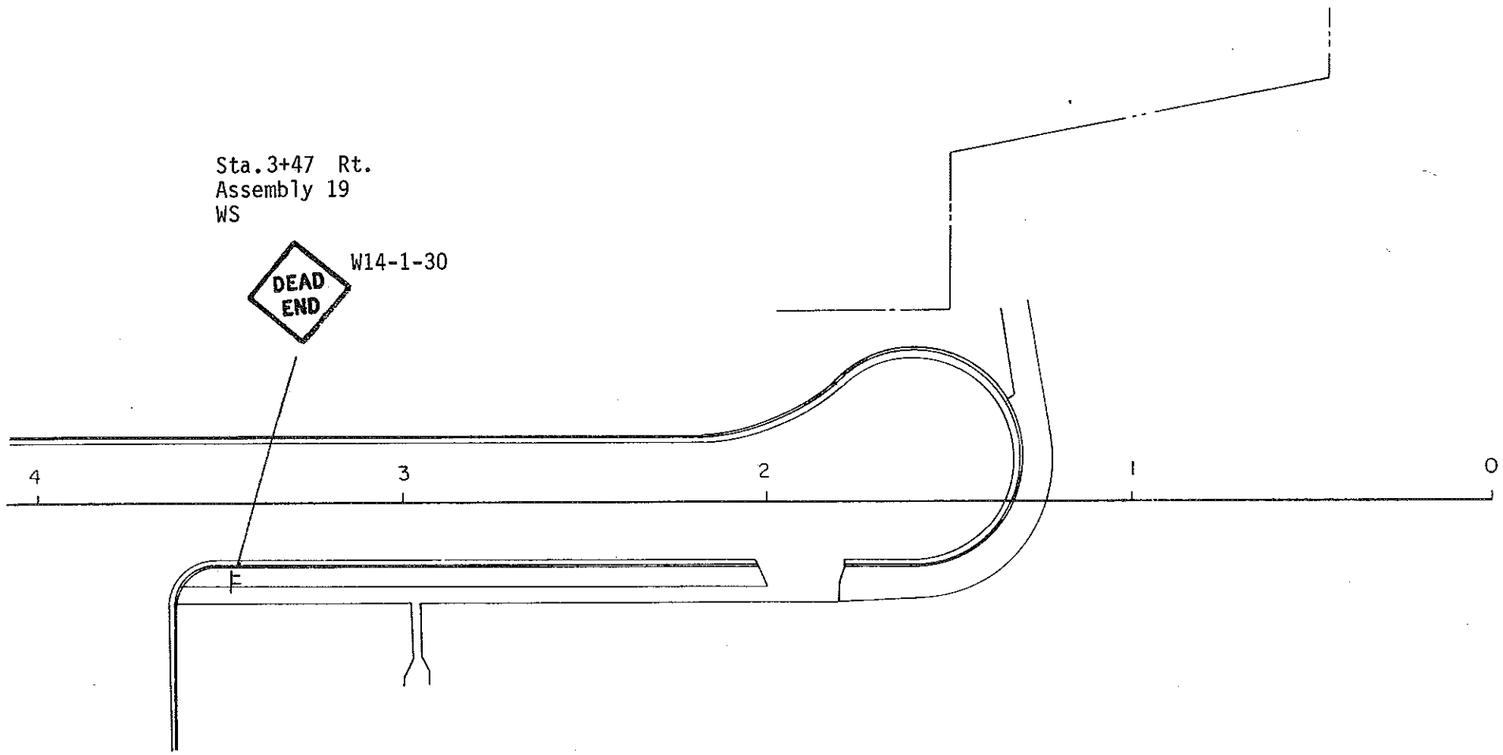
10th Ave sw (ND Hwy 6)
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	157

N

Sta.3+47 Rt.
Assembly 19
WS

W14-1-30



TRAFFIC CONTROL SYSTEM

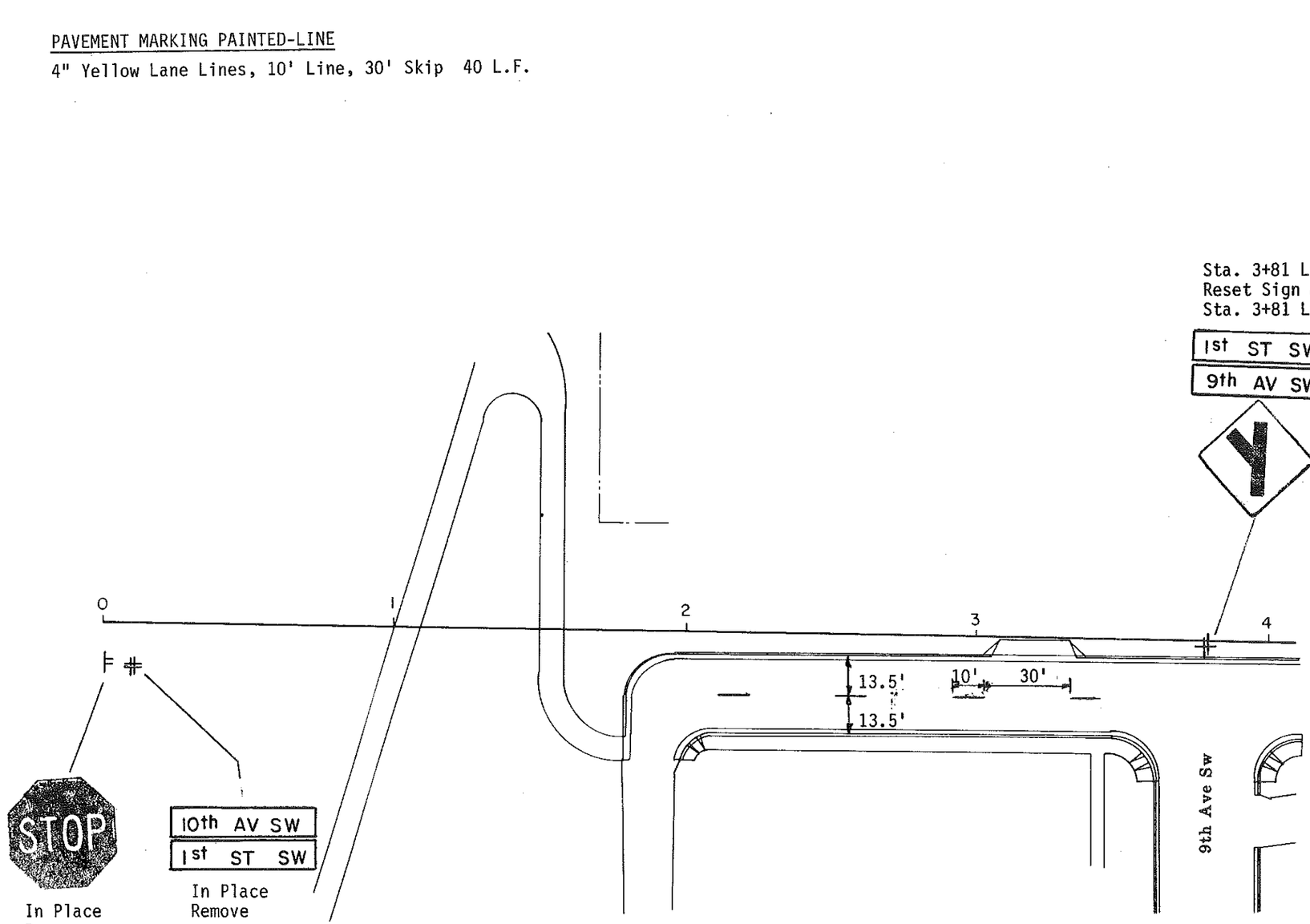
Signing Layout

1st St. sw
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO	SHEET NO.
8	N.D.	RRS-1-006(005)066	150

PAVEMENT MARKING PAINTED-LINE

4" Yellow Lane Lines, 10' Line, 30' Skip 40 L.F.



TRAFFIC CONTROL SYSTEM

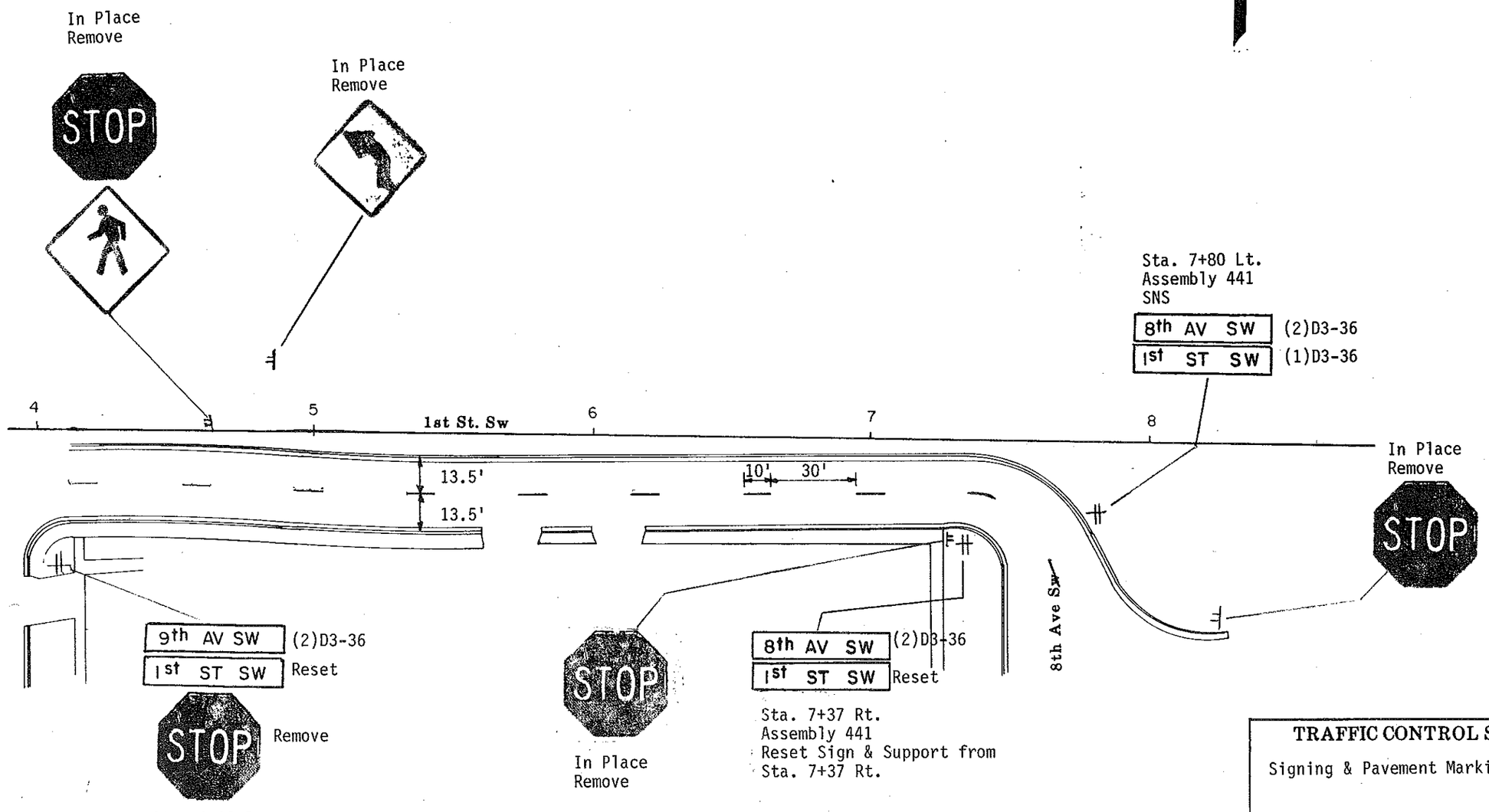
Signing & Pavement Marking Layout

1st St. sw & 9th Ave sw
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	159

PAVEMENT MARKING PAINTED-LINE

4" Yellow Lane Lines, 10' Line, 30' Skip 100 L.F.



TRAFFIC CONTROL SYSTEM

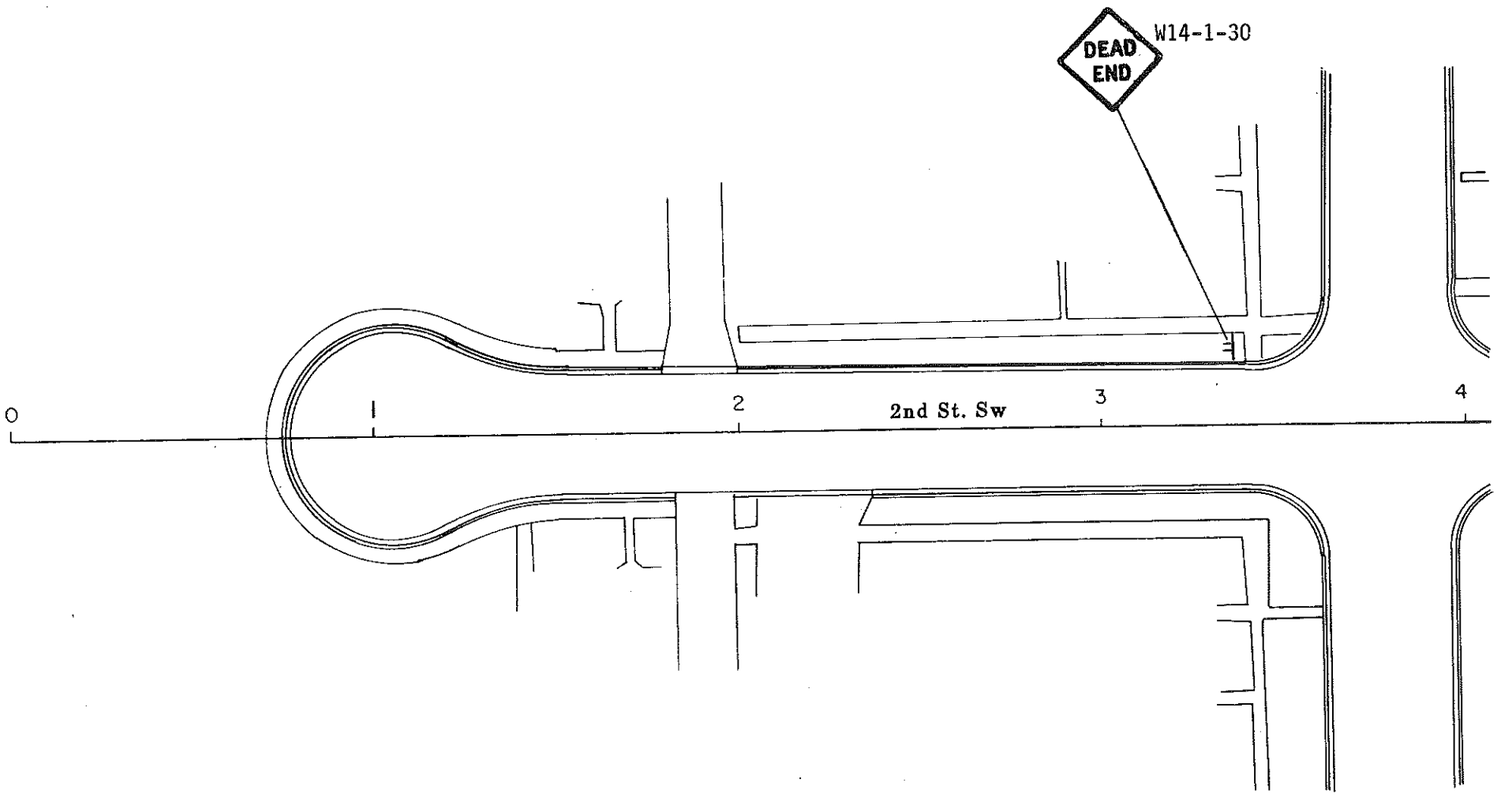
Signing & Pavement Marking Layout

1st St. sw & 8th Ave sw
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	160

N

Sta. 3+35 Lt.
Assembly 19
WS



TRAFFIC CONTROL SYSTEM

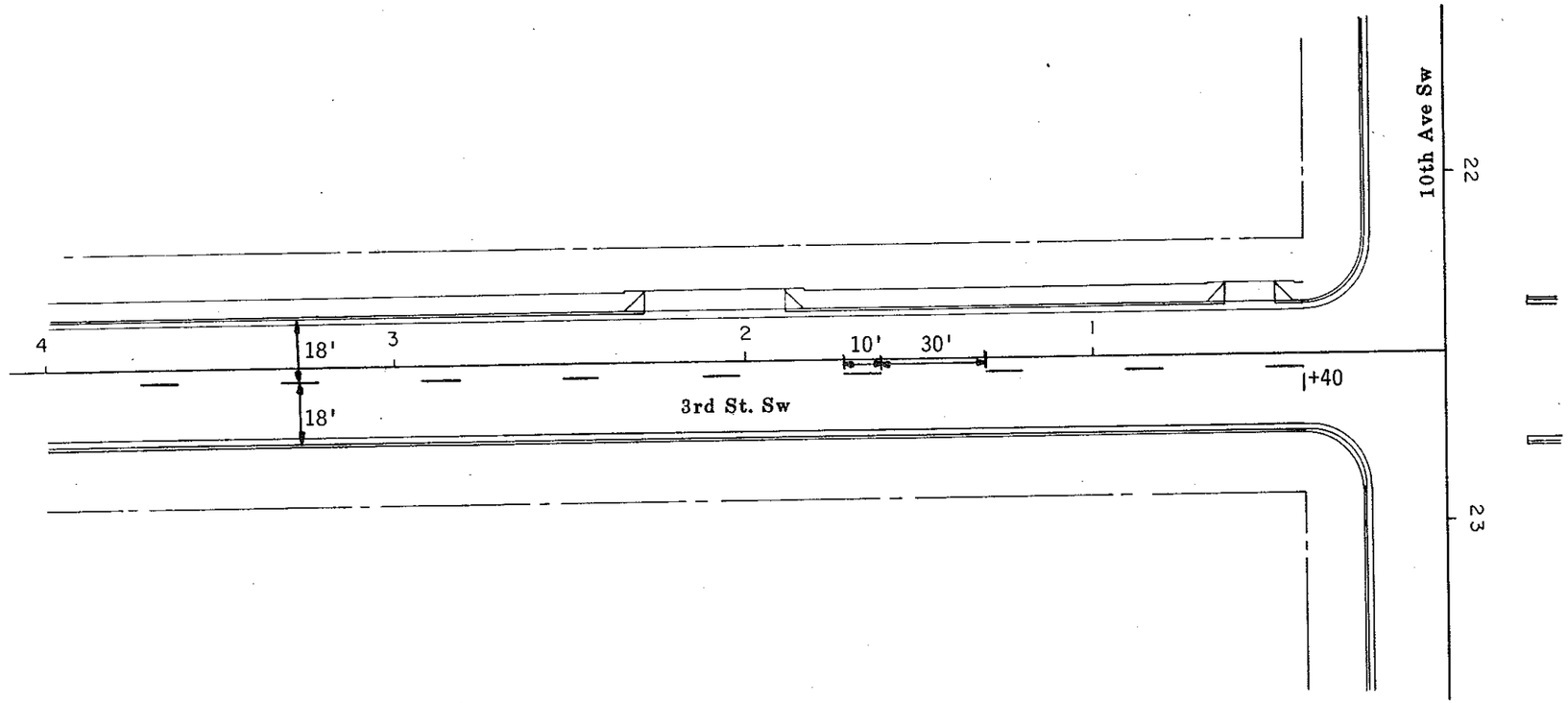
Signing Layout

2nd St. sw & 10th Ave sw
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	161

PAVEMENT MARKING PAINTED-LINE

4" Yellow Lane Lines, 10' Line, 30' Skip 90 L.F.



TRAFFIC CONTROL SYSTEM

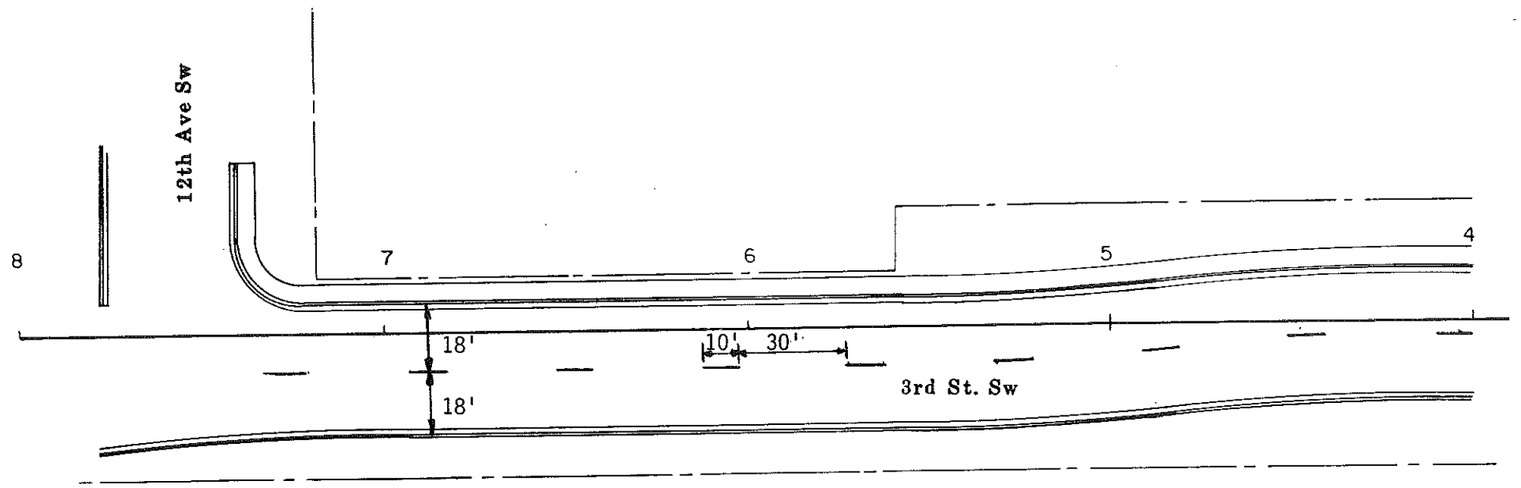
Signing & Pavement Marking Layout

3rd St. sw & 10th Ave sw
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO
8	N.D.	RRS-1-006(005)066	162

PAVEMENT MARKING PAINTED-LINE

4" Yellow Lane Line, 10' Line, 30' Skip 90 L.F.



TRAFFIC CONTROL SYSTEM

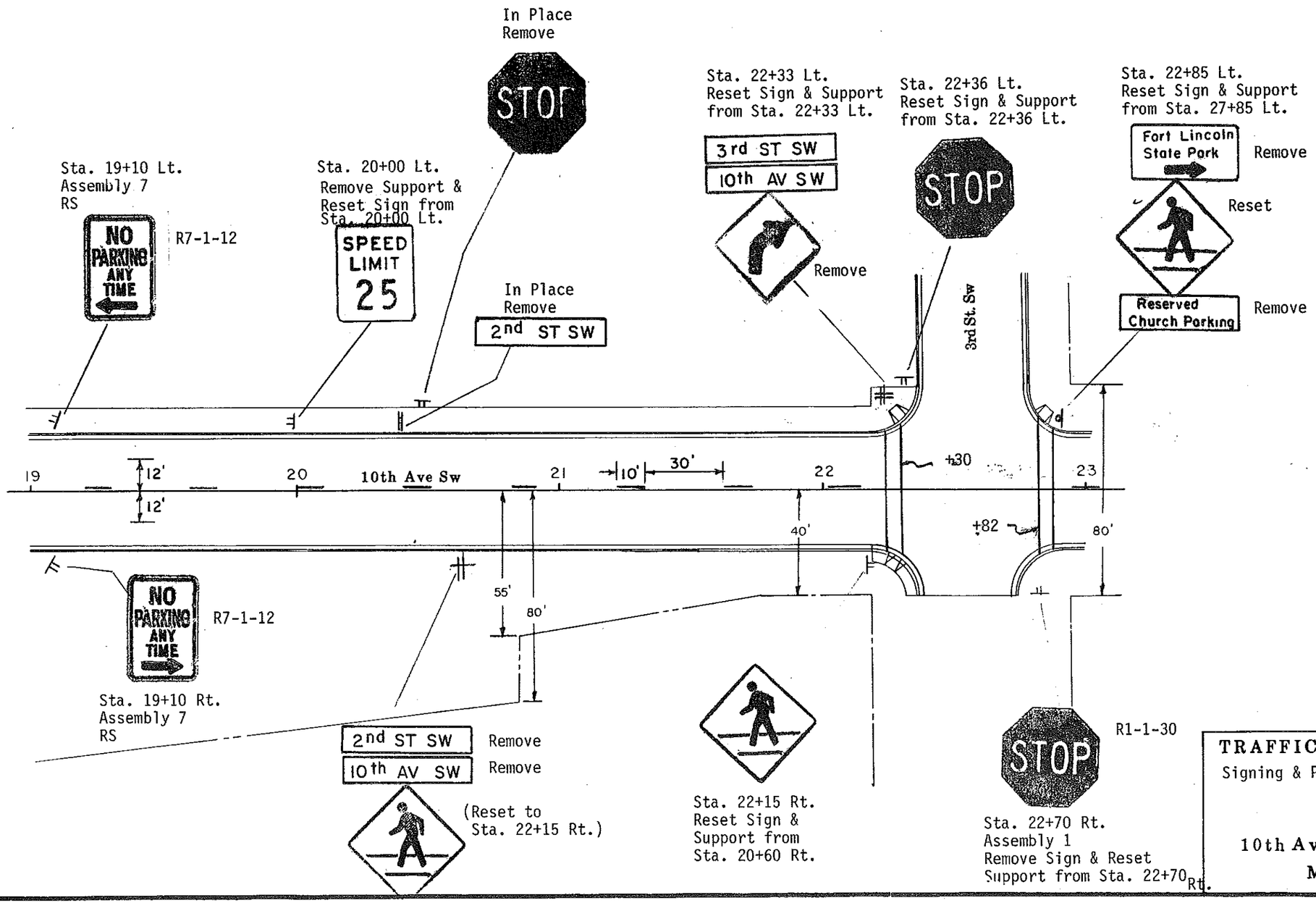
Signing & Pavement Marking Layout

3rd St. sw & 12th Ave sw
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	RRS-1-006(005)066	163

INSTALL PAVEMENT MARKING PAINTED--LINES

4" Yellow Lane Lines, 10' Line, 30' Skip	90 LF
6" White Crosswalk Line	285 LF
TOTAL	375 LF



TRAFFIC CONTROL SYSTEM

Signing & Pavement Marking Layout

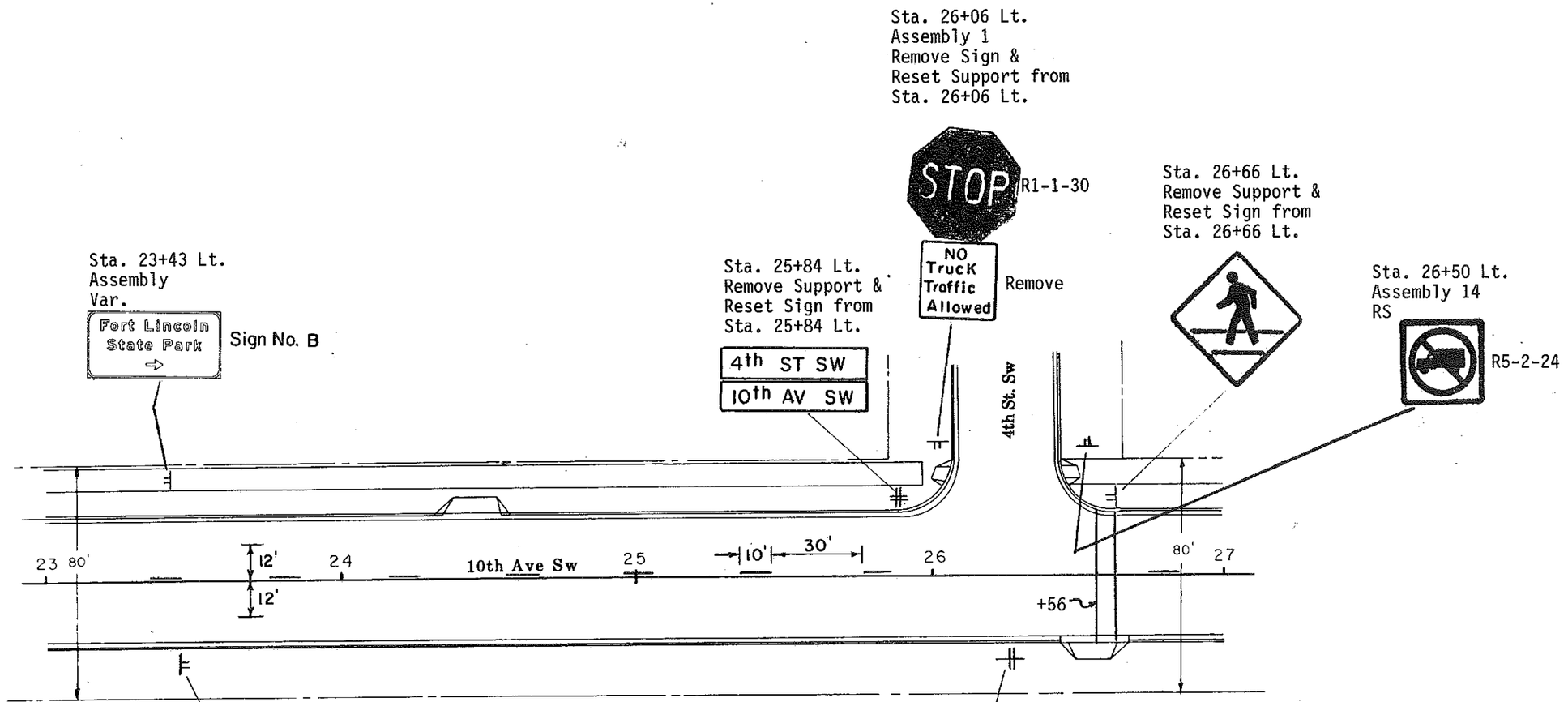
10th Ave sw (ND Hwy 6)

Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	164

INSTALL PAVEMENT MARKING PAINTED--LINES

4" Yellow Lane Lines, 10' Line, 30' Skip	80 LF	
6" White Crosswalk Line	132 LF	
TOTAL	212 LF	



TRAFFIC CONTROL SYSTEM

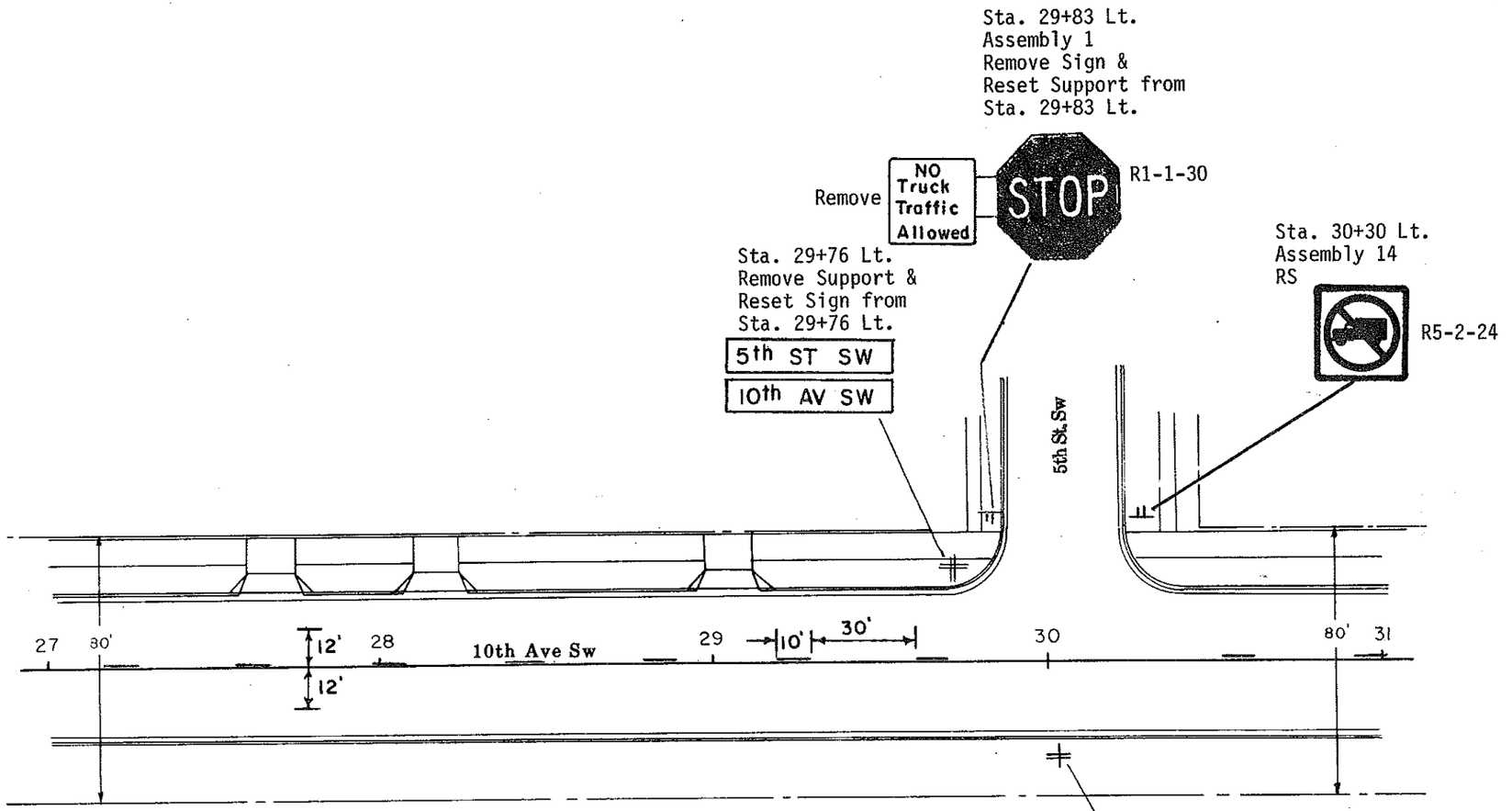
Signing & Pvmt. Marking Layout

10th Ave sw (ND Hwy 6)
Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	165

INSTALL PAVEMENT MARKING PAINTED--LIENS

4" Yellow Lane Lines, 10' Line, 30' Skip 90 LF



TRAFFIC CONTROL SYSTEM

Signing & Pavement Marking Layout

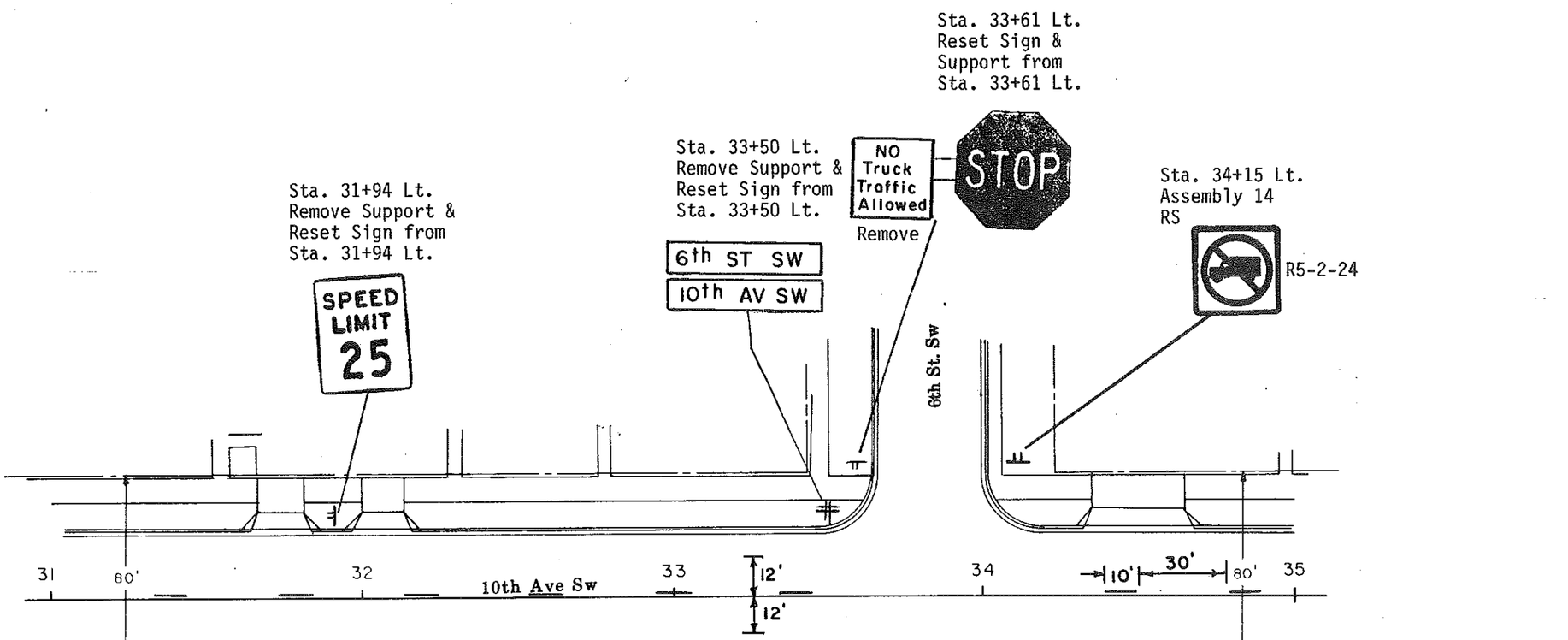
10th Ave sw (ND Hwy 6)

Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	166

INSTALL PAV EMENT MARKING PAINTED--LINES

4" Yellow Lane Lines, 10' Line, 30' Skip 80 LF



Sta. 34+01 Rt.
Reset Sign &
Support from
Sta. 34+01 Rt.

(Reset to
Sta. 34+88 Rt.)

Sta. 34+17 Rt.
Reset Sign &
Support from
Sta. 34+17 Rt.

Sta. 34+88 Rt.
Reset Sign on
New Support from
Sta. 34+17 Rt.

TRAFFIC CONTROL SYSTEM

Signing & Pavement Marking Layout

10th Ave sw (ND Hwy 6)

Mandan N.D.

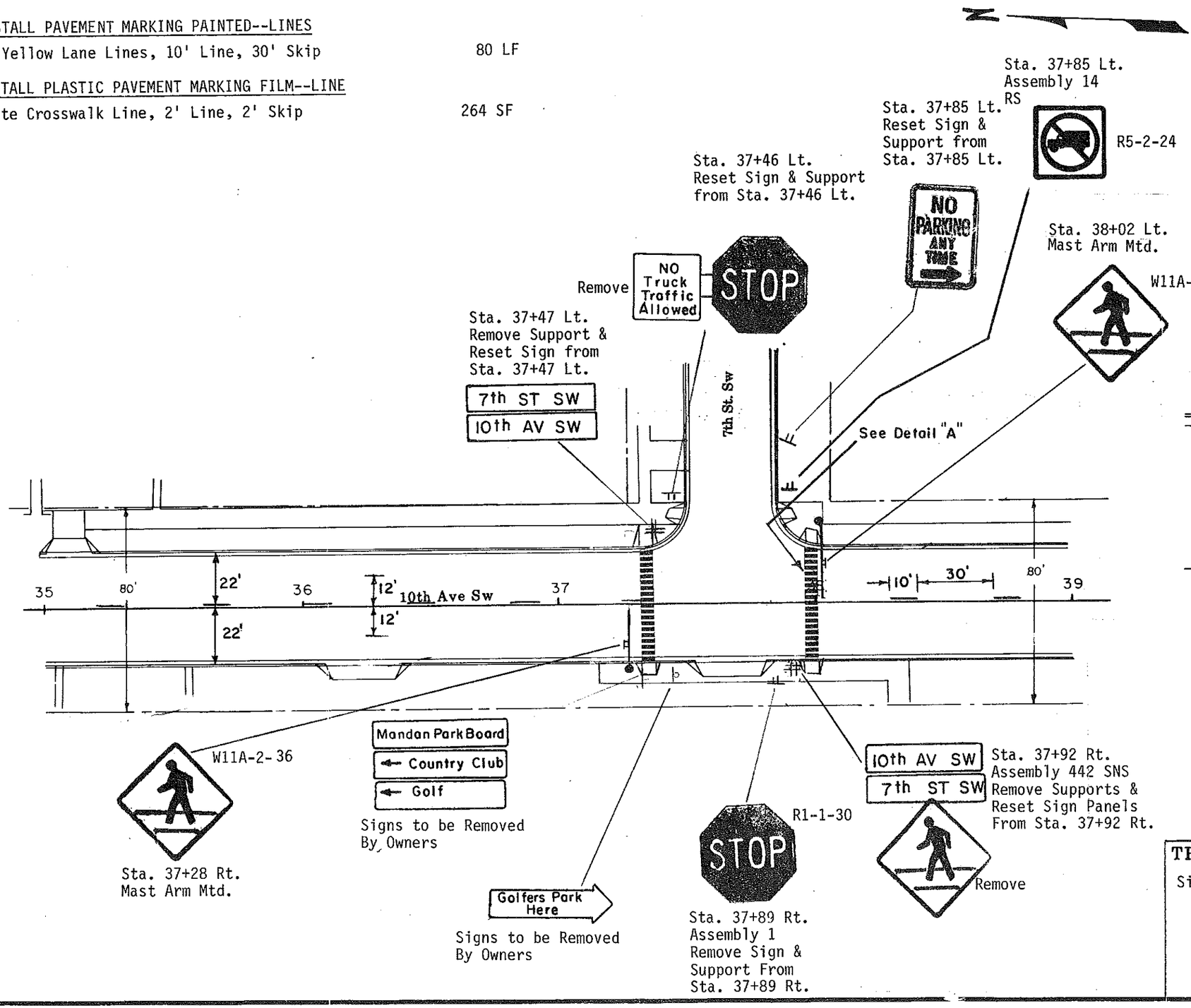
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	167

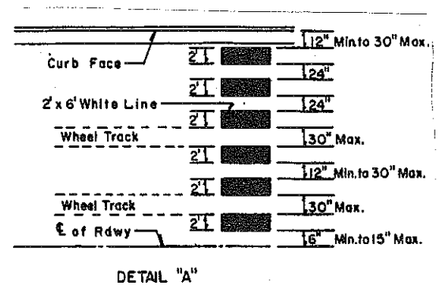
INSTALL PAVEMENT MARKING PAINTED--LINES

4" Yellow Lane Lines, 10' Line, 30' Skip — 80 LF

INSTALL PLASTIC PAVEMENT MARKING FILM--LINE

White Crosswalk Line, 2' Line, 2' Skip — 264 SF





DETAIL "A"

TRAFFIC CONTROL SYSTEM

Signing & Pavement Marking Layout

10th Ave sw (ND Hwy 6)

Mandan N.D.

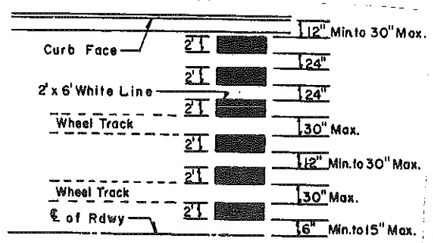
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	168

INSTALL PAVEMENT MARKING PAINTED--LINES

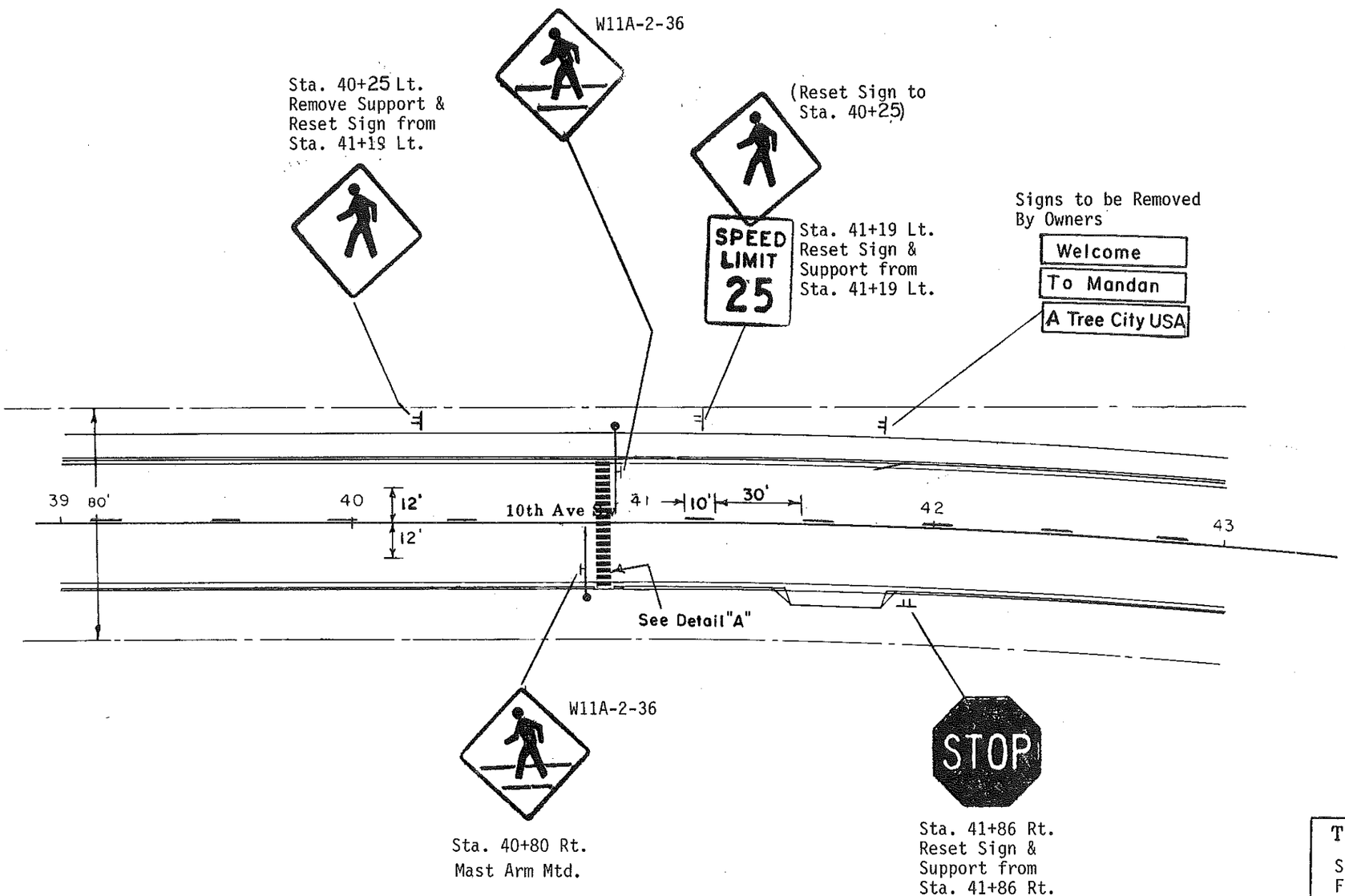
4" Yellow Lane Lines, 10' Line, 30' Skip 100 LF

INSTALL PLASTIC PAVEMENT MARKING FILM--LINE

White Crosswalk Line, 2' Line, 2' Skip 132 SF



DETAIL "A"



TRAFFIC CONTROL SYSTEM

Signing, Pavement Marking, & Flashing Beacon Layout

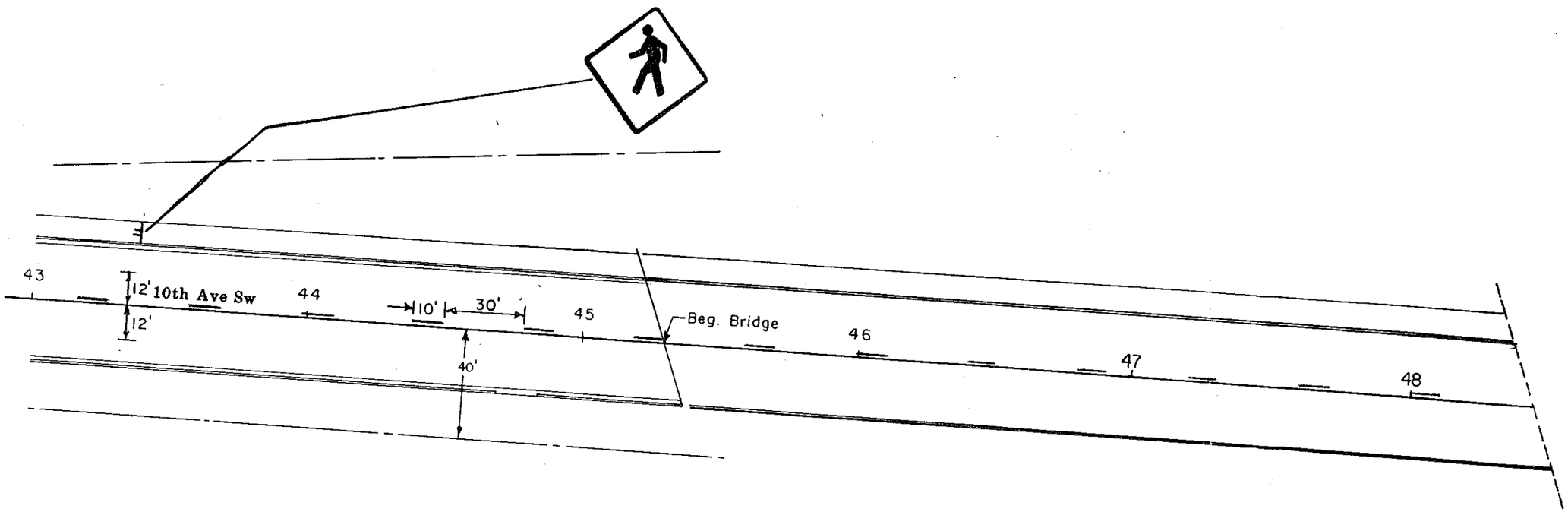
10th Ave sw (ND Hwy 6)

Mandan N.D.

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-006(005)066	169

INSTALL PAVEMENT MARKING PAINTED--LINES

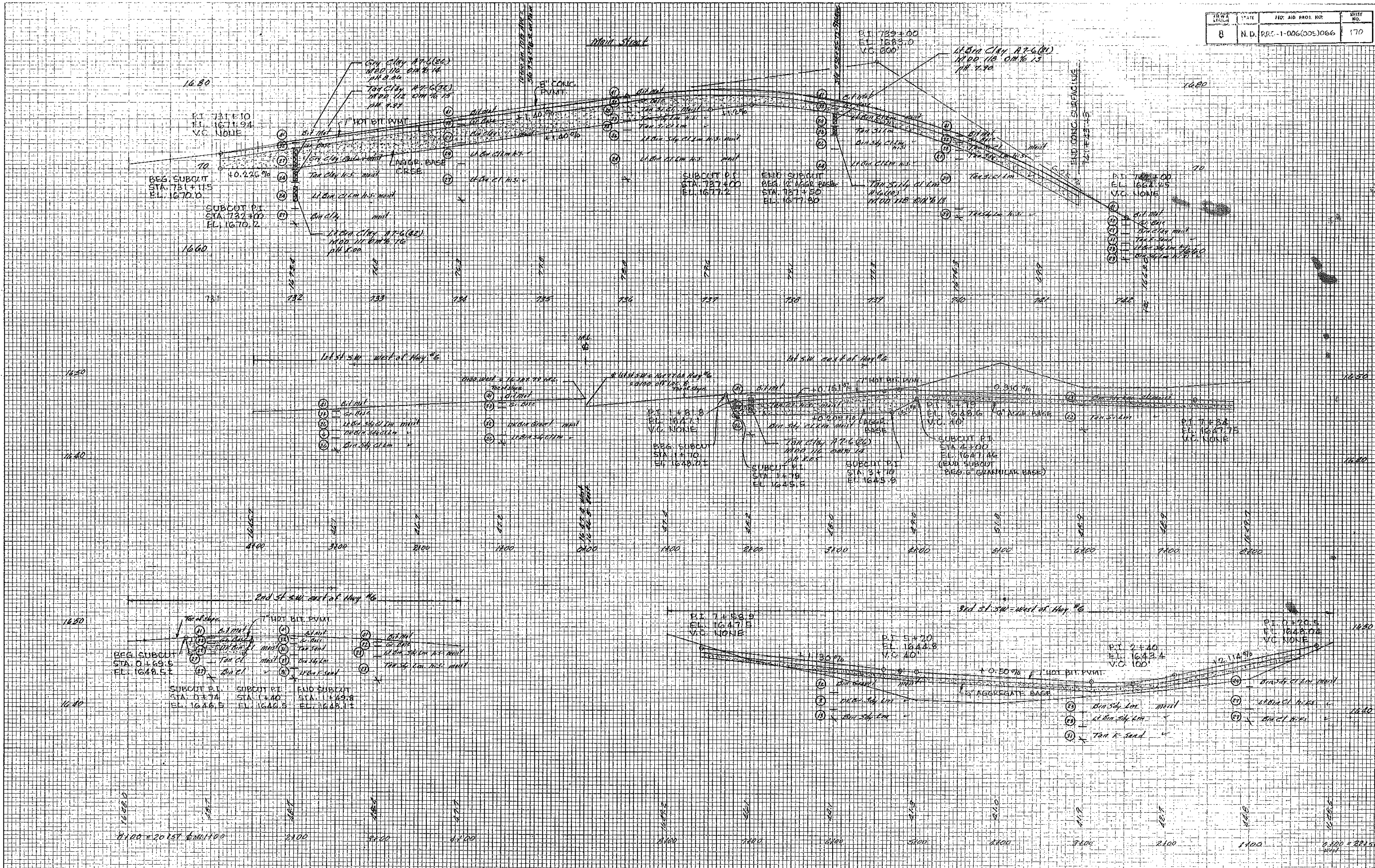
4" Yellow Lane Lines, 10' Line, 30' Skip 130 LF



TRAFFIC CONTROL SYSTEM

Signing & Pavement Marking Layout

10th Ave sw (N.D. Hwy.6)
Mandan N.D.



8
N. D.
RRC-1-006(005)066
170
Main Street
P.I. 731+10
EL. 1671.94
V.C. NONE
BEG. SUBCUT
STA. 731+11.5
EL. 1670.0
SUBCUT P.I.
STA. 732+00
EL. 1670.2
8" CONC. PVMT.
1" HOT BIT. PVMT.
SUBCUT P.I.
STA. 737+00
EL. 1677.2
END SUBCUT
P.I. 739+00
EL. 1683.0
V.C. 800'
END CONC. SURFACING
1st St S.W. west of Hwy #6
1st S.W. east of Hwy #6
P.I. 1+81.8
EL. 1647.1
V.C. NONE
BEG. SUBCUT
SUBCUT P.I.
STA. 1+79
EL. 1645.5
SUBCUT P.I.
STA. 3+10
EL. 1645.8
SUBCUT P.I.
STA. 4+00
(END SUBCUT
BEG. 6" GRANULAR BASE)
P.I. 7+84
EL. 1647.75
V.C. NONE
2nd St S.W. east of Hwy #6
1" HOT BIT. PVMT.
BEG. SUBCUT
STA. 0+69.5
EL. 1648.5±
SUBCUT P.I.
STA. 0+74
EL. 1646.5
SUBCUT P.I.
STA. 1+40
EL. 1646.5
END SUBCUT
STA. 1+49.8
EL. 1648.1±
3rd St S.W. west of Hwy #6
P.I. 7+58.9
EL. 1647.5
V.C. NONE
P.I. 5+20
EL. 1644.8
V.C. 40'
P.I. 2+40
EL. 1643.4
V.C. 100'
P.I. 0+70.5
EL. 1648.04
V.C. NONE
1" HOT BIT. PVMT.
6" AGGREGATE BASE

SURVEY NOTE BOOK NO. PLOTTED TEMPLATE AREAS AREAS CHECKED

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N. D.	F-RRS-1-006(005)066	171

NOTE: the new structures and approach fills installed on project RRS-1-006(004)067 are not shown on this sheet.

FINAL SURVEY	SURVEYED	BY	DATE
NOTE BOOK	PLOTTED		
NO.	TEMPLATE		
	AREAS		
	AREAS CHECKED		

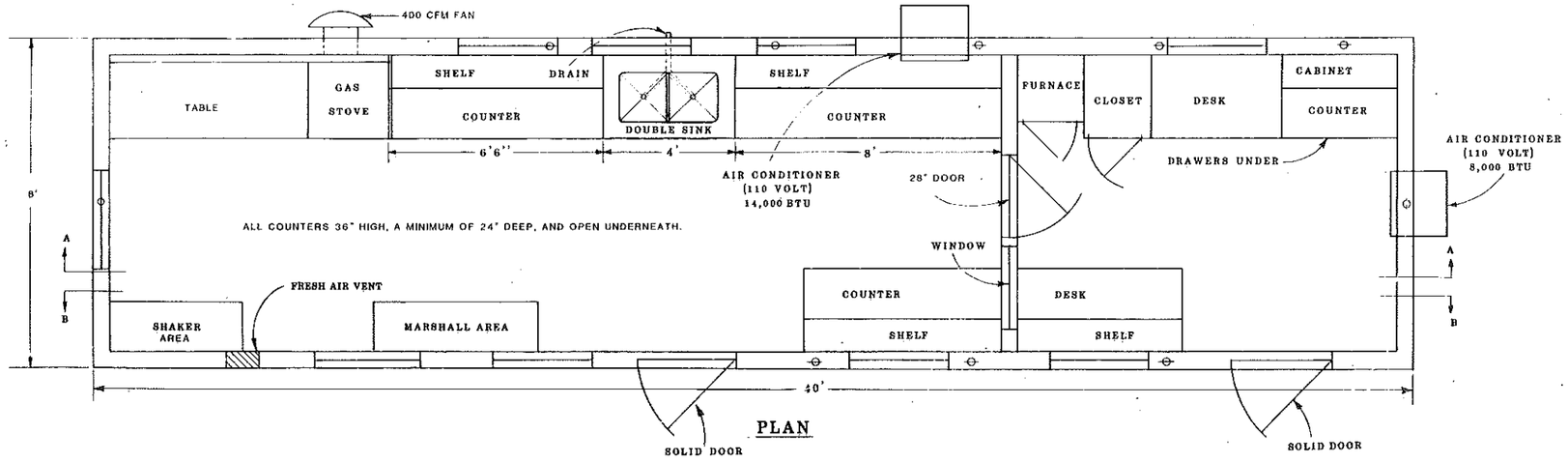
ORIGINAL SURVEY	SURVEYED	BY	DATE
NOTE BOOK	PLOTTED		
NO.	TEMPLATE		
	AREAS		
	AREAS CHECKED		

TYPE C FIELD LABORATORY

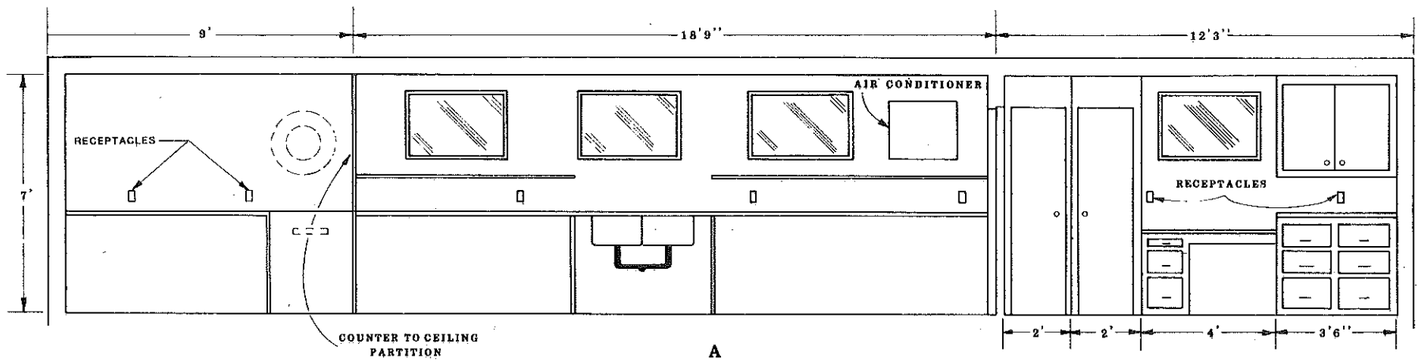
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.		

D-706-1

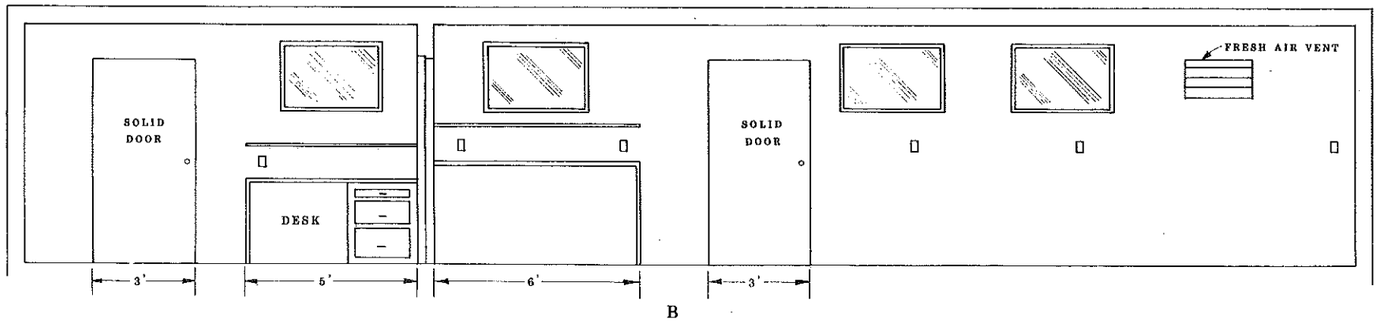
F-RRS-1-006(005)066



PLAN



A



B

LONGITUDINAL SECTIONS

NOTES:

There shall be a minimum of 6 exterior ventilated casement or double hung windows. The minimum total area of opening shall be 34 square feet. The number, size, and location of windows may be adjusted to fit conditions. Suggested locations are shown on drawing.

The sink shall be double compartment stainless steel. Each compartment shall be a minimum of 16"x14"x10" deep The sink shall be drained to an outside wasteline. A trap is not required. Water service lines shall be copper or plastic having a diameter of 1/2 inch.

The lab shall be equipped with an exhaust fan capable of removing inside air at a rate of 400 CFM.

The fresh air vent shall be hinged to open or close manually.

24" x 48" table shall be provided capable of holding a 200 lb. masonry saw. The table shall have a minimum clearance of 36" overhead.

The water supply tank shall have a capacity of 500 gallons.

Steps shall be provided for each of two entrance doors. Steps for each area shall be made of, or covered with, a material providing for a non-slip surface. They shall be heavy duty steps that are capable withstanding heavy loadings and extensive use.

The pressure tank on the pump shall be 20 gallon capacity.

Locks, latches and hinges for main doors shall be heavy duty type to withstand the intense use in service

The wall between the office and the work area shall be properly insulated to prevent the transmission of heat & noise.

The floor beneath the marshall area shall be heavily reinforced.

The lab shall be equipped with steel cable tie downs and ground anchors at each corner of the lab.

Electrical service entrance shall be wired for 100 amps, and have seperate circuits for air conditioners. Convenience outlets shall have a minimum spacing of 4 feet in counter areas.

10-1-86	
REVISIONS	
DATE	CHANGE
5/5/88	Drawing and Notes

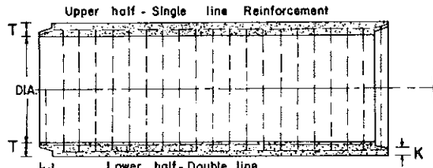
NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

APPROVED: David K.C. Boer
Design Engineer

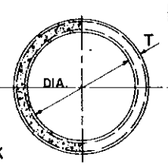
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	

D-714-1

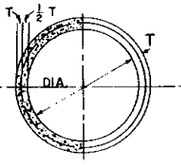
REINFORCED CONCRETE PIPE CULVERT AND END SECTIONS



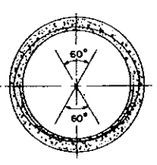
REINFORCED CONCRETE PIPE
TYPICAL LONGITUDINAL SECTION



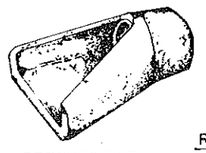
END VIEW
Double line Reinforcement



END VIEW
Single line Reinforcement

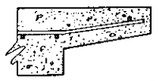


END VIEW
Top half showing Elliptical Reinforcement.
Bottom half showing Elliptical & Inner Cage Reinforcement.



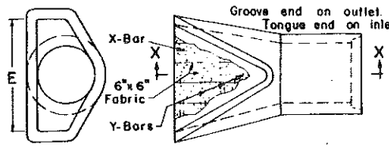
PERSPECTIVE

ARRANGEMENT FOR
At end of 36" to 108" pipe.

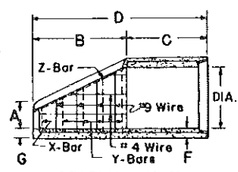


REINFORCEMENT
At end of 12" to 33" pipe.

SEE STANDARD D-714-22 FOR DETAILS OF CONCRETE PIPE TIES (TIE BOLTS).

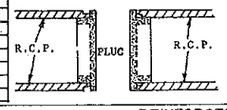


END VIEW PLAN

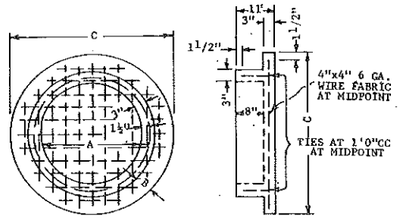


SECTION X-X
END SECTION
Equivalent to Class III Pipe

CONCRETE PIPE PLUG DIMENSIONS (In inches)			
PIPE DIAMETER	A	B	C
15	8	2.25	19.5
18	11	3.0	23.0
21	14	3.25	26.5
24	17	3.50	30.0
27	20	3.75	33.5
30	23	4.0	37.0
33	26	4.25	40.5
36	29	4.50	44.0
42	35	5.0	51.0
48	41	5.50	58.0



REINFORCED CONCRETE PIPE PLUG



CONCRETE SHALL CONFORM TO STRENGTH REQUIREMENTS FOR REINFORCED CONCRETE PIPE CULVERTS, CL. III.

END SECTION										
	TERMINAL DIMENSIONS						REINFORCING STEEL			
DIA.	A	B	C	D	E	F	G	X	Y	Z
12	0'-4"	2'-0"	4'-0⅞"	6'-0⅞"	2'-0"	2"	2"	2¼"x 2'	6-¼"x 2' @ 6" c.c.	2-⅛" x 4
15	0'-6"	2'-3"	3'-10"	6'-1"	2'-6"	2¼"	2¼"	2¼"x 2½"	6-¼"x 2½" @ 6" c.c.	2-⅜" x 4
18	0'-9"	2'-3"	3'-10"	6'-1"	3'-0"	2½"	2½"	2⅜"x 3"	6-¼"x 3" @ 6" c.c.	2-⅜" x 4
21	0'-9"	3'-0"	3'-1½"	6'-1½"	3'-6"	2⅝"	2⅝"	2⅜"x 3½"	8-¼"x 3½" @ 6" c.c.	2-⅜" x 5
24	0'-9½"	3'-7½"	2'-6"	6'-1½"	4'-0"	3"	3"	2½"x 4'	8-⅜"x 4' @ 8" c.c.	2-⅜" x 6
27	0'-10½"	4'-1½"	2'-0"	6'-1½"	4'-6"	3⅛"	3⅛"	2½"x 5'	8-⅜"x 5' @ 9" c.c.	2-⅜" x 6'
30	1'-0"	4'-6"	3'-7¾"	8'-1¾"	5'-0"	3½"	3½"	2½"x 5'	12-⅜"x 5' @ 8" c.c.	2-½" x 6'
36	1'-3"	5'-3"	2'-10½"	8'-1¾"	6'-0"	4"	4"	2½"x 6'	18-⅜"x 6' @ 6" c.c.	2-½" x 8
42	1'-9"	5'-3"	2'-11"	8'-2"	6'-6"	4½"	4½"	2½"x 7'	12-½"x 7' @ 9" c.c.	2-½" x 8'
48	2'-0"	6'-0"	2'-2"	8'-2"	7'-0"	5"	5"	2½"x 8'	16-½"x 8' @ 8" c.c.	2-½" x 8
54	2'-3"	5'-5"	2'-9¼"	8'-2¼"	7'-6"	5½"	5½"	2½"x 8'	16-½"x 8' @ 7" c.c.	2-½" x 8'
60	2'-11"	5'-0"	3'-3"	8'-3"	8'-0"	6"	5"	2½"x 9'	16-½"x 9' @ 6" c.c.	2-½" x 9
66	2'-6"	6'-0"	2'-3"	8'-3"	8'-6"	6½"	5½"	2½"x 9'	22-½"x 9' @ 6" c.c.	2-½" x 9
72	3'-0"	6'-6"	1'-9"	8'-3"	9'-0"	7"	6"	2½"x 10'	24-½"x 10' @ 6" c.c.	2-½" x 9
78	3'-0"	7'-6"	1'-9"	9'-3"	9'-6"	7½"	6½"	2½"x 10'	28-½"x 10' @ 6" c.c.	2-½" x 10'
84	3'-0"	7'-6½"	1'-9"	9'-3½"	10'-0"	8"	6½"	4½"x 10'	28-½"x 10' @ 5" c.c.	4-½" x 10'
90	3'-5"	7'-3½"	2'-0"	9'-3½"	11'-0"	8½"	6½"	4½"x 11'	28-½"x 11' @ 6" c.c.	4-½" x 10'

Permissable Fill Heights
RCP-Sewer-Trench Conditions
Other than Class I

PIPE SIZE	Class II	Class III	Class IV	Class V
	FT.	FT.	FT.	FT.
2" thru 54"	3-9	1-3 9-13	13-23	23+
60" thru 108"	1-9	9-13	13-23	23+

REINFORCED CONCRETE PIPE

CLASS I	CLASS II	CLASS III	CLASS IV	CLASS IV ALTERNATE	CLASS V	CLASS V ALTERNATE
D-LOAD TO PRODUCE A 0.01 INCH CRACK						
800	1000	1350	2000		3000	
D-LOAD TO PRODUCE ULTIMATE LOAD						
1200	1500	2000	3000		3750	

Internal Dia. of Pipe in inches	Cross-Sectional Water	Weight per lin. foot of pipe Std Wall	Joint Groove End Min./Max.	Joint Tongue End Min.	1200 — Minimum Wall Thickness	1200 — 4000 PSI — Circular rein. in circular pipe: Inner cage	Outer cage	Ellip. rein. in Cir. pipe & Cir. rein. in Ellip. pipe	Height of Fill Trench Conditions	1500 — Minimum Wall Thickness	1500 — 4000 PSI — Circular rein. in circular pipe: Inner cage	Outer cage	Ellip. rein. in Cir. pipe & Cir. rein. in Ellip. pipe	Height of Fill Normal Backfill	Height of Fill Imperfect Trench
Dia.	Sq.ft.	Lbs.	In.	In.	In.	Sq.in	Sq.in	Sq.in	Ft.	In.	Sq.in	Sq.in	Sq.in	Ft.	Ft.
12	0.79	92	1⅜-2⅜	¾							.07				
15	1.23	127	1½-2¾	⅞		TO BE USED FOR					.07				
18	1.77	166	1⅝-2⅞	1		R.C.P. SEWER ONLY					.07		.07		
21	2.40	214	1⅞-3⅛	1⅛							.07		.07		
24	3.14	265	2-3⅜	1⅛							.07		.07		
27	3.98	322	2⅛-4	1⅜		☆ Special conditions only				3⅛	.13		.14	4	.08
30	4.91	384	3¼-4⅜	1¼						3½	.14		.12	3-11	11-18
33	5.94	452	3½-4¾	1½						3¾	.15		.13	3-11	11-18
36	7.07	524	3¾-4¾	1½						4	.12	.07	.13	3-11	11-18
42	9.62	685	3¾-4¾	1¾						4½	.15	.09	.17	3-11	11-18
48	12.57	867	3¾-4¾	1⅞						5	.18	.11	.20	3-11	11-18
54	15.90	1070	4¼-5¼	2					☆	5½	.22	.13	.24	3-11	11-18
						5000 PSI									
60	19.63	1296	4½-5½	2¼	6	.21	.13	.23	6-9	6	.25	.15	.28	3-11	11-18
66	23.76	1542	5-6	2⅝	6½	.25	.15	.28	6-9	6½	.31	.19	.34	3-11	11-18
						5000 PSI									
72	28.27	1810	5⅝-6⅜	2⅞	7	.29	.17	.32	6-9	7	.35	.21	.39	3-11	11-18
78	33.18	2098	6¼-7¼	2⅞	7½	.32	.19	.36	6-9	7½	.40	.24	.44	3-11	11-18
84	38.48	2410	5⅝-7¾	3⅜	8	.37	.25	.41	6-9	8	.46	.28	.51	3-11	11-18
						5000 PSI									
90	44.18	2793	6¾-8¼	3⅜	8½	.41	.25	.46	6-9	8½	.51	.31	.57	3-11	11-18
96	50.27	3092	7-8¼	3½	9	.46	.28	.51	6-9	9	.57	.34	.63	3-11	11-18
						5000 PSI					5000 PSI				
102	56.75	3466	7-8½	3½	9½	.54 .32 .41		.15	6-9	9½	.68 .41		.27 .41	3-11	11-18
108	63.62	3864	7¼-8½	3¾	10	.61 .32 .48		.15	6-9	10	.76 .46		.30 .46	3-11	11-18

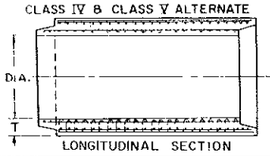
Internal Dia. of Pipe in inches	1500 — 4000 PSI — Ellip. rein. in Cir. pipe & Cir. rein. in Ellip. pipe	2000 — Minimum Wall Thickness	2000 — 4000 PSI — Circular rein. in circular pipe: Inner cage	Outer cage	Ellip. rein. in Cir. pipe & Cir. rein. in Ellip. pipe	2000 — 4000 PSI — Circular rein. in circular pipe: Inner cage	Outer cage	Ellip. rein. in Cir. pipe & Cir. rein. in Ellip. pipe	Height of Fill Normal Backfill	Height of Fill Imperfect Trench
Dia.	Sq.in	In.	Sq.in	Sq.in	Sq.in	Sq.in	Sq.in	Sq.in	Ft.	Ft.
12		2	.07						1-16	16-31
15		2¼	.07						1-16	16-31
18		2½	.07		.07				1-16	16-31
21		2¾	.07		.07				1-16	16-31
24		3	.07		.07	3¾	.07		1-16	16-31
27		3¼	.16		.14	4	.08		1-3 11-16	16-31
30		3½	.18		.15	4¼	.10		1-3 11-16	16-31
33		3¾	.20		.17	4½	.12		1-3 11-16	16-31
36		4	.17	.10	.19	4¾	.08	.07	1-3 11-16	16-31
42		4½	.21	.13	.23	5¼	.12	.07	1-3 11-16	16-31
48		5	.24	.14	.27	5¾	.16	.10	1-3 11-16	16-31
54		5½	.29	.17	.32	6¼	.21	.13	1-3 11-16	16-31
			5000 PSI							
60		6	.34	.20	.38	6¾	.25	.15	1-3 11-16	16-31
66		6½	.41	.25	.46	7¼	.31	.19	1-3 11-16	16-31
			5000 PSI							
72		7	.49	.29	.54	7¾	.36	.22	1-3 11-16	16-31
78		7½	.57	.34	.63	8¼	.42	.25	1-3 11-16	16-31
84		8	.64	.38	.71	8¾	.50	.30	1-3 11-16	16-31
			5000 PSI							
90		8½	.69	.41	.77	9¼	.59	.35	1-3 11-16	16-31
96		9	.76	.46	.84	9¾	.70	.42	17 53	1-3 11-16 16-31
			5000 PSI							
102		9½	.90	.54	.36 .54	10¼	.83	.50	.33 .50	1-3 11-16 16-31
108		10	1.08	.65	.43 .65	10¾	.99	.59	.40 .59	1-3 11-16 16-31

Internal Dia. of Pipe in inches	2000 — 4000 PSI — Ellip. rein. in Cir. pipe & Cir. rein. in Ellip. pipe	3000 — Minimum Wall Thickness	3000 — 4000 PSI — Circular rein. in circular pipe: Inner cage	Outer cage	Ellip. rein. in Cir. pipe & Cir. rein. in Ellip. pipe	3000 — 4000 PSI — Circular rein. in circular pipe: Inner cage	Outer cage	Ellip. rein. in Cir. pipe & Cir. rein. in Ellip. pipe	3000 — 5000 PSI — Inner cage Ai	Ellip. cage Ae	Outer cage Ao	Shear Steel N	Shear Steel S	Shear Steel Ar	Height of Fill Normal Backfill	Height of Fill Imperfect Trench
Dia.	Sq.in	In.	Sq.in	Sq.in	Sq.in	Sq.in	Sq.in	Sq.in	Sq.in	Sq.in	Sq.in	No.	In.	Sq.in	Ft.	Ft.
12		2	.07												1-16	24-43
15		2¼	.07												1-16	24-43
18		2½	.07		.07										1-16	24-43
21		2¾	.07		.07										1-16	24-43
24		3	.07		.07	3¾	.07								1-16	24-43
27		3¼	.16		.14	4	.08								1-3 11-16	24-43
30		3½	.18		.15	4¼	.10								1-3 11-16	24-43
33		3¾	.20		.17	4½	.12								1-3 11-16	24-43
36		4	.17	.10	.19	4¾	.08	.07							1-3 11-16	24-43
42		4½	.21	.13	.23	5¼	.12	.07							1-3 11-16	24-43
48		5	.24	.14	.27	5¾	.16	.10							1-3 11-16	24-43
54		5½	.29	.17	.32	6¼	.21	.13							1-3 11-16	24-43
			5000 PSI													
60		6	.34	.20	.38	6¾	.25	.15	6	.54	.27	.41	7	6	.22	24-43
66		6½	.41	.25	.46	7¼	.31	.19	6½	.60	.30	.45	8	6	.22	24-43
			5000 PSI													
72		7	.49	.29	.54	7¾	.36	.22	7	.64	.32	.48	8	6	.23	24-43
78		7½	.57	.34	.63	8¼	.42	.25	7½	.70	.35	.53	9	6	.25	24-43
84		8	.64	.38	.71	8¾	.50	.30	8	.76	.38	.57	10	6	.28	24-43
			5000 PSI													
90		8½	.69	.41	.77	9¼	.59	.35	8½	.82	.43	.62	11	6	.31	24-43
96		9	.76	.46	.84	9¾	.70	.42	9	.88	.46	.66	11	6	.34	24-43
			5000 PSI													
102		9½	.90	.54	.36 .54	10¼	.83	.50	9½	.94	.52	.71	12	6	.37	24-43
108		10	1.08	.65	.43 .65	10¾	.99	.59	10	1.02	.57	.76	12	6	.40	24-43

3000 — 5000 PSI — Minimum Wall Thickness	3000 — 6000 PSI — Circular rein. in circular pipe: Inner cage	Outer cage	Ellip. rein. in Cir. pipe & Cir. rein. in Ellip. pipe	3000 — 6000 PSI — Circular rein. in circular pipe: Inner cage	Outer cage	Ellip. rein. in Cir. pipe & Cir. rein. in Ellip. pipe	3000 — 5000 PSI — Minimum Wall Thickness	Inner cage Ai	Ellip. cage Ae	Outer cage Ao	Shear Steel N	Shear Steel S	Shear Steel Ar	Height of Fill Normal Backfill	Height of Fill Imperfect Trench
In.	Sq.in	Sq.in	Sq.in	Sq.in	Sq.in	Sq.in	In.	Sq.in	Sq.in	Sq.in	No.	In.	Sq.in	Ft.	Ft.
2	.10													16-24	24-43
2¼	.14													16-24	24-43
2½	.19		.16											16-24	24-43
2¾	.24		.21											16-24	24-43
3	.30		.24	3¾	.12	.07	.13							16-24	24-43
3⅛	.38	.23	.42	4	.14	.08	.16							16-24	24-43
3½	.41	.23	.46	4¼	.18	.11	.20							16-24	24-43
3¾	.46	.28	.51	4½	.23	.14	.25							16-24	24-43
4	.50	.30	.56	4¾	.27	.16	.30							16-24	24-43
4½	.60	.36	.67	5¼	.36	.28	.40							16-24	24-43
5	.73	.44	.81	5¾	.47	.28	.52	5	.66	.33	.50	8	4	.22	24-35 35-69
				6¼	.58	.35	.64	5½	.74	.37	.56	9	4	.22	24-35 35-69
				6¾	.70	.42	.78	6	.82	.41	.62	7	6	.22	24-35 35-69
				7¼	.84	.50	.93	6½	.88	.44	.66	8	6	.22	24-35 35-69
				7¾	.99	.57	.110	7	.96	.48	.72	8	6	.23	24-35 35-69
								7½	1.04	.52	.78	9	6	.25	24-35 35-69
								8	1.12	.56	.84	10	6	.28	24-35 35-69
								8½	1.20	.65	.90	11	6	.31	24-35 35-69
								9	1.32		.99	11	8	.34	24-35 35-69
								9½	1.42		1.07	12	8	.37	24-35 35-69

NOTES:
All reinforcement shall be electrically welded cold drawn steel wire fabric.
Circular reinforcement shall lap in accordance to A.A.S.H.O. M170.
All circular, longitudinal and elliptical reinforcement shall be assembled and securely fastened in cage fashion so as to maintain reinforcement in exact shape and correct positions within the forms
Laying length of pipe: 12" to 66" (incl.) = Not less than 4 feet
66" to 108" (incl.) = Not less than 6 feet

Joints shall be sealed with rubber gaskets or with sealer approved by the engineer whenever pipe are specified for storm drains or sanitary sewers.



Ai Ae Ao = Minimum circumferential reinforcement required in square inches per lineal foot of pipe.
Ar = Minimum radial reinforcement required in square inches per square foot of pipe.
N = Minimum number of rows of radial reinforcing at top and bottom of pipe.
S = Maximum circumferential spacing of rows of radial reinforcing.

REVISIONS	
DATE	CHANGE
11-5-86	Note Added
7-17-87	ADDED PIPE PLUG DETAIL
8-1-88	Reinforcement Cage

10-1-86

NORTH DAKOTA STATE HIGHWAY DEPARTMENT

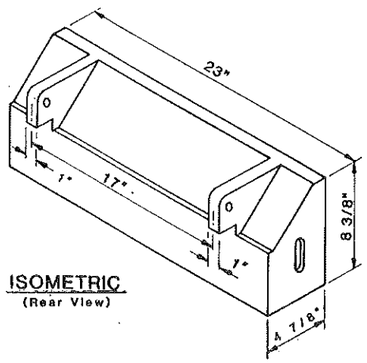
APPROVED: _____ DESIGN ENGINEER

INLET - TYPE 1

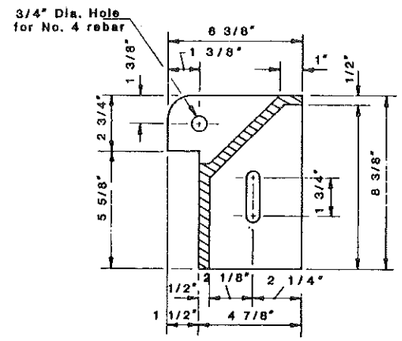
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.		

D-722-1

F-RRS-1-006(005)066

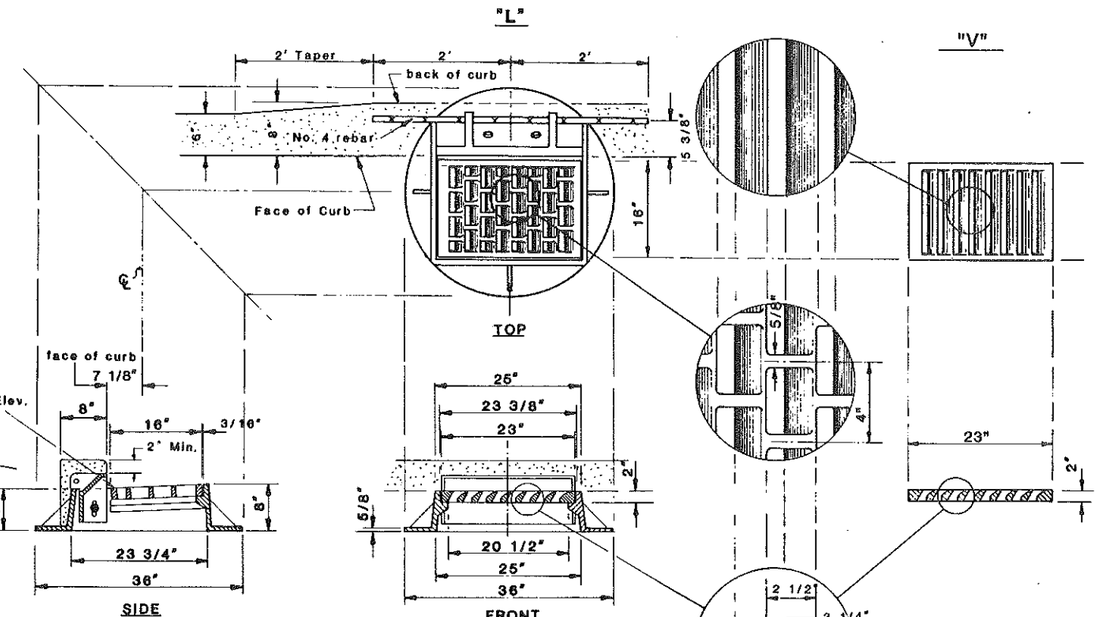


ISOMETRIC
(Rear View)



CURB BOX
Weight - 80 lbs

GRATE STYLES



CASTING DETAILS

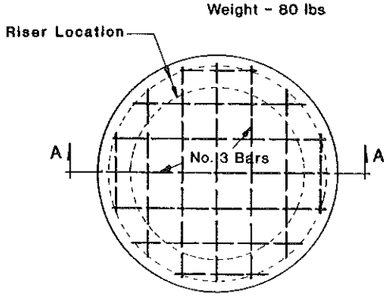
Weights - Frame - 209 lbs
Grate - 110 lbs

Notes:

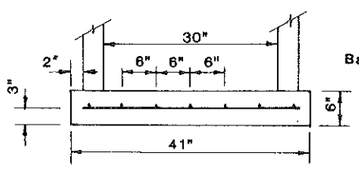
1. Other castings, similar in dimension and of equal or greater weight than that shown, may be used if accepted by the engineer in writing. The grate style shall be as specified on the plans.
2. Metal used in the manufacture of castings shall conform to AASHTO M-105, Class 35B.
3. The contractor shall 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.

Pay Item

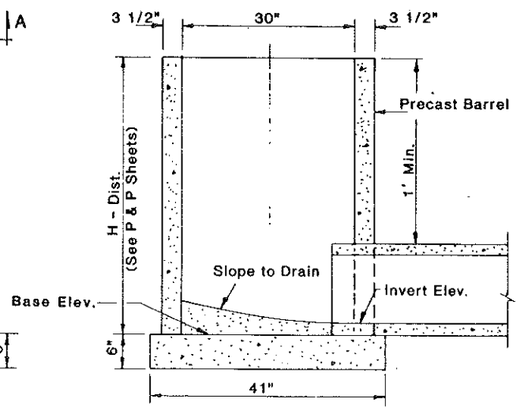
Inlet - Type 1 . . . . . Ea.



PLAN



Sect. A - A



ELEVATION

RISER DETAILS

December 1, 1989	
Revisions	
Date	Change

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

Approved: David X. O. Leer
Design Engineer

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.		

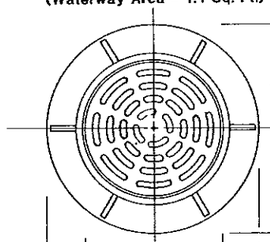
D-722-1A

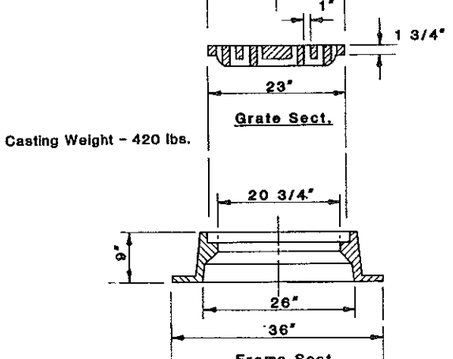
F-RRS-1-006(005)066

INLET - CATCH BASIN

CASTINGS

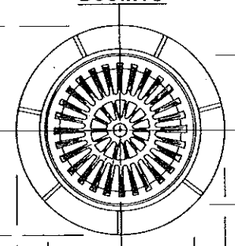
Type A
(Waterway Area - 1.1 Sq. Ft.)

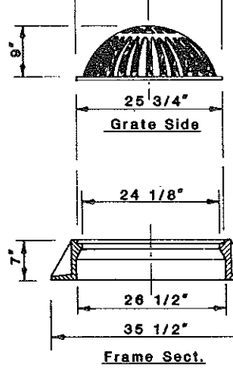


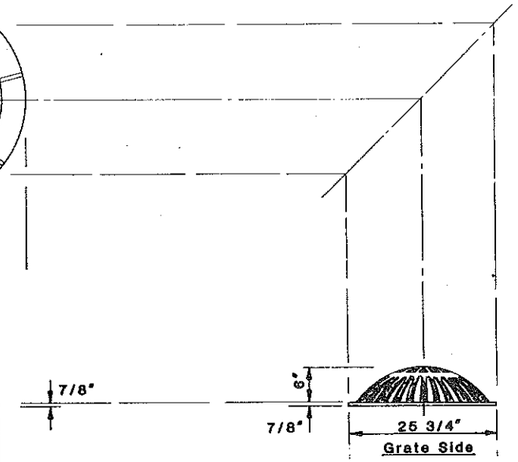


Casting Weight - 420 lbs.

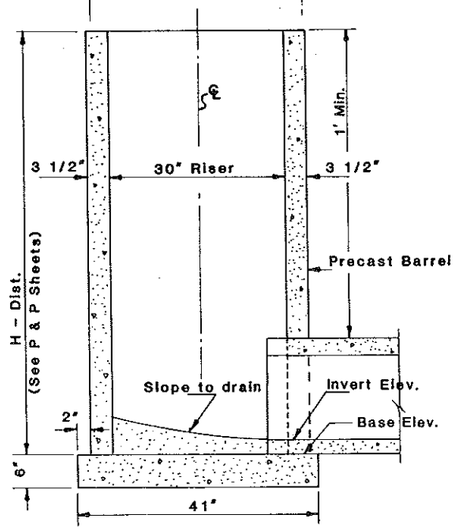
Beehive



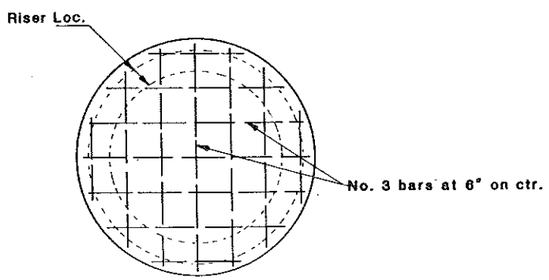




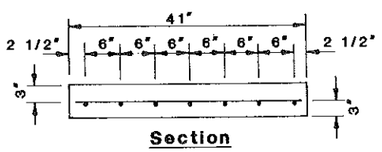
Casting Weights
6" - 285 lbs.
9" - 300 lbs.



INLET ELEVATION



Plan



Section

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.

Pay Items

Inlet - Catch Basin, Type A . . . . . Ea.
Inlet - Catch Basin, 6 in. Beehive . . . . . Ea.
Inlet - Catch Basin, 9 in. Beehive . . . . . Ea.

December 1, 1989	
Revisions	
Date	Change

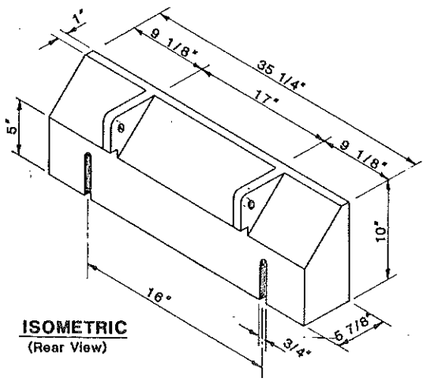
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
Approved: David K.O. Leer
Design Engineer

INLET - TYPE 2

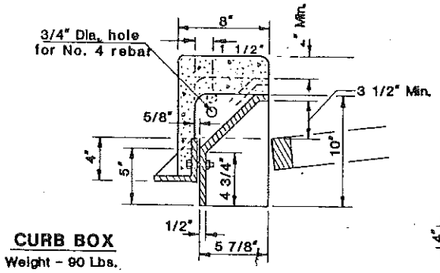
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.		

D-722-2

F-RRS-1-006(005)066



ISOMETRIC
(Rear View)

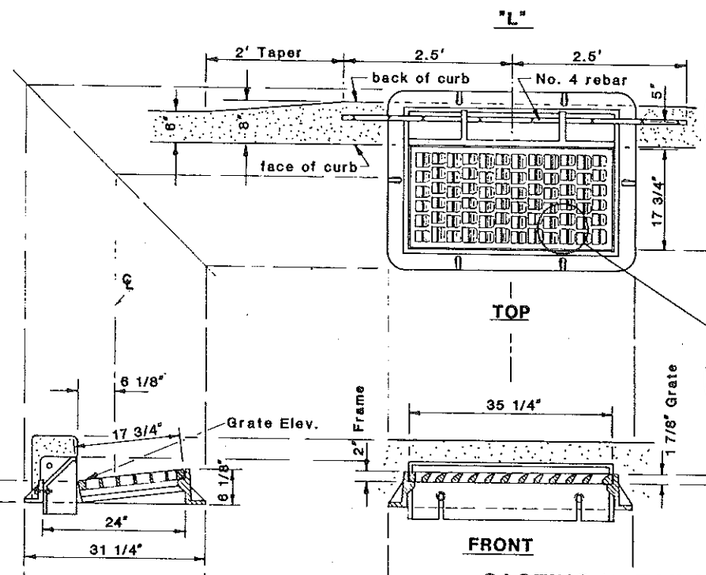


CURB BOX
Weight - 90 Lbs.

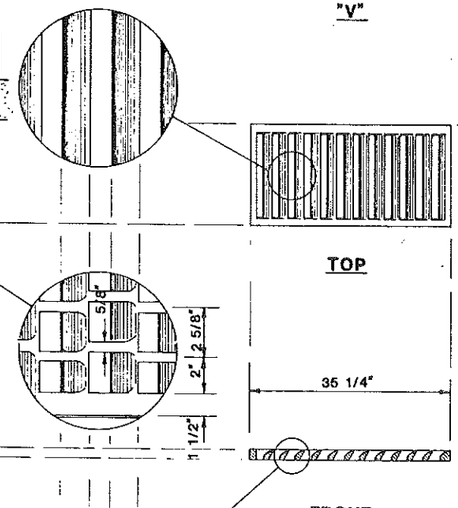
TOP

GRATE STYLES

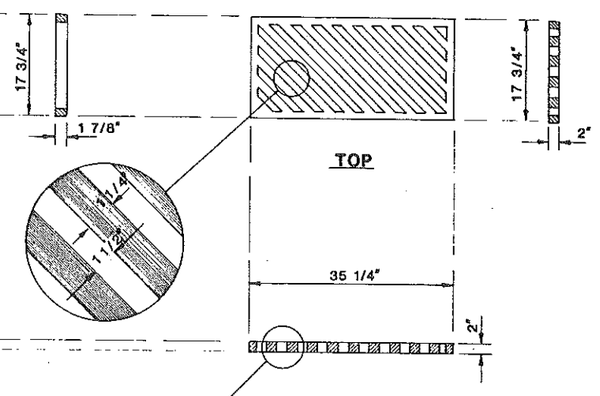
"L"



"V"

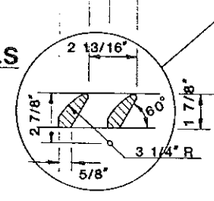


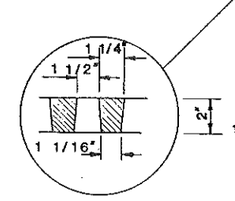
"D"
(Waterway Area - 1.9 Sq. Ft.)



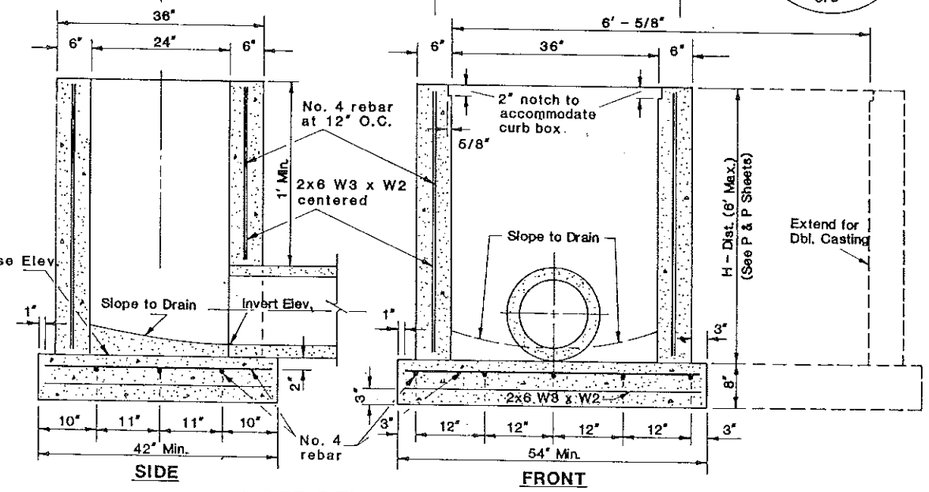
CASTING DETAILS

Weights - Frame 197 Lbs.
Grate 165 Lbs.

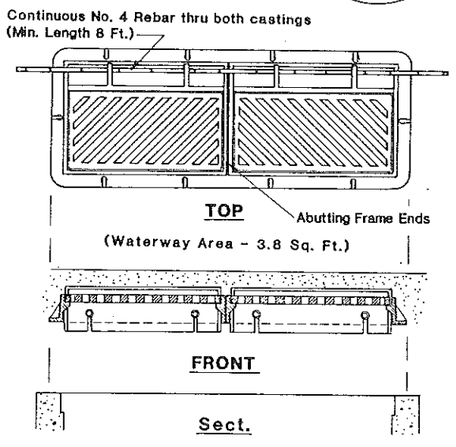




RISER DETAILS



INLET - TYPE 2 - DOUBLE



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.

Pay Items

Inlet - Type 2 . . . . . Ea.
Inlet - Type 2, Double . . . . . Ea.

December 1, 1989	
Revisions	
Date	Change

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

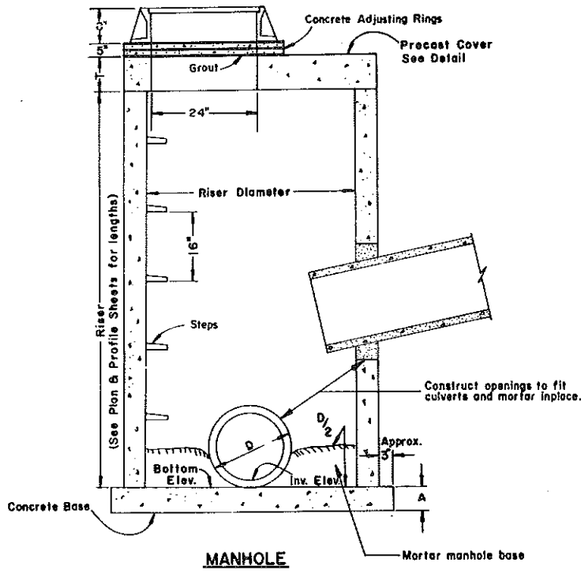
Approved: David L. O. Leer
Design Engineer

F-RRS-1-006(005)066

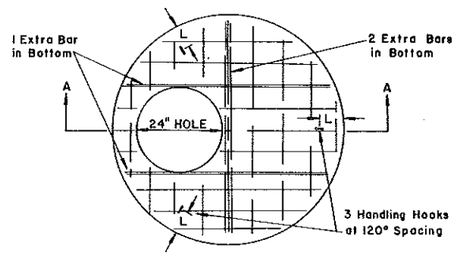
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.		

D-722-5

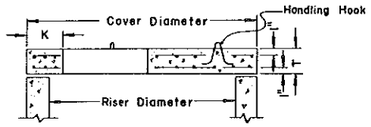
MANHOLE DETAILS



MANHOLE



TOP VIEW



SECTION A-A

PRECAST COVER

PRECAST MANHOLE COVERS

PIPE DIAMETER	COVER DIAMETER	WEIGHT OF SECTION	T	K	L	BOTTOM BARS	TOP BARS
42"	51"	800#	6"	6"	7"	#4 AT 6"	——
48"	58"	1110#	6"	6"	8"	#4 AT 6"	——
54"	65"	1950#	8"	6"	8"	#4 AT 6"	——
60"	72"	2470#	8"	7"	9"	#4 AT 6"	#3 AT 6"
66"	79"	3050#	8"	7"	9"	#4 AT 6"	#3 AT 6"
72"	86"	3680#	8"	8"	10"	#4 AT 6"	#3 AT 6"
78"	93"	4360#	8"	8"	10"	#4 AT 4"	#3 AT 4"
84"	100"	5100#	8"	9"	11"	#4 AT 4"	#3 AT 4"
90"	107"	5890#	8"	9"	11"	#4 AT 4"	#3 AT 4"
96"	114"	6730#	8"	9"	11"	#4 AT 4"	#3 AT 4"
102"	121"	7630#	8"	9"	12"	#4 AT 4"	#3 AT 4"
108"	128"	12460#	12"	10"	12"	#4 AT 4"	#3 AT 4"
120"	140"	15500#	12"	11"	13"	#4 AT 4"	#3 AT 4"

Top and Bottom Bars run in both directions.

MANHOLE BASES

PIPE DIAMETER	BASE DIAMETER	WEIGHT OF SECTION	A	BARS
42"	58"	1380#	6"	#3 AT 6"
48"	66"	1785 #	6"	#3 AT 6"
54"	72"	2125 #	6"	#3 AT 6"
60"	78"	3320 #	8"	#3 AT 6"
66"	86"	4030 #	8"	#3 AT 6"
72"	92"	4610 #	8"	#3 AT 6"
78"	100"	5460 #	8"	#3 AT 6"
84"	107	6230 #	8"	#3 AT 6"
90"	114	7070 #	8"	#3 AT 6"
96"	120	7850 #	8"	#3 AT 6"
102"	127	13200 #	12"	#3 AT 6"
108"	132	14270 #	12"	#3 AT 6"
120"	148	17925 #	12"	#3 AT 6"

NOTES: BOTTOMS OF MANHOLES SHALL BE CUT OR PRECAST SQUARE TO FIT THE BASE GROUT JOINT BETWEEN BASE AND WALL WITH CEMENT MORTAR. THE CONTRACTOR MAY, IF HE SO DESIRES, CONSTRUCT THE MANHOLES LOWER THAN PLAN GRADE AND BRING THE CASTING TO GRADE USING PRECAST ADJUSTING RINGS IN A MANNER SATISFACTORY TO THE ENGINEER IN THE FIELD.

THE CONTRACTOR SHALL HAVE THE OPTION OF USING PRE-CAST OR POURED IN PLACE BASES.

PRECAST BASES SHALL BE REINFORCED AS SHOWN IN LISTING FOR EACH SIZE BASE.

THE AGGREGATE SIZE SHALL BE APPROVED BY THE ENGINEER.

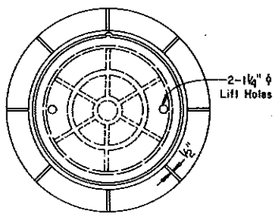
PRECAST BARRELS AND RISERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH AASHTO M-199.

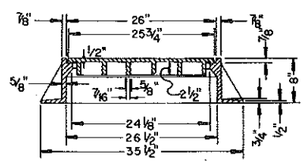
NOTE: METHOD OF MEASUREMENT FOR MANHOLES SHALL BE AS FOLLOWS. THE CONTRACT UNIT PRICE BID FOR MANHOLES SHALL INCLUDE THE FURNISHING AND INSTALLING THE FOLLOWING:

1. CAST IRON RING AND COVER OR BEEHIVE CASTING & COVER
2. PRECAST COVER
3. CONCRETE BASE
4. CONCRETE ADJUSTING RINGS

THE ITEM "MANHOLE RISER" SHALL INCLUDE THE FURNISHING & INSTALLING OF THE REQUIRED LENGTH OF RISER & CAST IRON STEPS.

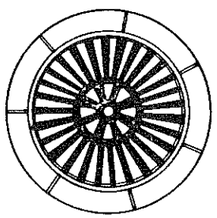
MORTAR TO BE INCLUDED IN THE PRICE BID FOR MANHOLES.

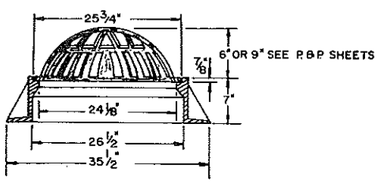




MANHOLE CAST IRON RING & COVER

Weight 460 Lbs.



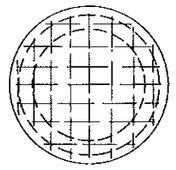


BEEHIVE CASTING & COVER

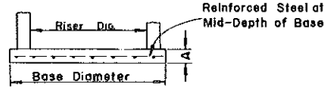
(To be used when noted on plans)

6" Beehive Weight 285 Lbs.

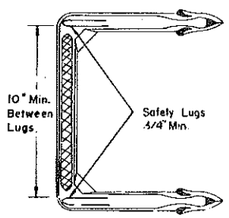
9" Beehive Weight 300 Lbs.



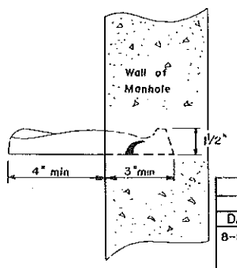
TOP VIEW



PRECAST MANHOLE BASE



STEP DETAIL



MANHOLE STEP SHALL BE CORROSION RESISTANT AND SHALL HAVE A MINIMUM VERTICAL LOAD RESISTANCE OF 400 POUNDS AND A PULL-OUT RESISTANCE OF UP TO 1000 POUNDS. CONFIGURATION OF THE STEPS SHALL BE APPROVED BY THE ENGINEER.

THE CONTRACTOR MAY, IF HE SO ELECTS, CONSTRUCT MANHOLES OF SOLID CONCRETE BLOCK OR BRICK. THE MATERIALS SHALL BE APPROVED BY THE ENGINEER IN WRITING. THE TYPE OF CONSTRUCTION SHALL BE AS SPECIFIED IN SECTION 722 OF THE STANDARD SPECIFICATIONS.

OTHER CASTINGS, SIMILAR IN DIMENSION AND OF EQUAL OR GREATER WEIGHT THAN THAT SHOWN MAY BE USED IF ACCEPTED BY THE ENGINEER IN WRITING.

METAL USED IN THE MANUFACTURE OF CASTINGS SHALL CONFORM TO AASHTO M-105, CLASS 35 B.

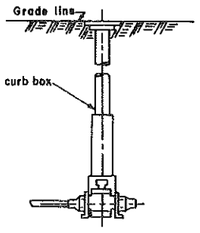
10-1-86

REVISIONS	
DATE	CHANGE
8-3-87	NOTE

NORTH DAKOTA STATE HIGHWAY DEPARTMENT

APPROVED: David K.D. Leer
DESIGN ENGINEER

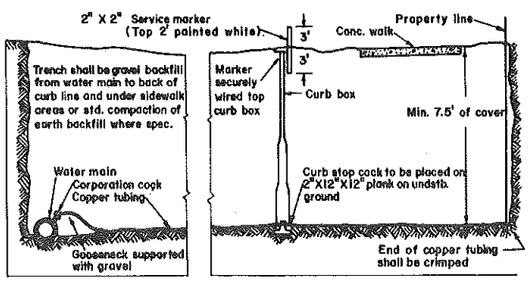
FED. REGION	STATE	FED. AID PROJ. NO	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	
		D-724-1	



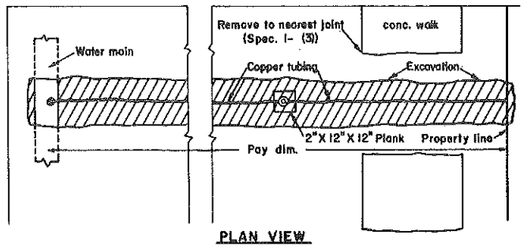
NOTE: Service clamp not required where small size service lines connect to large C.I.P. and three threads of the corp. stop make contact with the wall.

CURB STOP

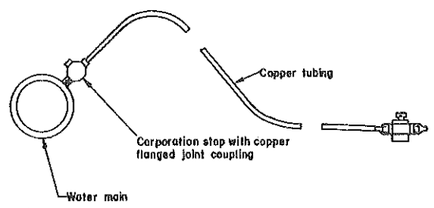
WATER CURB CONNECTION



SECTIONAL ELEVATION

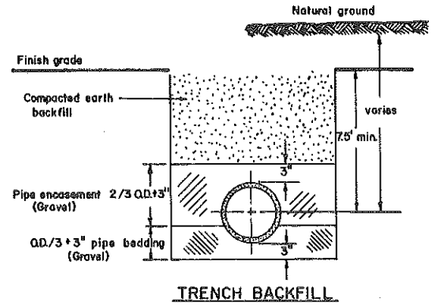


PLAN VIEW



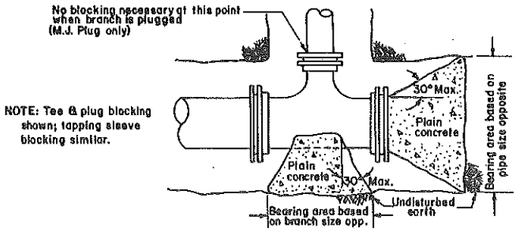
TYPICAL CORPORATION STOP AND CURB STOP

No Scale



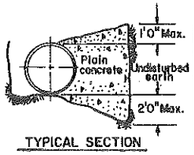
TRENCH BACKFILL

WATERMAIN THRUST BLOCK DETAILS



NOTE: Tee & plug blocking shown; tapping sleeve blocking similar.

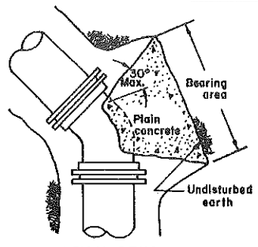
TEE, PLUG & TAPPING SLEEVE



TYPICAL SECTION

TABLE OF REQUIRED BEARING AREAS					
SIZE OF PIPE	90° BEND	45° BEND	22.5° BEND	11.25° BEND	TEES, PLUGS & TAPPING SLEEVE
4"	2' SQ.	2' SQ.	2' SQ.	2' SQ.	2' SQ.
6"	3' SQ.	2' SQ.	2' SQ.	2' SQ.	3' SQ.
8"	5' SQ.	3' SQ.	2' SQ.	2' SQ.	4' SQ.
10"	8' SQ.	4' SQ.	3' SQ.	2' SQ.	6' SQ.
12"	11' SQ.	6' SQ.	3' SQ.	2' SQ.	8' SQ.
16"	20 SQ.	11' SQ.	6' SQ.	4' SQ.	15' SQ.
16"	25' SQ.	14' SQ.	7' SQ.	4' SQ.	18' SQ.

NOTE: Concrete blocking to be poured against undisturbed earth, Keep bolts and bolts free of concrete. Concrete in place to be included in price bid for water main.

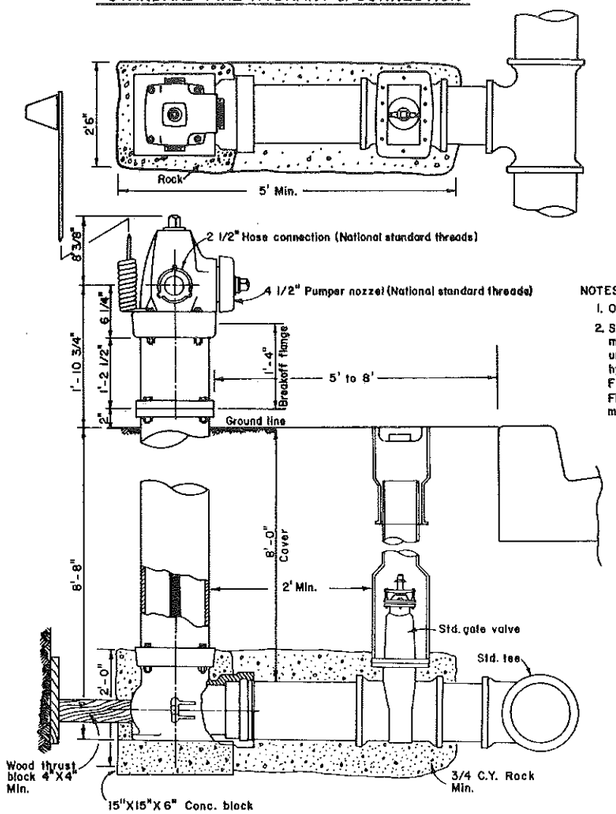


THRUST BLOCK DETAIL

No Scale

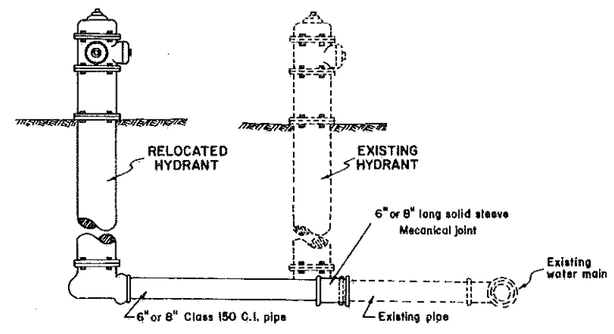
TYPICAL BEND

STANDARD FIRE HYDRANT & CONNECTION



NOTES:

1. Operating & Cap nuts: city standards
2. Supplier will furnish and install hydrant marker. Cost will be included with the unit bid price for the hydrant. The hydrant marker shall be the Nordic Flexi-Flag as manufactured by Nordic Fiberglass, Inc. or approved equal. marker will be rust resistant.



Concrete thrust blocking to be placed as directed.

Hydrant to be set on a precast concrete pad 6" thick by 18" sq. The hydrant shall be surrounded by 1/2 C.Y. course conc. aggr.

LAYOUT FOR RELOCATION OF HYDRANTS

TYPICAL SEQUENCE OF INSTALLATION

1. Remove existing hydrant.
2. Install long solid sleeve mech. joint, Cl.150 C.I.P.
3. Install 6" or 8" Cl. 150 C.I. Pipe (length as needed).
4. Install salvaged hydrant at new location.

All materials necessary for the Relocation of the Hydrant to be included in price bid for "Relocate Hydrant."

Existing water main valve to be adjusted as necessary and paid for as "Adjusted Utility Appurtenances."

10-1-86	
REVISIONS	
DATE	CHANGE

NORTH DAKOTA STATE HIGHWAY DEPARTMENT

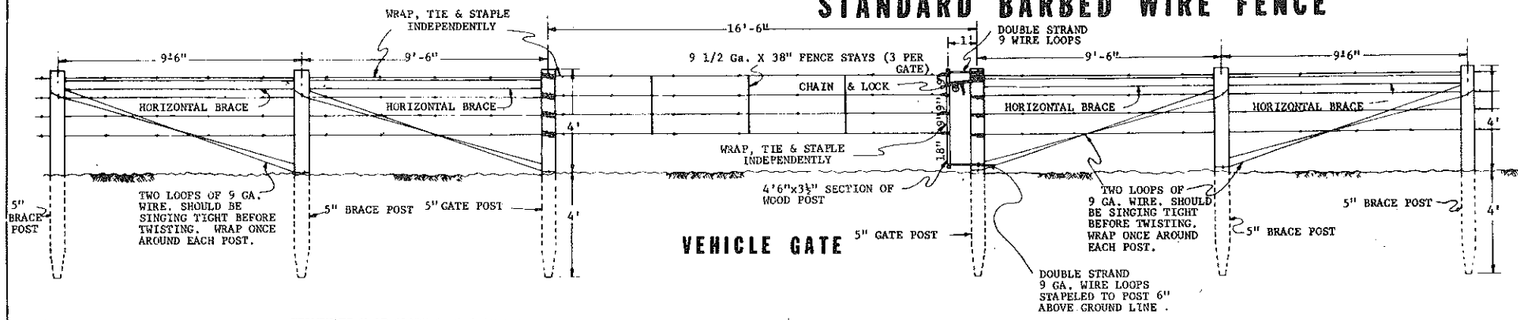
APPROVED: David K.D. Leer
DESIGN ENGINEER

STANDARD BARBED WIRE FENCE

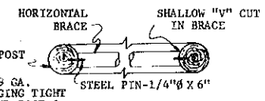
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.		

D-752-1

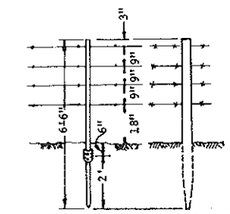
F-RRS-1-006(005)066



VEHICLE GATE



HORIZONTAL BRACE DETAIL



STEEL OR WOOD LINE POSTS

16'-6" SPACING

NOTES:

CORNER ASSEMBLY POSTS SHALL BE ROUND-BACK ANGLE STEEL OR TREATED WOOD. THE TYPE OF POST USED UNDER THE ABOVE OPTIONS SHALL BE DETERMINED BY THE CONTRACTOR. TREATED WOOD POSTS SHALL BE USED FOR GATES, DOUBLE BRACE ASSEMBLIES AND FENCE TERMINAL. TYPE OF LINE POST TO BE INDICATED ON PLANS.

NO DEDUCTION IN MEASURED PAY LENGTH OF WIRE FENCE WILL BE MADE FOR GATES, CORNER ASSEMBLIES, DOUBLE BRACE ASSEMBLIES, FENCE TERMINALS OR DEPRESSION FENCING. DEPRESSION FENCING AND ABUTMENT FENCING SHALL BE INCLUDED IN THE PRICE BID FOR FENCING.

ALL MATERIALS SHALL BE IN ACCORDANCE WITH SEC. 752 OF THE STANDARD SPECIFICATIONS. POSTS AND BRACES SHALL BE GALVANIZED IN ACCORDANCE WITH REQUIREMENTS OF AASHTO M-111 OR PAINTED WITH PAINT CONFORMING TO SECTION 852 OF THE STANDARD SPECIFICATIONS.

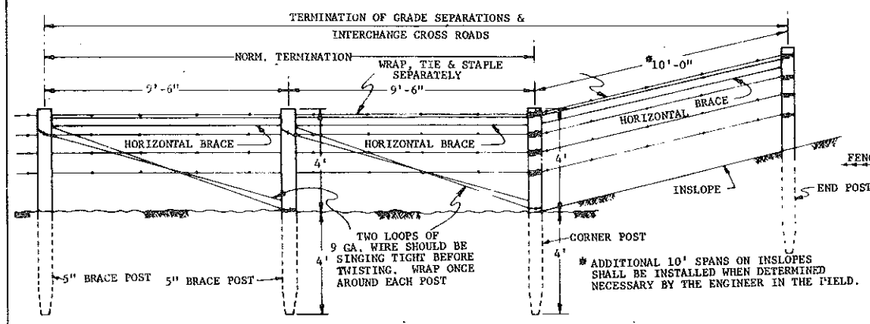
UNLESS OTHERWISE SHOWN ON THE PLANS THE BARB WIRE SHALL BE 12 1/2 GAGE WIRE WITH 2 POINT BARBS.

DOUBLE BRACE ASSEMBLIES SHALL BE INSTALLED AT LOCATIONS SHOWN ON THE PLANS OR ESTABLISHED BY THE ENGINEER. THE DISTANCE BETWEEN ADJACENT FENCE TERMINALS, CORNER ASSEMBLIES, OR DOUBLE BRACE ASSEMBLIES SHALL NOT EXCEED 1320 FEET.

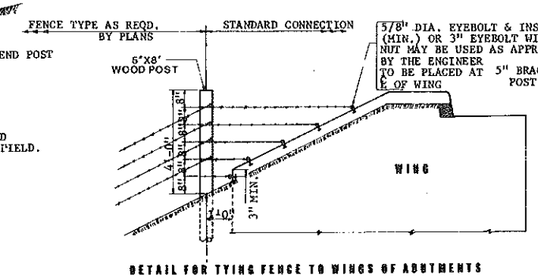
ADDITIONAL MATERIALS AND LABOR FOR EACH FENCE TERMINAL WILL BE PAID FOR AT THE PRICE BID FOR DOUBLE BRACE ASSEMBLY.

PRIVATE FENCES SHALL NOT BE CONNECTED TO THE HIGHWAY FENCE.

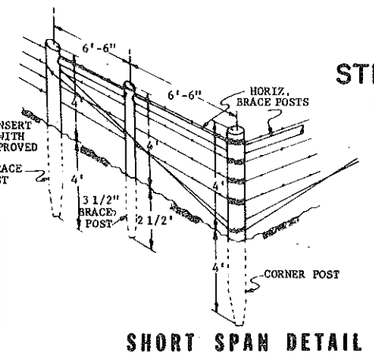
COST OF FURNISHING AND INSTALLING INSERTS AND EYEBOLTS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR FENCING. EYEBOLTS SHALL BE GALVANIZED ACCORDING TO AASHTO DESIGNATION: M-30, INSERTS OF CORROSION RESISTANT MATERIAL NEED NOT BE GALVANIZED. CONCRETE INSERTS SHALL BE OF SUCH DESIGN THAT, WHEN INSTALLED IN THE CONCRETE, WILL BE CAPABLE OF DEVELOPING THE FULL STRENGTH OF THE 5/8" DIA. THREADED EYE BOLT.



FENCE TERMINAL

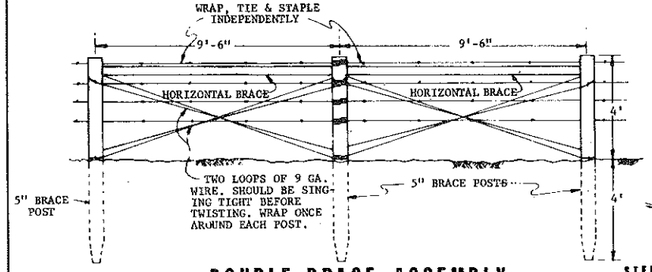


DETAIL FOR TYING FENCE TO WINGS OF ABUTMENTS

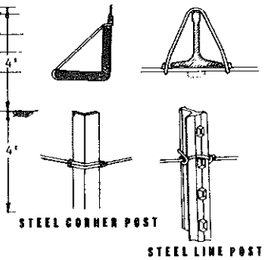


SHORT SPAN DETAIL

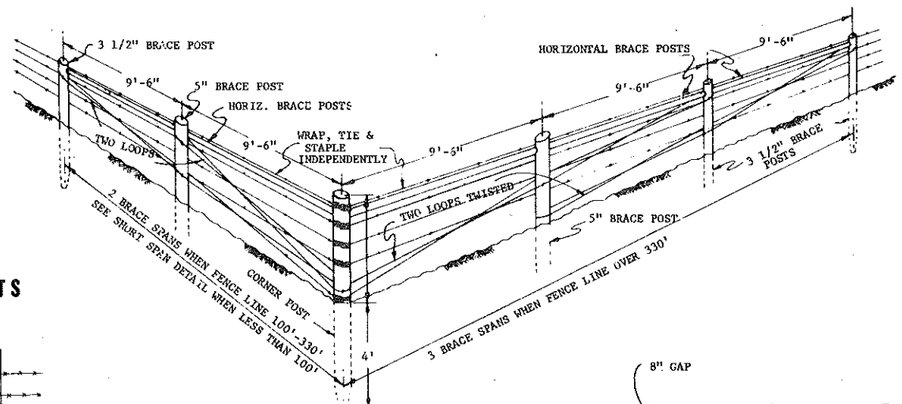
(FENCE LINE 100' OR LESS)



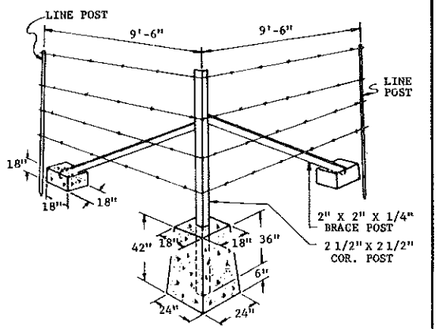
DOUBLE BRACE ASSEMBLY



WIRE FASTENING TO POSTS



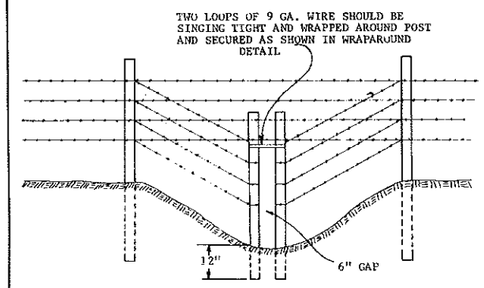
CORNER ASSEMBLY WOOD POSTS



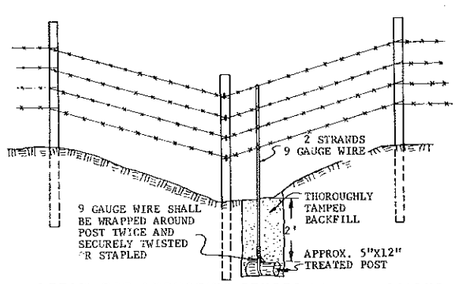
CORNER ASSEMBLY - STEEL POSTS

POST SIZES

USE OF POST	TREATED WOOD		STEEL		
	Post Dia.	Post Length	Post Length	Post Wt. Lbs./Ft.	Anchor Wt. Lbs.
Line Post	3 1/2"	6'-6"	6'-6"	1.33	0.67
Corner Post	8"	8'	7'	4.10	(CONC.)
End Post	5"	8'			
Brace Post	5" / 3 1/2"	8'	7'	3.19	(CONC.)
Gate Post	5"	8'			
Horizontal Brace	3 1/2"	VAR.			

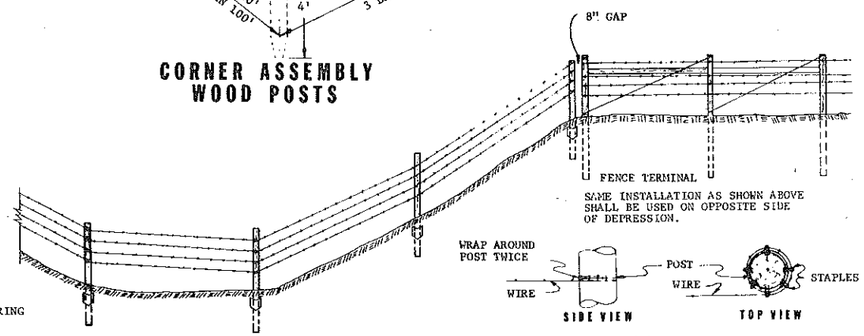


BREAK-AWAY FENCE FOR NARROW DEPRESSIONS SUBJECT TO FLOODING



DETAIL FOR ANCHORING FENCES IN DEPRESSIONS

THE NUMBER OF FENCE ANCHORS SHOWN IN THE PLANS IS APPROXIMATE ONLY. THE EXACT NUMBER (AND LOCATIONS) SHALL BE DETERMINED IN THE FIELD AND PAYMENT MADE ACCORDINGLY. OTHER METHODS OF ANCHORING THE FENCE MAY BE USED IF APPROVED BY THE ENGINEER.



FENCING FOR WIDE DEPRESSIONS

WRAP-AROUND DETAIL

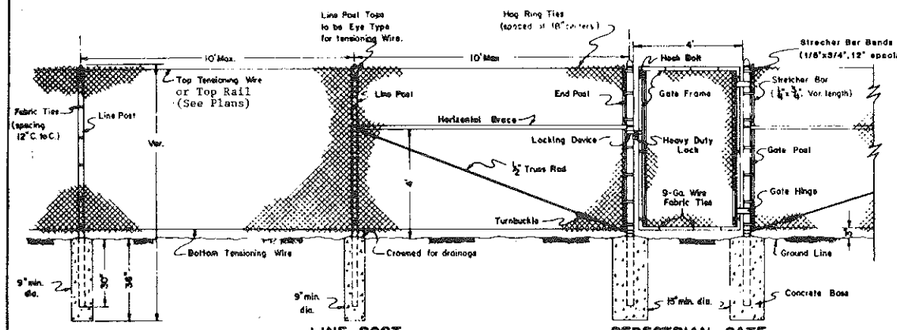
10-1-86 REVISIONS	
DATE	CHANGE
2-4-87	Gate Post
6-1-89	Note Wire Gage

NORTH DAKOTA STATE HIGHWAY DEPARTMENT

APPROVED: David K.D. Laar
DESIGN ENGINEER

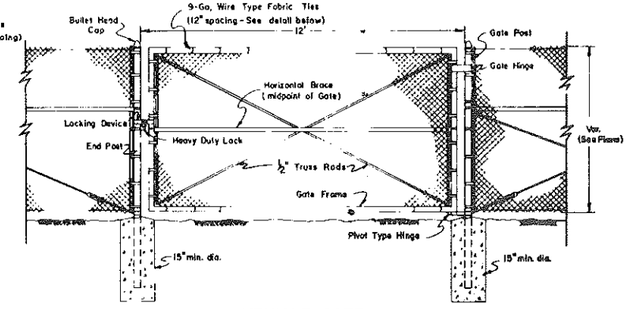
FHWA REGION	STATE	FED AID PROJ NO	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	
		D-752-2	

CHAIN LINK FENCE

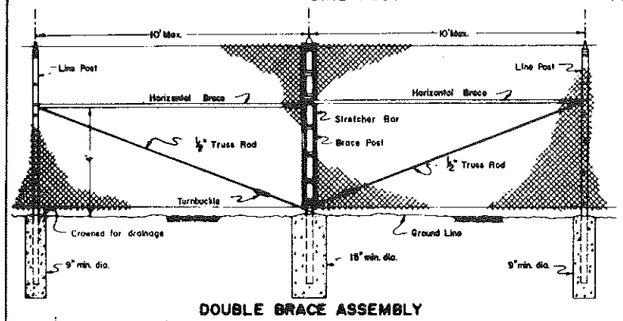


LINE POST

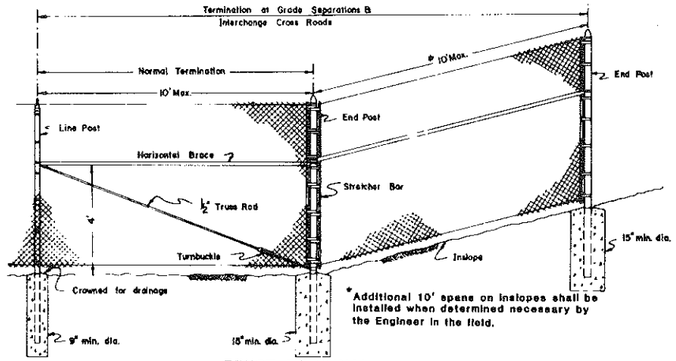
PEDESTRIAN GATE



VEHICLE GATE

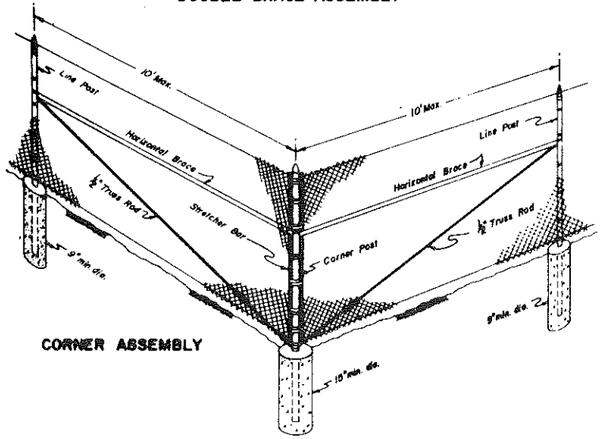


DOUBLE BRACE ASSEMBLY

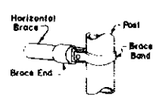


*Additional 10' spans on inslopes shall be installed when determined necessary by the Engineer in the field.

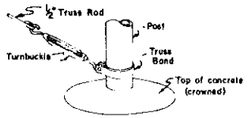
FENCE TERMINAL



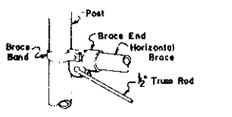
CORNER ASSEMBLY



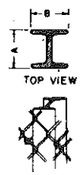
BRACE ATTACHMENT



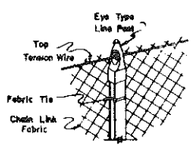
TRUSS ATTACHMENT AT TERMINAL POSTS



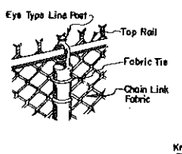
BRACE & TRUSS ATTACHMENT



"H" COLUMN POST



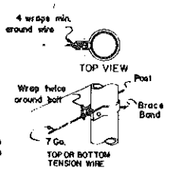
LINE POST TOP DETAIL



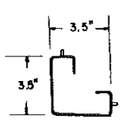
LINE POST TOP DETAIL (PIPE ALTERNATE SHOWN)

HOG RING FASTENER DETAIL

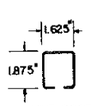
STRETCHER BAR BAND



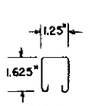
TENSION WIRE ANCHORAGE



TEMINAL POST

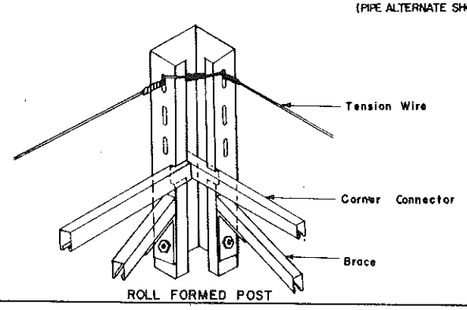


LINE POST

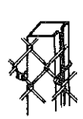


TOP & BRACE RAIL

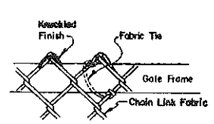
"C" SECTION POST & RAIL



ROLL FORMED POST



"C" SECTION POST



WIRE TYPE FABRIC TIE DETAIL

PRIVATE FENCES SHALL NOT BE CONNECTED TO THE HIGHWAY RIGHT-OF-WAY FENCE.

DOUBLE BRACE ASSEMBLIES SHALL BE INSTALLED AT LOCATIONS SHOWN ON THE PLANS OR ESTABLISHED BY THE ENGINEER. THE DISTANCE BETWEEN ADJACENT FENCE TERMINALS, CORNER ASSEMBLIES, OR DOUBLE BRACE ASSEMBLIES SHALL NOT EXCEED 1000 FEET.

ALL MISCELLANEOUS FITTINGS SHALL BE OF THE TYPE AND SIZE RECOMMENDED BY THE MANUFACTURER OF THE FENCE AND APPROVED BY THE ENGINEER.

SEE PLANS FOR LENGTH OF ALL POSTS, HEIGHT OF FABRIC, AND LOCATION AND NUMBER OF GATES.

CONCRETE FOR POST BASES SHALL BE CLASS YE IN ACCORDANCE WITH SEC. 802 OF THE STANDARD SPECIFICATIONS. COURSE AGGREGATE FOR CONCRETE MIX SHALL BE SIZE NO. 4 OR 5 AT THE OPTION OF THE CONTRACTOR BUT SHALL NOT BE CHANGED DURING THE WORK EXCEPT BY WRITTE. PERMISSION OF THE ENGINEER.

CHAIN LINK FABRIC SHALL BE 9-GAGE WIRE 2" MESH. KNUCKLED FINISHED TOP AND BOTTOM. WIRE SHALL HAVE A MINIMUM TENSILE STRENGTH OF 80,000 P.S.I.

EACH FENCE TERMINAL WILL BE COUNTED AND PAID FOR AS A DOUBLE BRACE ASSEMBLY.

THE CONTRACTOR SHALL HAVE THE OPTION OF USING ANY OF THE TYPES OF POSTS SHOWN IN THE TABLE OF EQUIVALENT POST SIZES AND WEIGHTS FOR THE SPECIFIED USE.

NO DEDUCTION IN MEASURED PAY LENGTH OF CHAIN LINK FENCE WILL BE MADE FOR GATES, CORNER ASSEMBLIES, DOUBLE BRACE ASSEMBLIES OR FENCE TERMINALS.

TOP AND BOTTOM TENSIONING WIRES SHALL BE 7-GAGE STEEL WIRE WITH A MINIMUM TENSILE STRENGTH OF 80,000 POUNDS PER SQUARE INCH.

TOP RAIL SHALL BE 1-5/8" X 1-1/4" 14 GA. ROLL FORMED SECTIONS OR 1-5/8" O.D. PIPE CL. 1 OR CL. 2 TOPRAIL SHALL PASS THROUGH INTERMEDIATE POST TOPS AND FORM A CONTINUOUS BRACE WITHIN EACH STRETCH OF FENCE AND BE SECURELY FASTENED TO TERMINAL POSTS.

TOP TENSIONING WIRE ALTERNATE WILL BE USED UNLESS TOP RAIL IS SPECIFIED ON THE PLANS.

THE FABRIC SHALL BE TIED TO THE TOP RAIL OR TENSION WIRE AS RECOMMENDED BY THE MANUFACTURER.

EQUIVALENT POST SIZES AND WEIGHTS

USE OF POST	SECTION	"C" SEC. STEEL		"H" COLUMN STEEL			ROUND STEEL			ROUND ALUM.	
		Size	Weight	Size		Weight	Size	Weight - Lbs./Ft.		Size	Weight
		Inch	Lbs./Ft.	A	B	Lbs./Ft.	Out. Dia.	Class 1	Class 2	Out. Dia.	Lbs./Ft.
LINE POST	Fabric 6' or less	1.875 x 1.625	1.60	1 7/8"	1 5/8"	2.72	1.900"	2.72	2.28	1.900"	1.26
	Fabric over 6'	1.875 x 1.625	2.34	2 1/4"	2"	4.10	2.375"	3.65	3.12	2.375"	1.74
END, CORNER,	Fabric 6' or less	3.5 x 3.5	5.10				2.375"	3.65	3.12	2.375"	1.74
	Fabric over 6'	3.5 x 3.5	5.10				2.875"	5.79	4.64	2.875"	2.65
GATE POST	All	3.5 x 3.5	5.10				3.500"		5.71	4.000"	4.33
							4.000"	9.11			
EXTERIOR FRAME FOR GATE	Gate width 6' or less	—	—				1.315"	1.68	1.35	1.315"	.75
	Gate width over 6'	—	—				1.900"	2.72	2.28	1.900"	1.26
HORIZONTAL BRACE		1.625 x 1.25	1.35				1.660"	2.27	1.84	1.660"	1.04
BRACE POST	Fabric 6' or less	1.875 x 1.624	2.34				2.375"	3.65	3.12	2.375"	1.74
	Fabric 6' or less	1.875 x 1.624	2.34				2.875"	5.79	4.64	2.875"	2.65

"H" COLUMN STEEL POSTS NOT PERMITTED

10-1-86 REVISIONS	
DATE	CHANGE
10-15-86	NOTE
12-11-86	NOTE

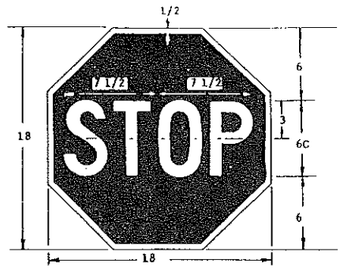
NORTH DAKOTA STATE HIGHWAY DEPARTMENT

APPROVED David K.O. Leer
DESIGN ENGINEER

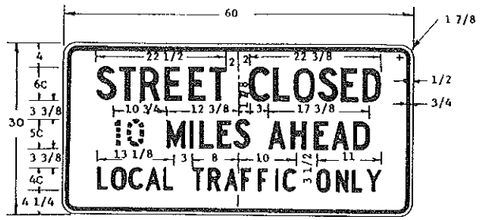
CONSTRUCTION SIGN DETAILS

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	F-RRS-1-006(005)066	

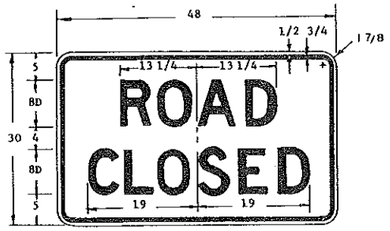
D754-1



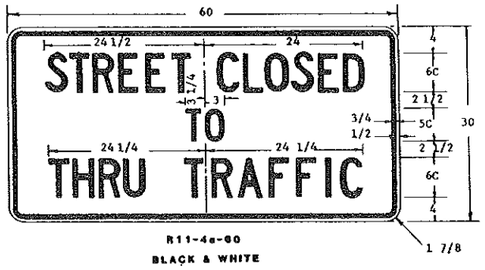
STOP-SLOW PADDLE
RED & WHITE
FLAGPERSON PADDLE



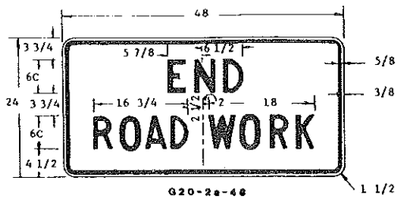
R11-3c-60
BLACK & WHITE



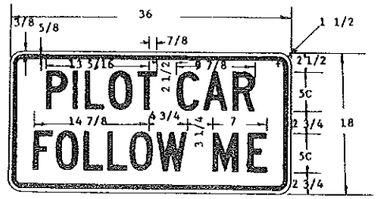
R11-2-48
BLACK & WHITE



R11-4c-60
BLACK & WHITE

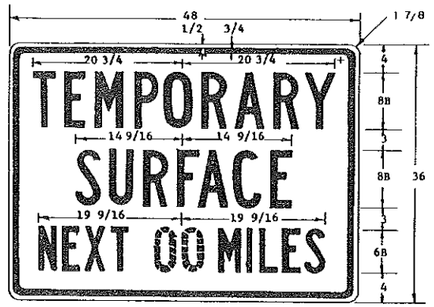


G20-2c-48
BLACK & ORANGE



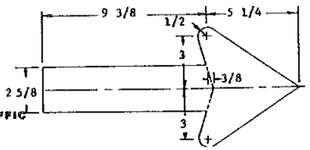
G20-4-36
BLACK & ORANGE

PILOT CAR SIGN SHALL BE MOUNTED ON REAR OF A VEHICLE USED FOR GUIDING CONTROLLED ONE-WAY TRAFFIC THROUGH A CONSTRUCTION AREA.

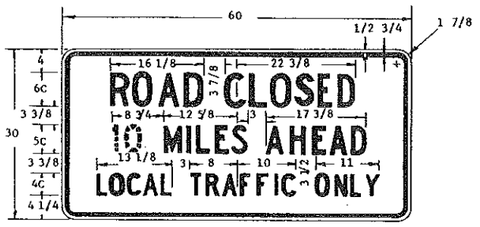


G20-8-48
BLACK & ORANGE

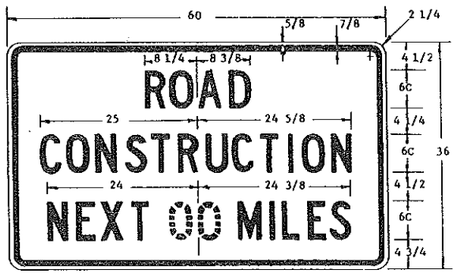
MESSAGES AND BORDERS: THE MESSAGES AND BORDERS SHALL BE SCREENED ON REFLECTIVE SHEETING OR INSTALLED USING PIGMENTED PLASTIC FILM CONFORMING TO THE REQUIREMENT OF SEC. 894-3.5 OF THE STD. SPECIFICATIONS. THE PIGMENTED PLASTIC FILM SHALL BE INSTALLED IN ACCORDANCE WITH THE REFLECTIVE SHEETING MANUFACTURERS RECOMMENDATIONS. THE BORDERS SHALL HAVE THE RADII AND WIDTH SHOWN ON THE PLANS. THE LETTERS SHALL BE FABRICATED IN ACCORDANCE WITH THE STANDARD LETTER GUIDE OF THE HEIGHT AND SERIES SHOWN ON THE PLANS.
THE DETAILS OF THESE LETTERS MAY BE OBTAINED FROM THE STATE HIGHWAY DEPARTMENT OR THE SHEETING MANUFACTURER.



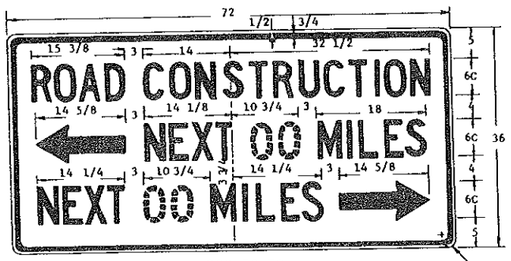
ARROW DETAIL FOR SIGN NO'S.
G20-50-72 & G20-52-72



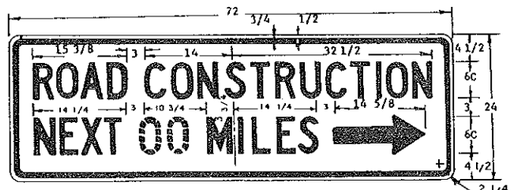
R11-3a-60
BLACK & WHITE



G20-1-60
BLACK & ORANGE

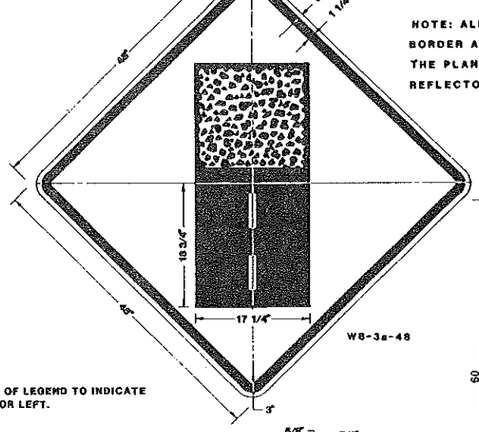


G20-50-72
BLACK & ORANGE

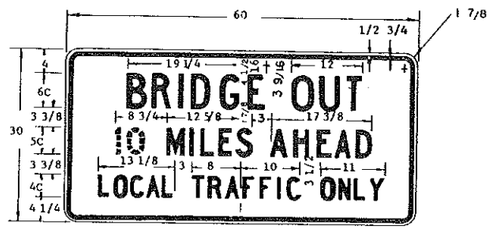


G20-52-72
BLACK & ORANGE

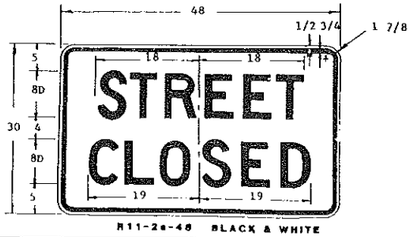
ARROW MAY BE RIGHT OR LEFT OF LEGEND TO INDICATE CONSTRUCTION TO THE RIGHT OR LEFT.



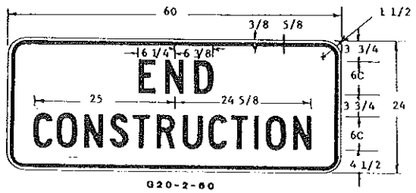
NOTE: ALL SIGNS SHALL HAVE REFLECTORIZED MESSAGE BORDER AND BACKGROUND, UNLESS SHOWN OTHERWISE ON THE PLANS. IN NO CASE IS THE COLOR BLACK REFLECTORIZED.



R11-3b-60
BLACK & WHITE

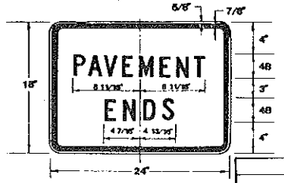


R11-2a-48 BLACK & WHITE

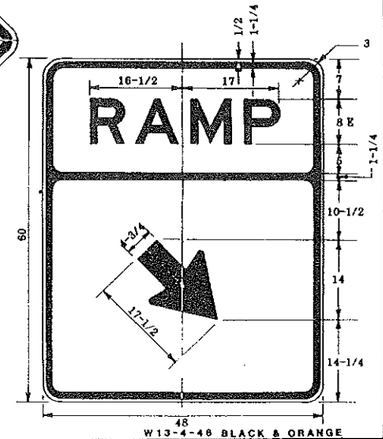


G20-2-60
BLACK & ORANGE

G20-54-48
BLACK & ORANGE



W8-3a-24
BLACK & ORANGE



W13-4-48 BLACK & ORANGE

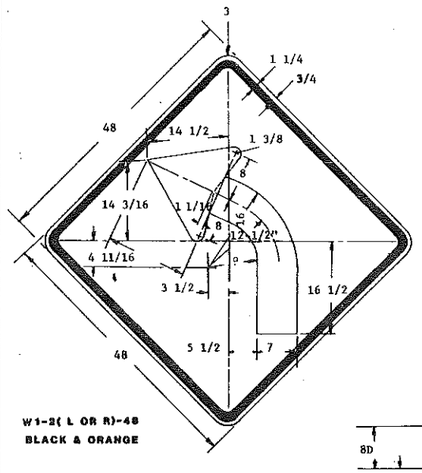
10-1-86 REVISIONS	
DATE	CHANGE

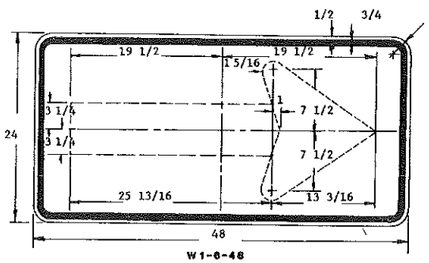
NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED _____ DESIGN ENGINEER

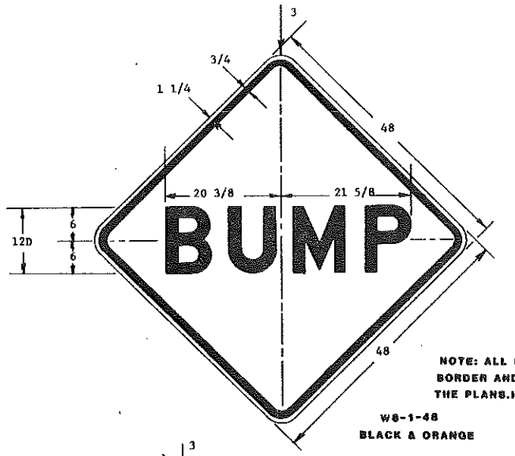
CONSTRUCTION SIGN DETAILS

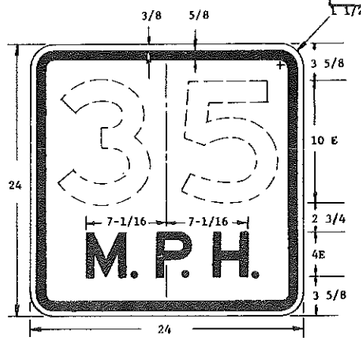
FHWA REGION	STATE	FED AID PROJECT NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	

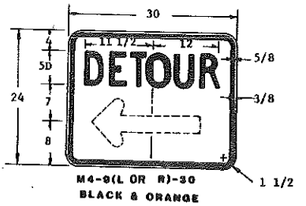
D-754-2



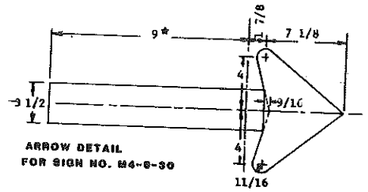


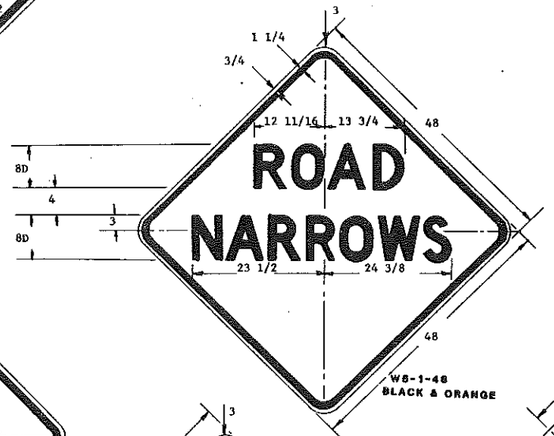


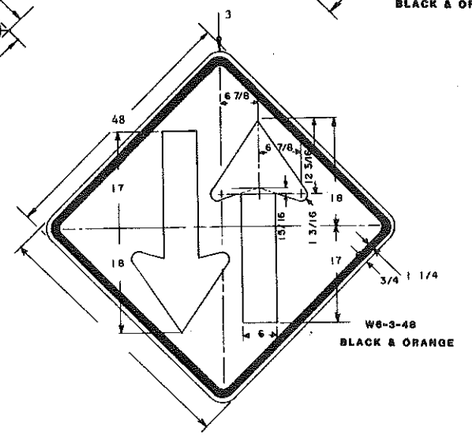


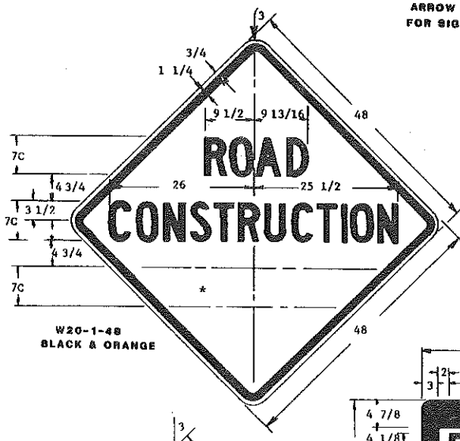


NOTE: ALL SIGNS SHALL HAVE REFLECTORIZED MESSAGE BORDER AND BACKGROUND,UNLESS SHOWN OTHERWISE ON THE PLANS.IN NO CASE IS THE COLOR BLACK REFLECTORIZED.



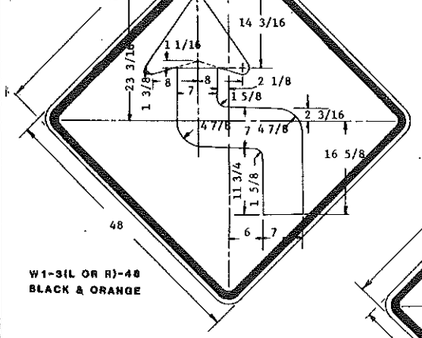


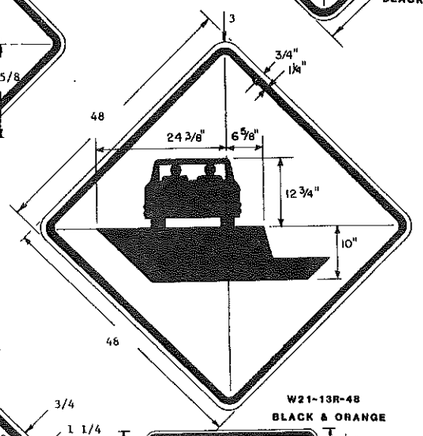


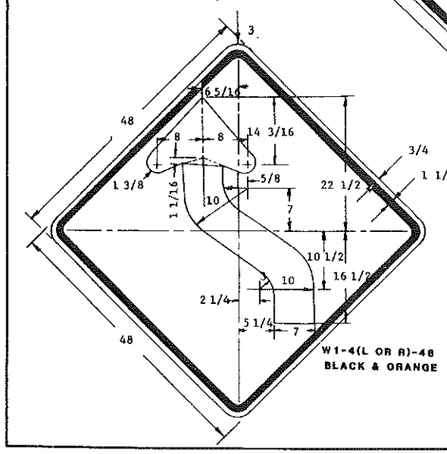


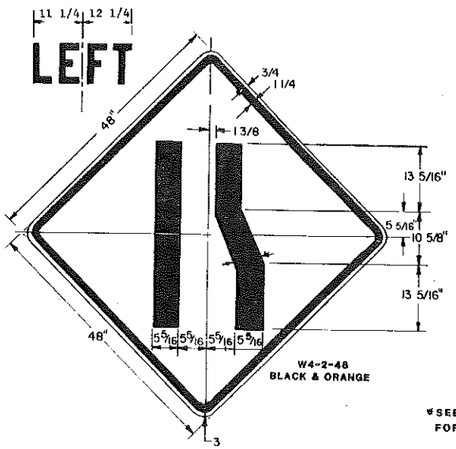
MESSAGE AND BORDER: THE MESSAGES AND BORDERS SHALL BE SCREENED ON REFLECTIVE SHEETING OR INSTALLED USING PIGMENTED PLASTIC FILM CONFORMING TO THE REQUIREMENT OF SEC. 634.06 OF THE STD. SPECIFICATIONS. THE PIGMENTED PLASTIC FILM SHALL BE INSTALLED IN ACCORDANCE WITH THE REFLECTIVE SHEETING MANUFACTURERS RECOMMENDATIONS. THE BORDERS SHALL HAVE THE RADII AND WIDTH SHOWN ON THE PLANS. THE LETTERS SHALL BE FABRICATED IN ACCORDANCE WITH THE STANDARD LETTER GUIDE OF THE HEIGHT AND SERIES SHOWN ON THE PLANS. THE DETAILS OF THESE LETTERS MAY BE OBTAINED FROM THE STATE HIGHWAY DEPARTMENT OR THE SHEETING MANUFACTURER.

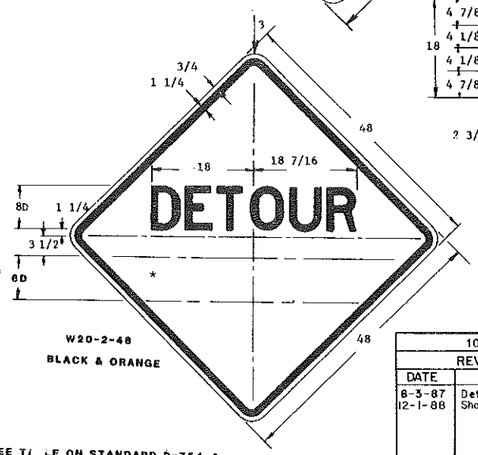
*DIMENSION SHALL BE 3" WHEN ARROW IS PLACED VERTICALLY.

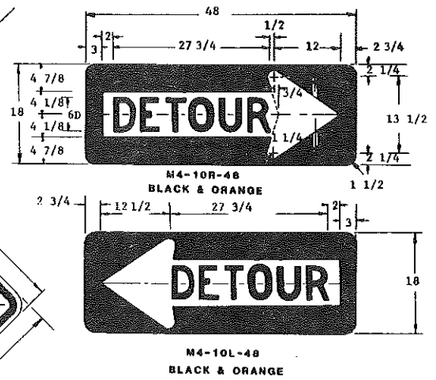










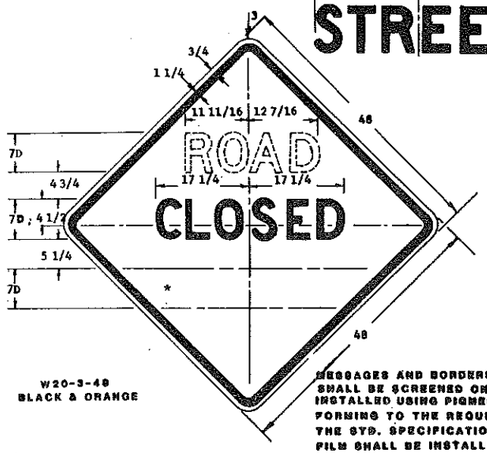


*SEE TABLE ON STANDARD D-754-4 FOR MESSAGE AND DIMENSIONS.

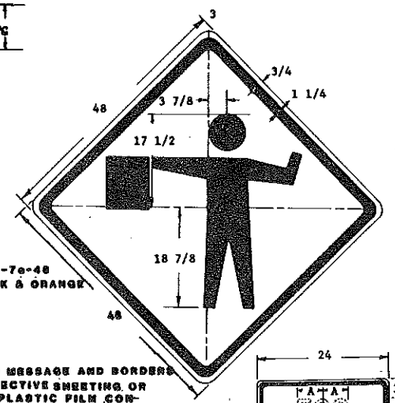
10-1-86		
REVISIONS		NORTH DAKOTA. STATE HIGHWAY DEPARTMENT
DATE	CHANGE	
6-3-87	Detour No.	APPROVED David K.O. Leer
12-1-88	Shoulder Drop Off	DESIGN ENGINEER

CONSTRUCTION SIGN DETAILS

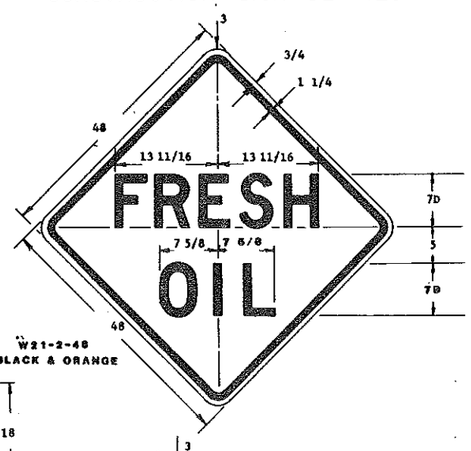
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	
		D 754-3	



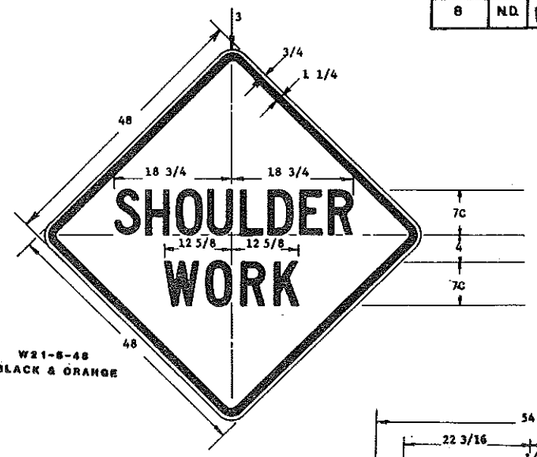
W20-3-48
BLACK & ORANGE



W20-7a-48
BLACK & ORANGE



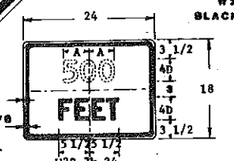
W21-2-48
BLACK & ORANGE



W21-5-48
BLACK & ORANGE

NOTE: EXISTING INVENTORY OF FLAGMAN & MEN WORKING SIGNS WITH WORD MESSAGES MAY BE USED UNTIL THEY NEED REPLACE -MENT.

MESSAGES AND BORDERS: THE MESSAGE AND BORDERS SHALL BE SCREENED ON REFLECTIVE SHEETING OR INSTALLED USING PIGMENTED PLASTIC FILM CONFORMING TO THE REQUIREMENT OF SEC. 808.03 OF THE STD. SPECIFICATIONS. THE PIGMENTED PLASTIC FILM SHALL BE INSTALLED IN ACCORDANCE WITH THE REFLECTIVE SHEETING MANUFACTURERS RECOMMENDATIONS. THE BORDERS SHALL HAVE THE RADII AND WIDTH SHOWN ON THE PLANS. THE LETTERS SHALL BE FABRICATED IN ACCORDANCE WITH THE STANDARD LETTERS GUIDE OF THE HEIGHT AND SERIES SHOWN ON THE PLANS. THE DETAILS OF THESE LETTERS MAY BE OBTAINED FROM THE STATE HIGHWAY DEPARTMENT OR THE SHEETING MANUFACTURERS.

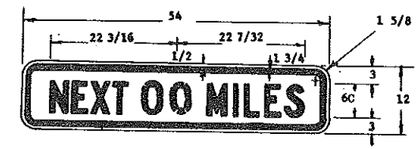


W20-7a-24

SIGN	DIMENSION (INCHES) A
500'	4 - 11/16
1000'	5 - 1/2
1500'	5 - 5/16

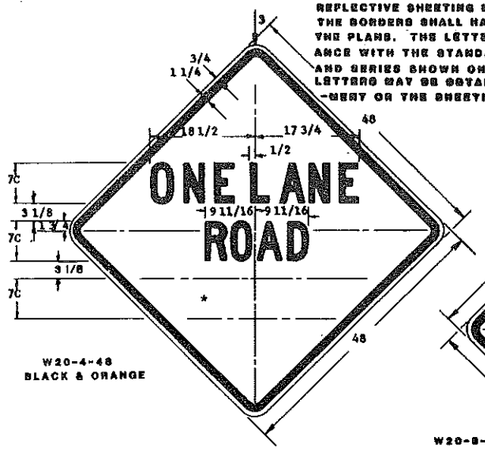
FOR USE WITH W20-7a-48 & W21-1a-48

BLACK & ORANGE



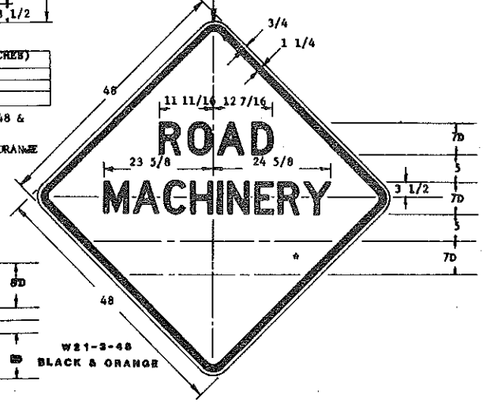
W20-52-54
BLACK & ORANGE

NOTE: ALL SIGNS SHALL HAVE REFLECTORIZED MESSAGES, BORDER AND BACKGROUND, UNLESS SHOWN OTHERWISE ON THE PLANS. IN NO CASE IS THE COLOR BLACK REFLECTORIZED.

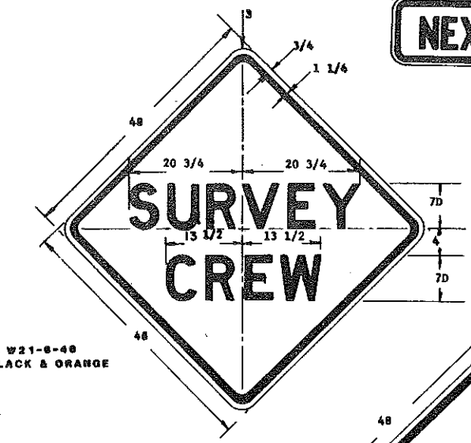


W20-4-48
BLACK & ORANGE

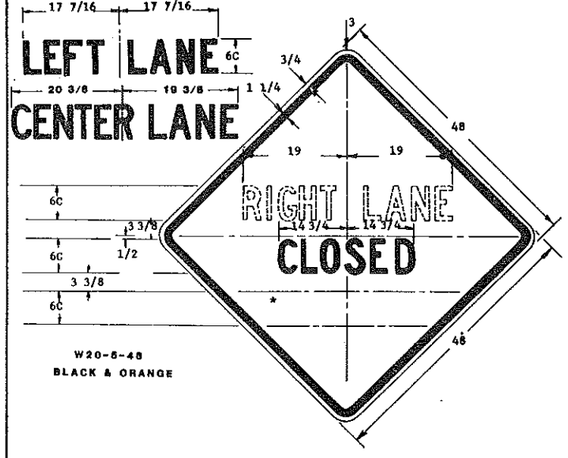
W20-8-48
BLACK &ORANGE



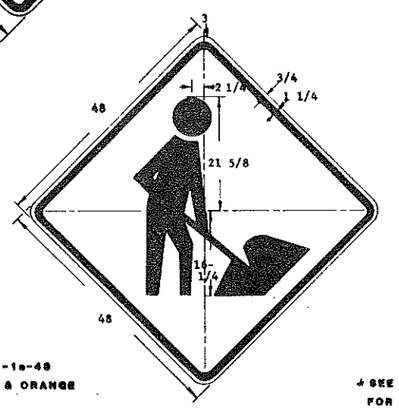
W21-3-48
BLACK & ORANGE



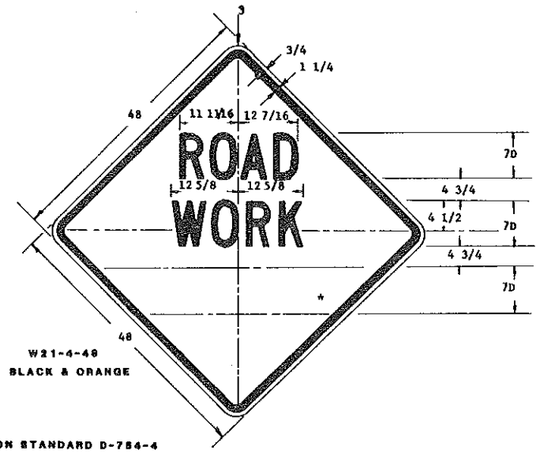
W21-6-48
BLACK & ORANGE



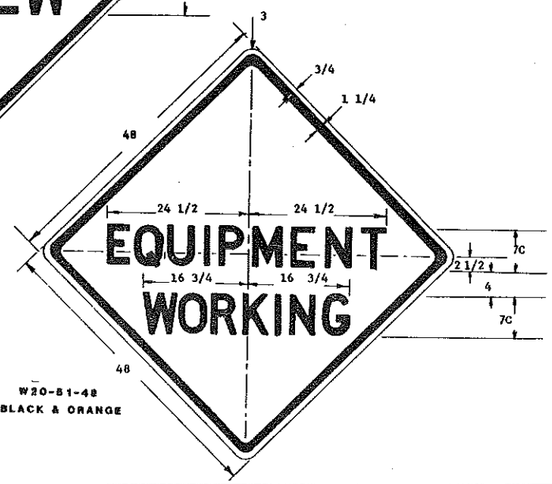
W20-5-48
BLACK & ORANGE



W21-1a-48
BLACK & ORANGE



W21-4-48
BLACK & ORANGE



W20-51-48
BLACK & ORANGE

* SEE TABLE ON STANDARD D-754-4 FOR MESSAGES AND DIMENSIONS.

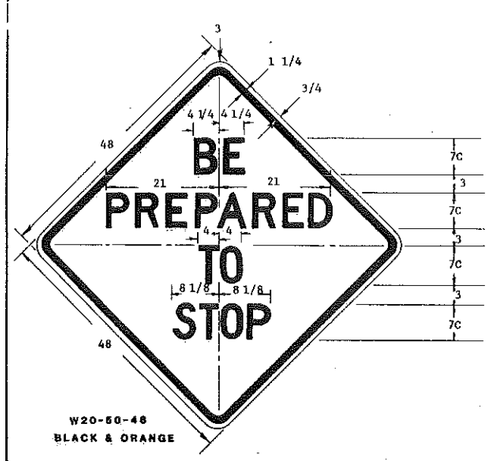
10-1-88	
REVISIONS	
DATE	CHANGE

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED: David K.O. Leer
DESIGN ENGINEER

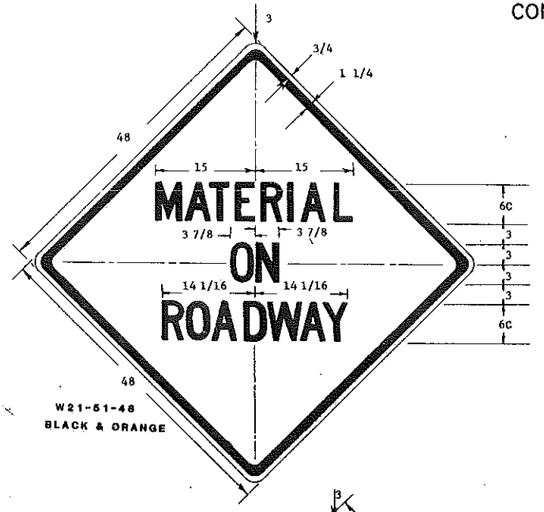
CONSTRUCTION SIGN DETAILS

FHWA REGION		FED. AID PROJECT NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	

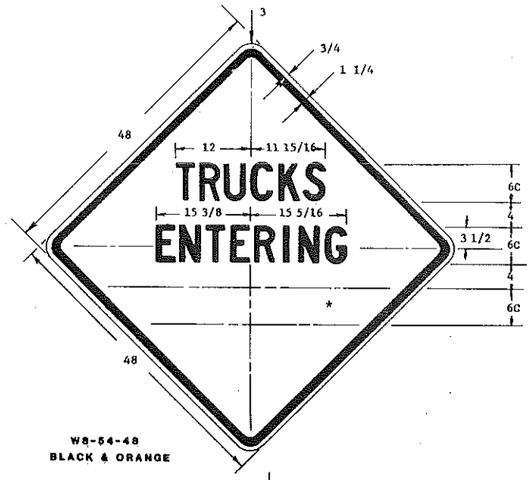
D 754-4



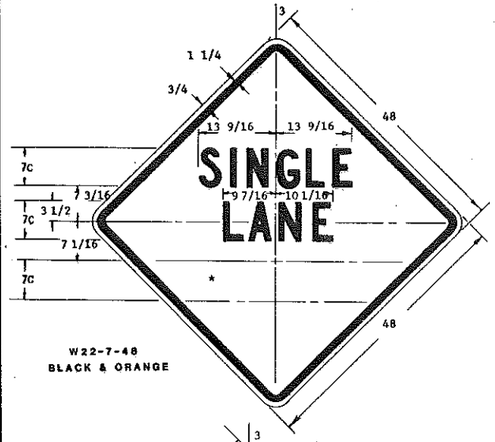
W20-50-48
BLACK & ORANGE



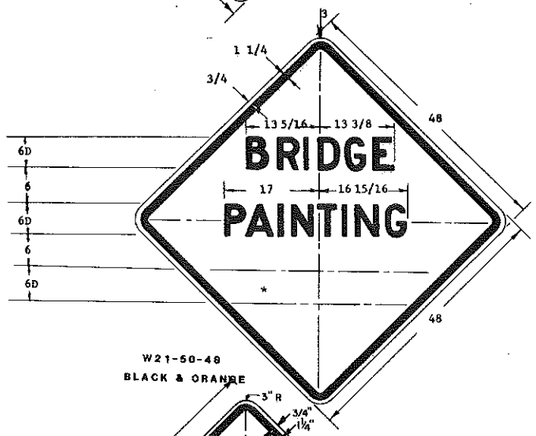
W21-51-48
BLACK & ORANGE



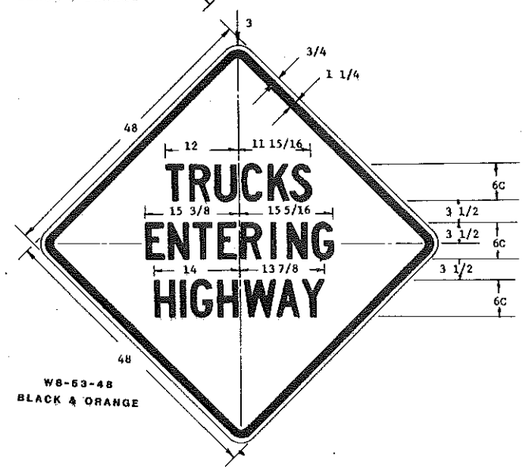
W8-54-48
BLACK & ORANGE



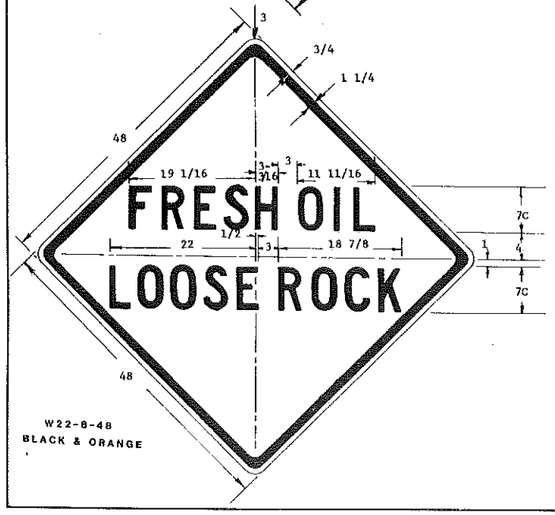
W22-7-48
BLACK & ORANGE



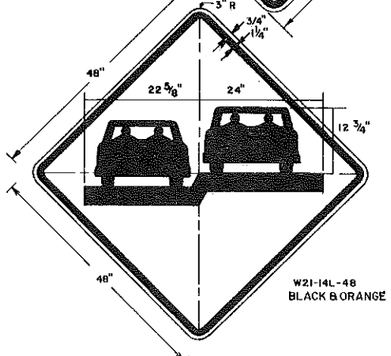
W21-50-48
BLACK & ORANGE



W8-53-48
BLACK & ORANGE

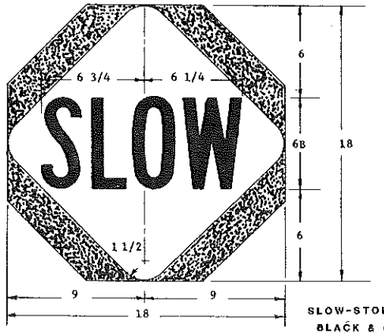


W22-8-48
BLACK & ORANGE

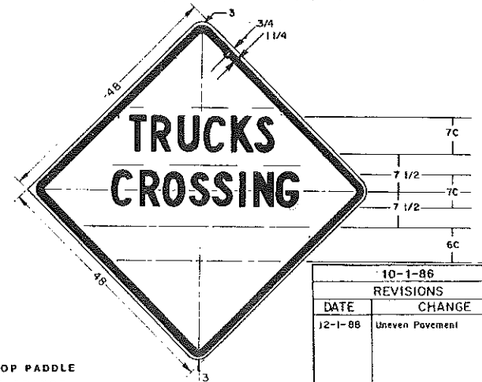


W21-14L-48
BLACK & ORANGE

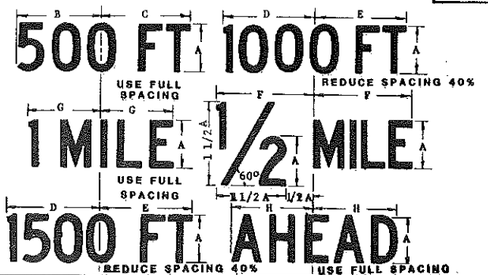
24"X18"
BLACK & ORANGE



SLOW-STOP PADDLE
BLACK & ORANGE
FLAGPERSON PADDLE



W8-55-48
BLACK & ORANGE



DIMENSIONS (INCHES)							
A	B	C	D	E	F	G	H
4C	6-7/8	7	7-1/2	8	8-5/16	6-1/16	7
5C	8-3/4	8-13/16	9-3/8	10	10-7/16	7-5/8	8-3/4
6C	10-3/8	10-1/2	11-1/4	12	12-1/2	9-1/8	10-1/2
7C	12	12-3/16	13-1/8	14	14-9/16	10-5/8	12-1/4
8C	13-3/4	14	15	16	16-5/8	12-1/8	14
4D	8-1/8	8-5/8	8-1/2	9	9	7-3/16	8-11/16
5D	10-3/16	10-13/16	11-5/8	11-1/4	11-1/4	8-1/2	10-7/8
6D	12-3/16	12-15/16	12-3/4	13-1/2	13-1/2	11-13/16	13-1/8
7D	14-1/4	15-1/8	14-7/8	15-3/4	15-3/4	13-1/16	15-1/2
8D	16-1/4	17-1/4	17	18	18	14-3/8	17-7/16

MESSAGES AND BORDERS: THE MESSAGES AND BORDERS SHALL BE SCREENED ON REFLECTIVE SHEETING OR INSTALLED USING PIGMENTED PLASTIC FILM CONFORMING TO THE REQUIREMENT OF SEC. 894.03 OF THE STD. SPECIFICATIONS. THE PIGMENTED PLASTIC FILM SHALL BE INSTALLED IN ACCORDANCE WITH THE REFLECTIVE SHEETING MANUFACTURERS RECOMMENETION.
THE BORDERS SHALL HAVE THE RADII AND WIDTH SHOWN ON THE PLANS. THE LETTERS SHALL BE FABRICATED IN ACCORDANCE WITH THE STANDARD LETTER GUIDE OF THE HEIGHT AND SERIES SHOWN ON THE PLANS. THE DETAILS OF THESE LETTERS MAY BE OBTAINED FROM THE STATE HIGHWAY DEPARTMENT OR THE SHEETING MANUFACTURER.

NOTE: ALL SIGNS SHALL HAVE REFLECTORIZED MESSAGE BORDER AND BACKGROUND, UNLESS SHOWN OTHERWISE ON THE PLANS. IN NO CASE IS THE COLOR BLACK REFLECTORIZED.

STANDARD SIGNS THAT ARE SHOWN IN THE CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS SHALL BE FABRICATED IN THE SHAPE, COLOR AND DIMENSIONS AS SHOWN IN THE STANDARD SIGNS LAYOUT BOOKLET.

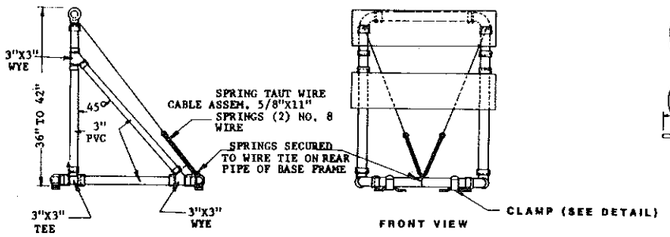
10-1-86 REVISIONS	
DATE	CHANGE
12-1-88	Uneven Pavement

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED: David K.O. Leer
DESIGN ENGINEER

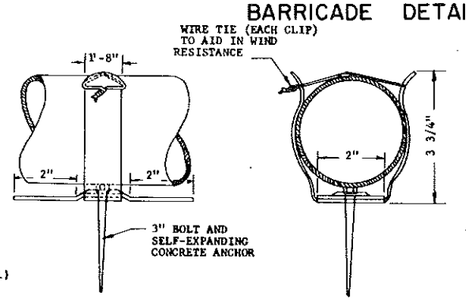
BARRICADE DETAILS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	

D 754-5



SIDE VIEW FRONT VIEW

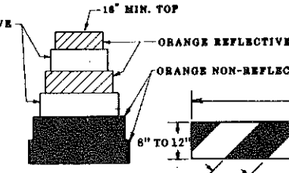


TYPICAL CLAMP DETAIL

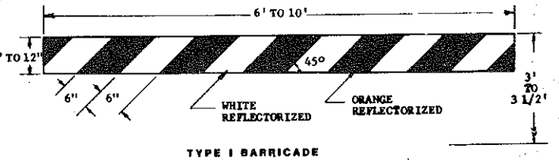
(SINGLE FIRE EXTINGUISHER CLIPS, 3 1/2" DIA.)

DELINEATOR DRUMS

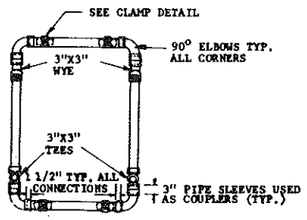
THE MARKINGS ON DRUMS SHALL BE ORANGE AND WHITE STRIPES 4 TO 8 INCHES WIDE. THERE SHALL BE AT LEAST TWO ORANGE AND TWO WHITE STRIPES. WHERE DRUMS HAVE RIBS OR INDENTATION THERE SHALL BE NO REFLECTORIZED SHEETING IN THIS AREA. THIS SPACE SHALL BE NO MORE THAN 2 INCHES WIDE. THE DRUM SURFACE SHALL BE PREPARED AS RECOMMENDED BY THE SHEETING MANUFACTURER BEFORE REFLECTIVE SHEETING IS APPLIED.



DELINEATOR DRUM
36" MIN. HEIGHT



TYPE I BARRICADE



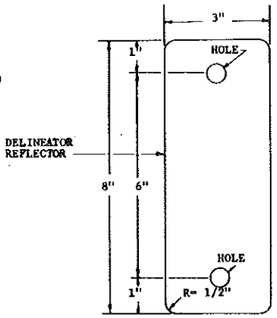
BASE

BREAKAWAY BARRICADE ASSEMBLY

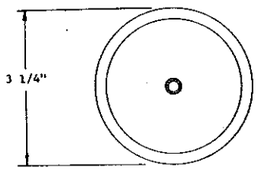
NOTE: THE PIPE, WYES, TEES AND ELBOWS USED TO CONSTRUCT TYPE II BARRICADES (SPECIAL) SHALL CONFORM TO THE REQUIREMENTS OF ASTM DESIGNATION: D2241 FOR PVC 1120 OR 1220, SDR 21, PRESSURE RATING 200 P.S.I. THE WYES, TEES, AND ELBOWS SHALL SHALL CONFORM TO THE REQUIREMENTS OF ASTM DESIGNATION: D-2466, TYPE II, GRADE 1. ALL JOINTS SHALL BE SLIP-FIT AND SHALL NOT BE THEADED OR CEMENTED.

3" PVC PIPE CONFORMING TO ASTM D2665-DWV OR ASTM D2729 MAY BE USED AS AN ALTERNATE TO ASTM D2241-SDR 21.

THE 9" X 48" BARRICADE RAIL SHALL BE FABRICATED FROM 0.025" ANODIZED ALUMINUM AND SHALL BE ATTACHED WITH 1 INCH NO. 14 PAN BEAD METAL SCREWS. COLORS: REFLECTIVE ORANGE AND REFLECTIVE WHITE.

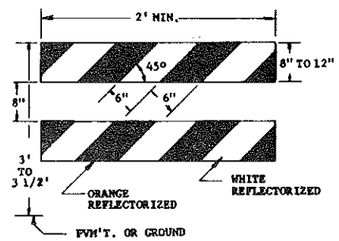


3" x 8" - 18 GUAGE GALVANIZED STEEL SHEETS, OR OR .080" ALUMINUM PLATE WITH WHITE REFLECTIVE SHEETING (TYPE 3A OR 3B) AS SPECIFIED IN SECTION 804 OF THE STANDARD SPECIFICATIONS.

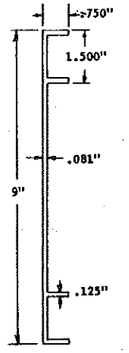


ACRYLIC PLASTIC REFLECTOR

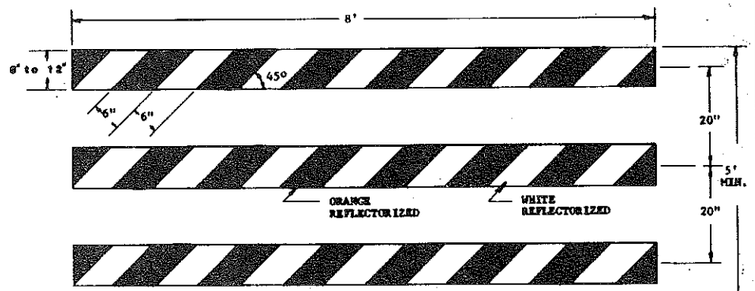
DELINEATOR REFLECTOR SHALL MEET THE REQUIREMENTS OF SECTION 804.



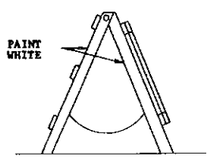
TYPE II BARRICADE



EXTRUDED ALUMINUM BARRICADE BAR DETAIL



TYPE III BARRICADE



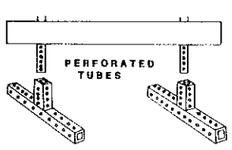
SIDE VIEW FRONT VIEW

MOVABLE BARRICADE ASSEMBLY

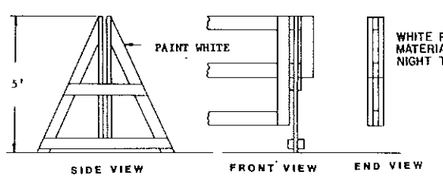
NOTE: EACH MOVABLE BARRICADE SHALL BE WEIGHTED DOWN BY A SUFFICIENT NUMBER OF SAND BAGS OR OTHER SUITABLE WEIGHT SO THAT IT WILL NOT BE BLOWN OVER BY THE WIND UNLESS THE MOVABLE SUPPORTING STRUCTURE IS CONSTRUCTED IN SUCH A MANNER THAT THE WIND CANNOT BLOW IT OVER. WEIGHT USED SHALL BE APPROVED BY THE ENGINEER IN THE FIELD. THE STRIPES SHALL SLANT DOWNWARD TOWARD THE SIDE WHICH TRAFFIC IS TO PASS. BARRICADES USED AT THE BEGINNING OF A PROJECT SHALL FACE TRAFFIC ENTERING THAT PROJECT.

SIDE VIEW FRONT VIEW

HINGED BARRICADE ASSEMBLY

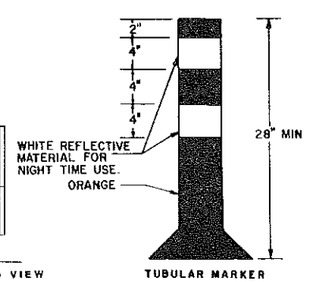


SECTIONAL BARRICADE

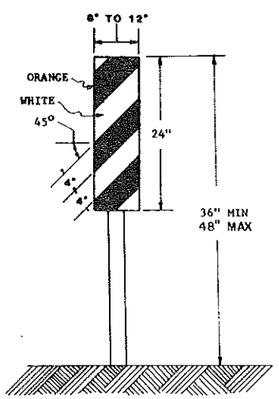


SIDE VIEW FRONT VIEW END VIEW

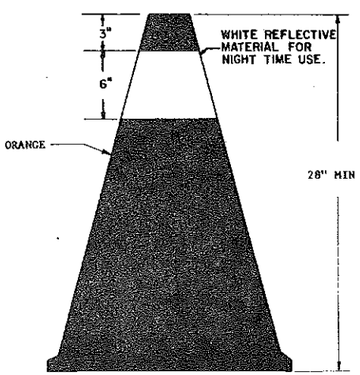
DEMOUNTABLE BARRICADE ASSEMBLY



TUBULAR MARKER



VERTICAL PANEL



CONE

BARRICADES: Number Of Reflectorized Rail Faces

TYPE I	TYPE II	TYPE III
2(One Each Direction)	4(Two Each Direction)	6(Facing in two Directions)

BARRICADE RAIL MATERIAL MAY BE 1" NOMINAL THICKNESS STANDARD LUMBER OR 3/4" PLYWOOD AND PREPARED AS RECOMMENDED BY THE SHEETING MANUFACTURER BEFORE REFLECTIVE SHEETING IS APPLIED.

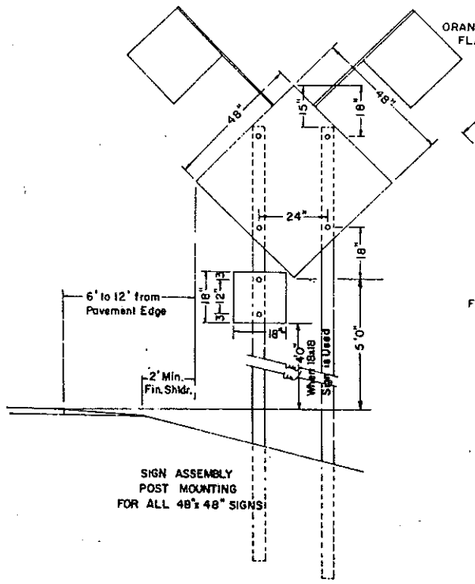
10-1-86	
REVISIONS	
DATE	CHANGE
8-3-87	Type Sheeting
10-1-87	Delineator Drum Note
6-9-88	Barricades Type III

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED: David K. O. Leer
DESIGN ENGINEER

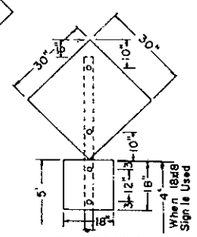
CONSTRUCTION SIGN AND BARRICADE ASSEMBLY DETAILS

FHWA REGION	STATE	FED AID PROJ NO	SHEET NO
8	N.D.	F-RRS-1-006(005)066	

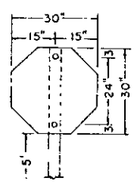
D-754-5-A



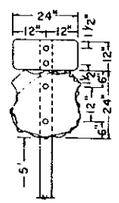
SIGN ASSEMBLY
POST MOUNTING
FOR ALL 48"x48" SIGNS



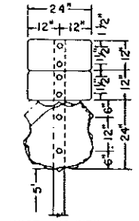
POST MOUNTING
FOR ALL 30"x30" SIGNS



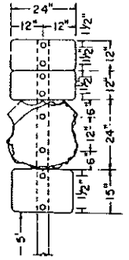
POST MOUNTING
FOR SIGN NO. R-1-30



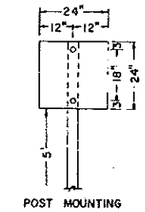
POST MOUNTING
FOR ASSEMBLIES WITH
ONE CARDINAL DIRECTION
SIGN & ONE ROUTE MARKER



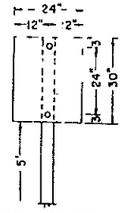
POST MOUNTING
FOR ASSEMBLIES WITH
ONE CARDINAL DIRECTION
SIGN, ONE DETOUR SIGN
& ONE ROUTE MARKER



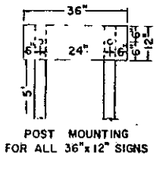
POST MOUNTING
FOR ASSEMBLIES WITH ONE
CARDINAL DIRECTION SIGN, ONE
DETOUR SIGN, ONE ROUTE MARKER
& ONE DIRECTIONAL ARROW



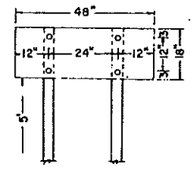
POST MOUNTING
FOR ALL 24"x24" SIGNS



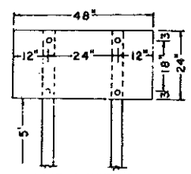
POST MOUNTING
FOR ALL 24"x30" SIGNS



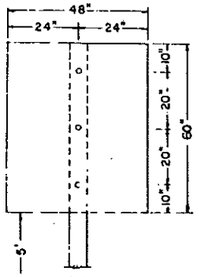
POST MOUNTING
FOR ALL 36"x12" SIGNS



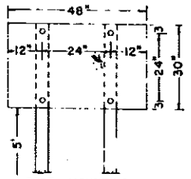
POST MOUNTING
FOR ALL 48"x18" SIGNS



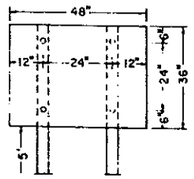
POST MOUNTING
FOR ALL 48"x24" SIGNS



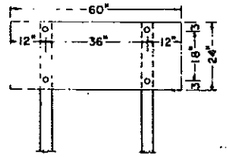
POST MOUNTING
FOR ALL 48"x60" SIGNS



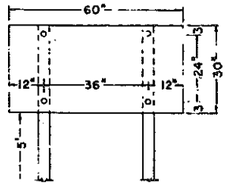
POST MOUNTING
FOR ALL 48"x30" SIGNS



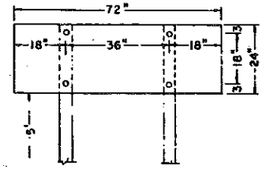
POST MOUNTING
FOR ALL 48"x36" SIGNS



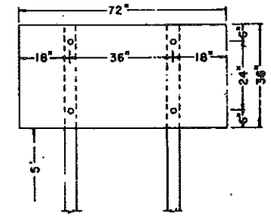
POST MOUNTING
FOR ALL 60"x24" SIGNS



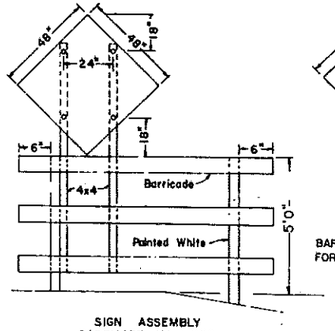
POST MOUNTING
FOR ALL 60"x30" SIGNS



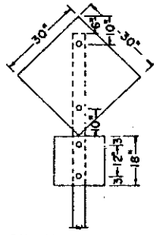
POST MOUNTING
FOR ALL 72"x24" SIGNS



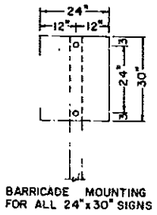
POST MOUNTING
FOR ALL 72"x36" SIGNS



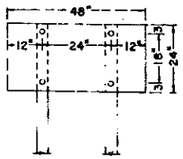
SIGN ASSEMBLY
BARRICADE MOUNTING
FOR ALL 48"x48" SIGNS



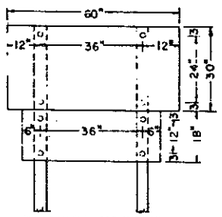
BARRICADE MOUNTING
FOR ALL 30"x30" SIGNS



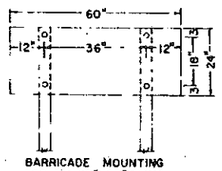
BARRICADE MOUNTING
FOR ALL 24"x30" SIGNS



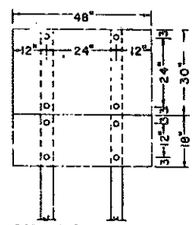
BARRICADE MOUNTING
FOR ALL 48"x24" SIGNS



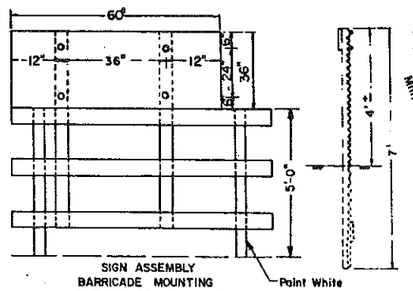
BARRICADE MOUNTING
FOR ALL 60"x30" SIGNS



BARRICADE MOUNTING
FOR ALL 60"x24" SIGNS



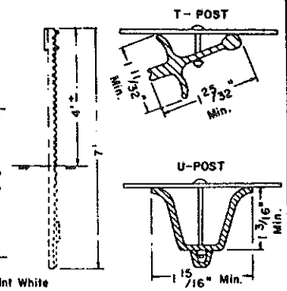
BARRICADE MOUNTING
FOR ALL 48"x30" & 48"x18" SIGNS

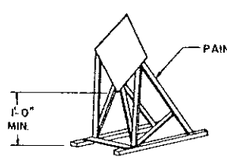


SIGN ASSEMBLY
BARRICADE MOUNTING
FOR ALL G20-1-60 SIGNS

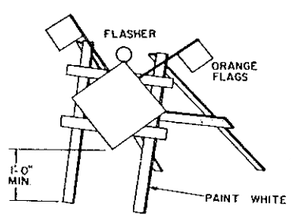
NOTE:
In Urban Areas the vertical clearance shall be increased to 7 feet on all signs, except when supplemental signs are placed below main signs. The supplemental signs shall be placed at a 6'-0" minimum clearance.

DELINEATOR ATTACHMENT
AND POST MOUNTING DETAILS





PORTABLE SIGN MOUNTING



PORTABLE SIGN MOUNTING

NOTES:
Barricade and Sign Supports: Wooden supports shall be painted white. Steel supports shall be galvanized or painted.
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.

NOTES:
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.

BARRICADE MOUNTING SIGNS: The bottom of the sign shall be flush with the top of the top rail. Wood sign posts shall be 4x4 min. SFS or equivalent steel posts. See Stds. D-754-5 thru D-754-9 for construction sign and barricade location details. All barricades and barricade mounted signs shall be assembled with 3/8" bolts.

SIGN SUPPORTS: The sign supports shall be imbedded to a sufficient depth so that the signs will remain plumb throughout duration of the project. It is suggested that the min. depth of imbedment be 5'-0".

MATERIAL: All signs shall be .100" aluminum, 12 gage galv. steel, 1/2" plywood or other approved mat'l.

HOLES: All holes to be punched round for 3/8" bolts.

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.

10-1-88

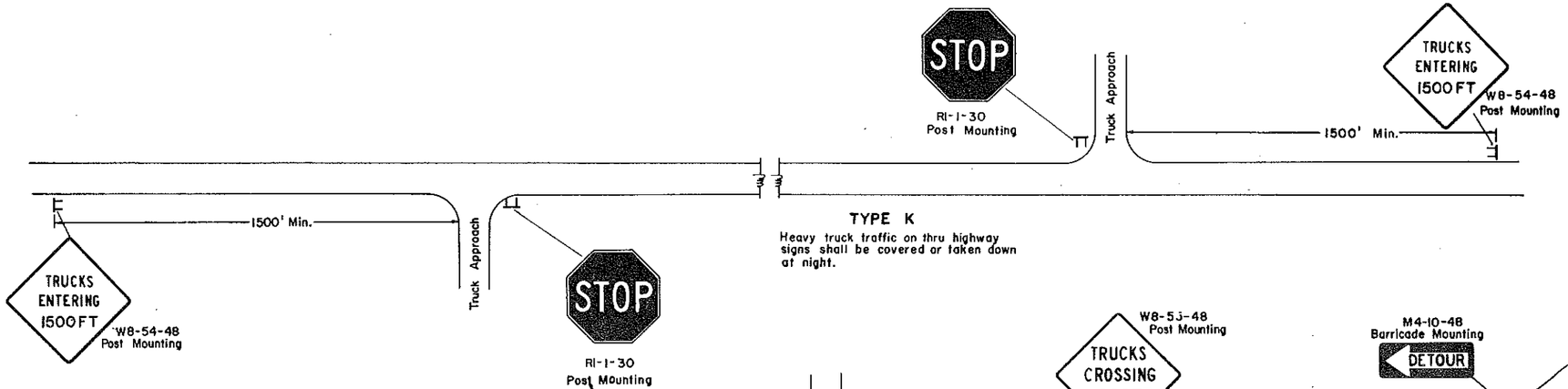
REVISIONS	
DATE	CHANGE
8-1-88	SIGN ASSEMBLY

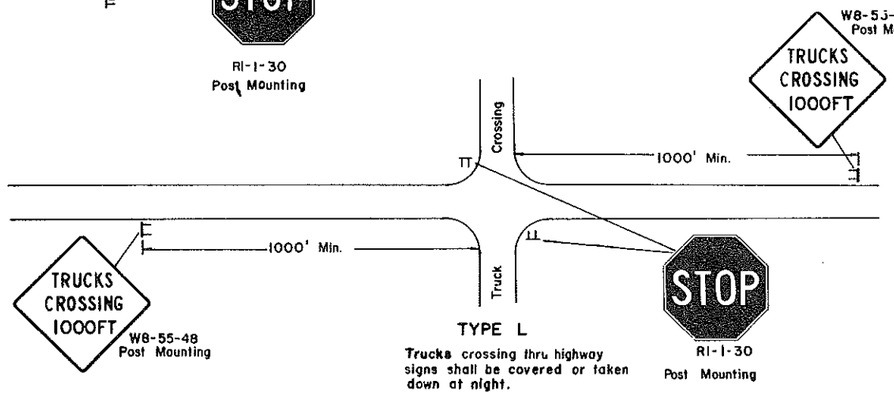
NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED David K.O. Leer
DESIGN ENGINEER

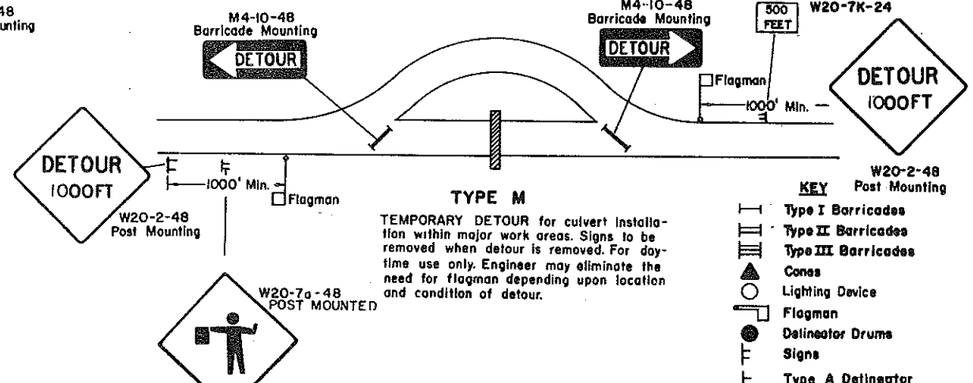
CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

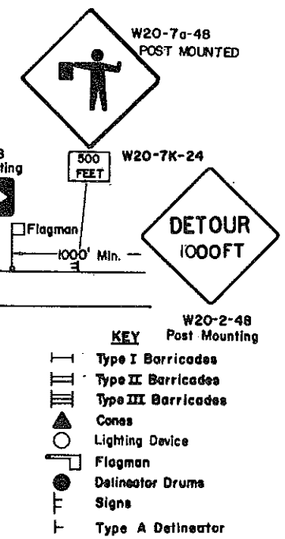
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	

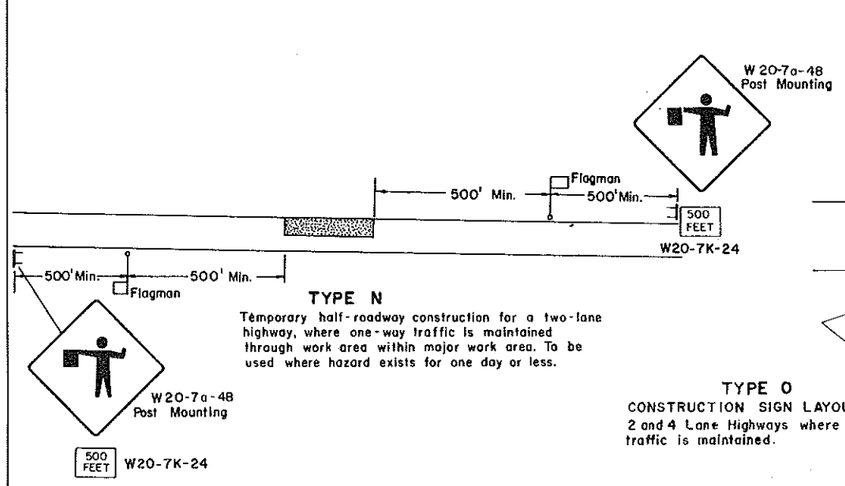
D-754-10

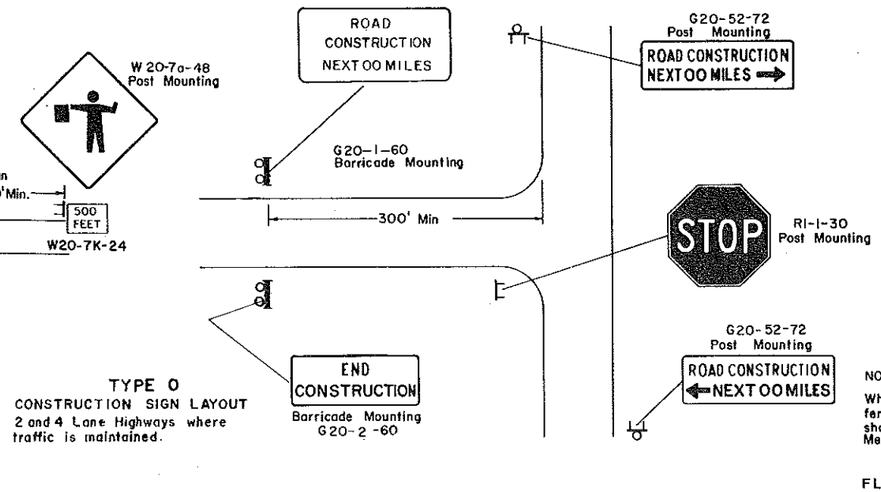












NOTE:

Where advance warning sign placed as shown interferes with permanent signs, The warning sign location shall be determined by the Engineer for best results. Messages shall be varied as required.

FLAGS: All diamond warning signs shall have two orange warning flags 24" square mounted perpendicular to the edges of the diamond sign end at such a distance above the edges so that when flag is hung limp it will not touch the sign.

Lighting- Flashers shall be placed above the barricade bars and above all warning signs unless barricades and signs have Type 3A or 3B reflective sheeted faces.

Mounting- Barricade shown to be placed on roadway shall be on a movable Assembly. Sign to be mounted on barricades shall be mounted with the sign bottom on the top of the top barricade bar intermediate Sign shall be on a movable assembly Sign show to be placed on roadway shall be placed on movable assemblies.

10-1-86

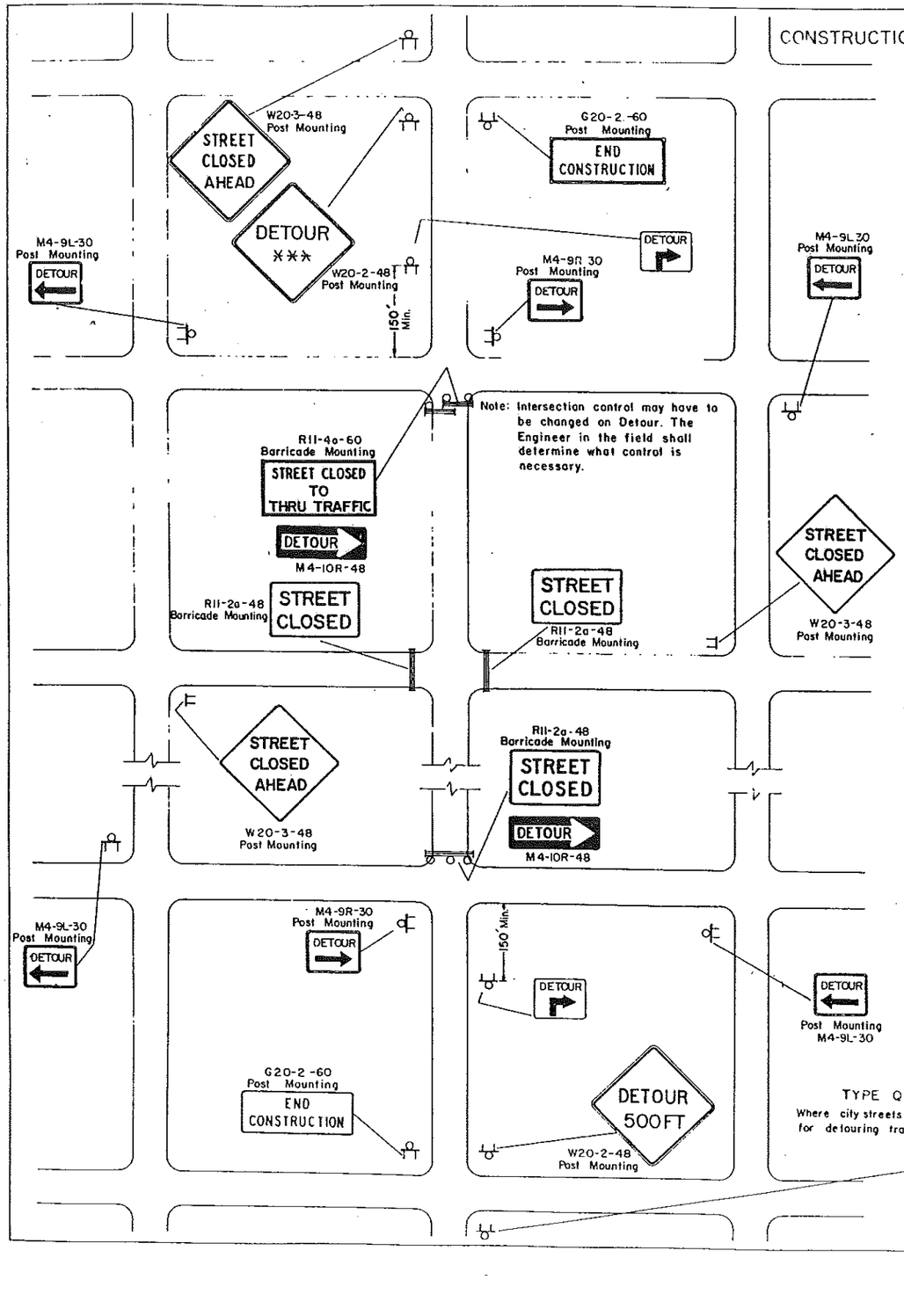
REVISIONS	
DATE	CHANGE
8-3-87	NOTE

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED: David K.O. Leer
DESIGN ENGINEER

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

FHWA REGION	STATE	FED AID PROJ NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	

D-754-11



Sequencing Arrow Panels shall be Type A, B or C dependent on traffic volumes and speeds as follows:

Type A Sequencing Arrow Panels shall be used on roadways with slow moving traffic speeds and low volume (25 mph and 750 ADT or less).

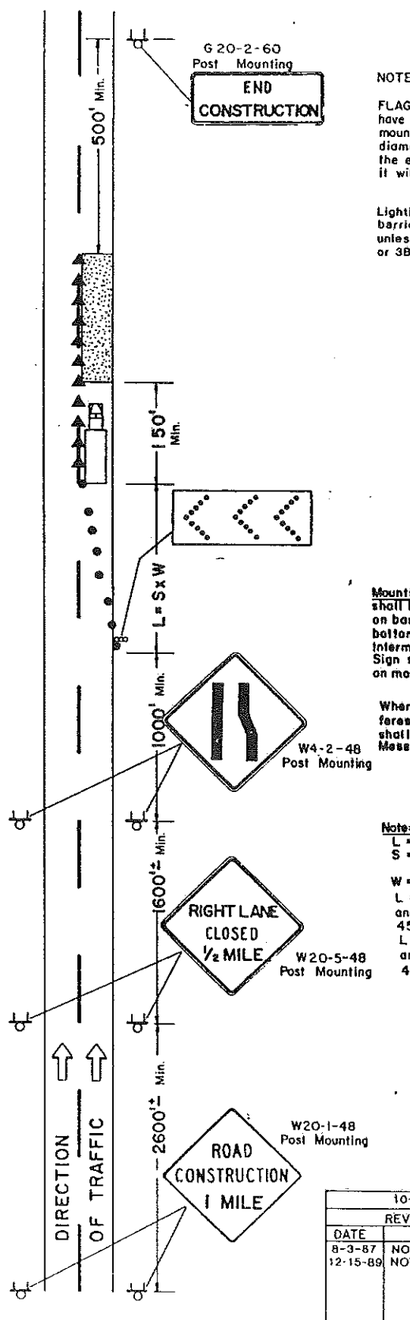
Type B Sequencing Arrow Panels shall be used on roadways with moderate traffic speeds and moderate traffic volumes (40 mph and less and 5000 ADT or less).

Type C Sequencing Arrow Panels shall be used on roadways with high traffic speeds and high traffic volumes (More than 40 mph and over 5000 ADT).

Sequencing arrow panels should normally be placed at the beginning of the tapper. Where shoulder width does not provide sufficient room the arrow panel should be moved closer to the work area so that it can be placed on the surface roadway.

KEY

- Type I Barricades
- Type II Barricades
- Type III Barricades
- Cones
- Lighting Device
- Flagman
- Delineator Drums
- Signs
- Type A Delineator
- Sequencing Arrow Panel



NOTES:

FLAGS: All diamond warning signs shall have two orange warning flags 24" square mounted perpendicular to the edges of the diamond sign and at such a distance above the edges so that when flag is hung limp it will not touch the sign.

Lighting- Flashers shall be placed above the barricade bars and above all warning signs unless barricades and signs have Type 3A or 3B reflective sheeted faces.

Mounting- Barricade shown to be placed on roadway shall be on a movable Assembly. Sign to be mounted on barricades shall be mounted with the sign bottom on the top of the top barricade bar. Intermediate Sign shall be on a movable assembly. Sign show to be placed on roadway shall be placed on movable assemblies.

Where advance warning sign placed as shown interferes with permanent signs, The warning sign location shall be determined by the Engineer for best results. Messages shall be varied as required.

Note:
- L = Minimum Length of Taper
- S = Numerical value of Speed limit or 85 percentile speed
- W = Width of offset

L = S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater.
L = WS²/60 for urban, residential, and other streets with speeds of 40 mph or less.

TYPE P

4 Lane Divided Roadway where half of roadway is closed. Longer than one day or outside of major work area.

10-1-86	
REVISIONS	
DATE	CHANGE
8-3-87	NOTE
12-15-89	NOTE

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

APPROVED David K.O. Leer
DESIGN ENGINEER

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	

D-754-23

ASSEMBLY DETAILS

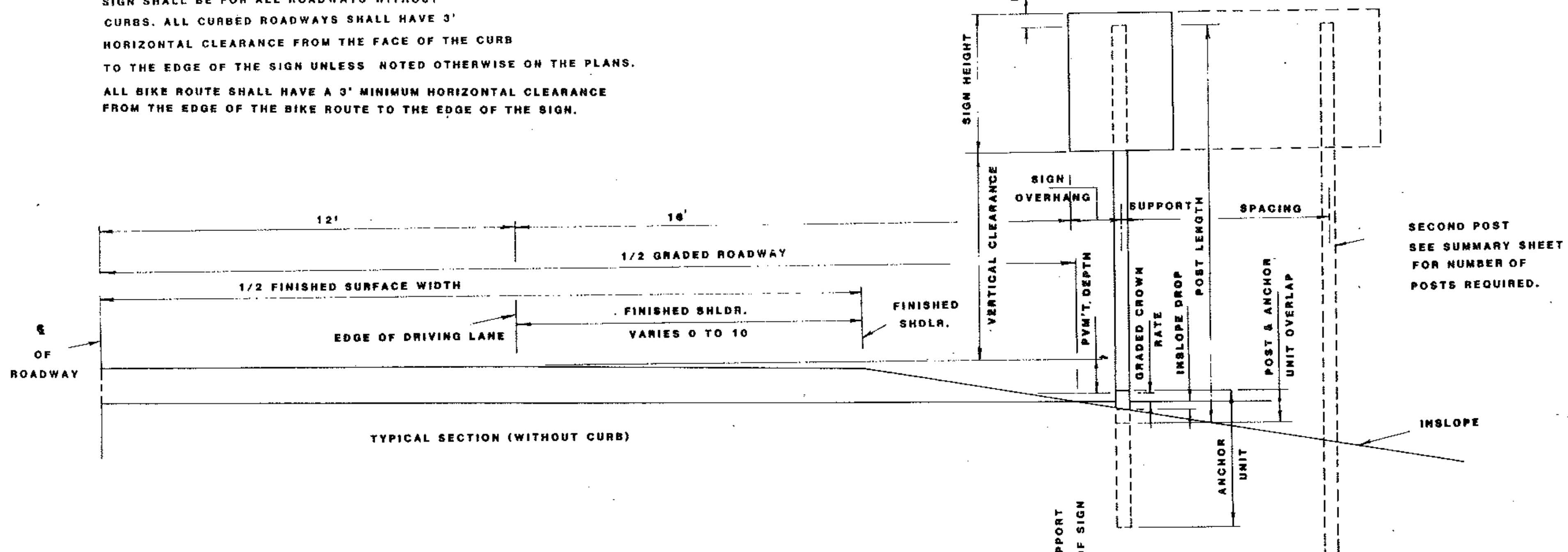
MINIMUM
HORIZONTAL CLEARANCE

THE 16' CLEARANCE FROM THE EDGE OF THE DRIVING LANE TO THE EDGE OF THE SIGN SHALL BE FOR ALL ROADWAYS WITHOUT CURBS. ALL CURBED ROADWAYS SHALL HAVE 3' HORIZONTAL CLEARANCE FROM THE FACE OF THE CURB TO THE EDGE OF THE SIGN UNLESS NOTED OTHERWISE ON THE PLANS.

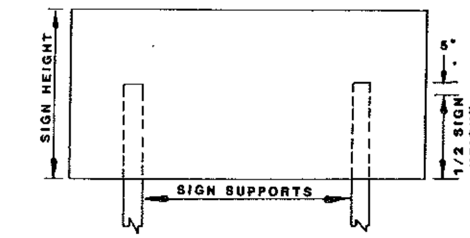
ALL BIKE ROUTE SHALL HAVE A 3' MINIMUM HORIZONTAL CLEARANCE FROM THE EDGE OF THE BIKE ROUTE TO THE EDGE OF THE SIGN.

MINIMUM
VERTICAL CLEARANCE

5' RURAL ROADWAYS
6' ON RURAL OR URBAN EXPRESSWAYS
7' ON FREEWAYS



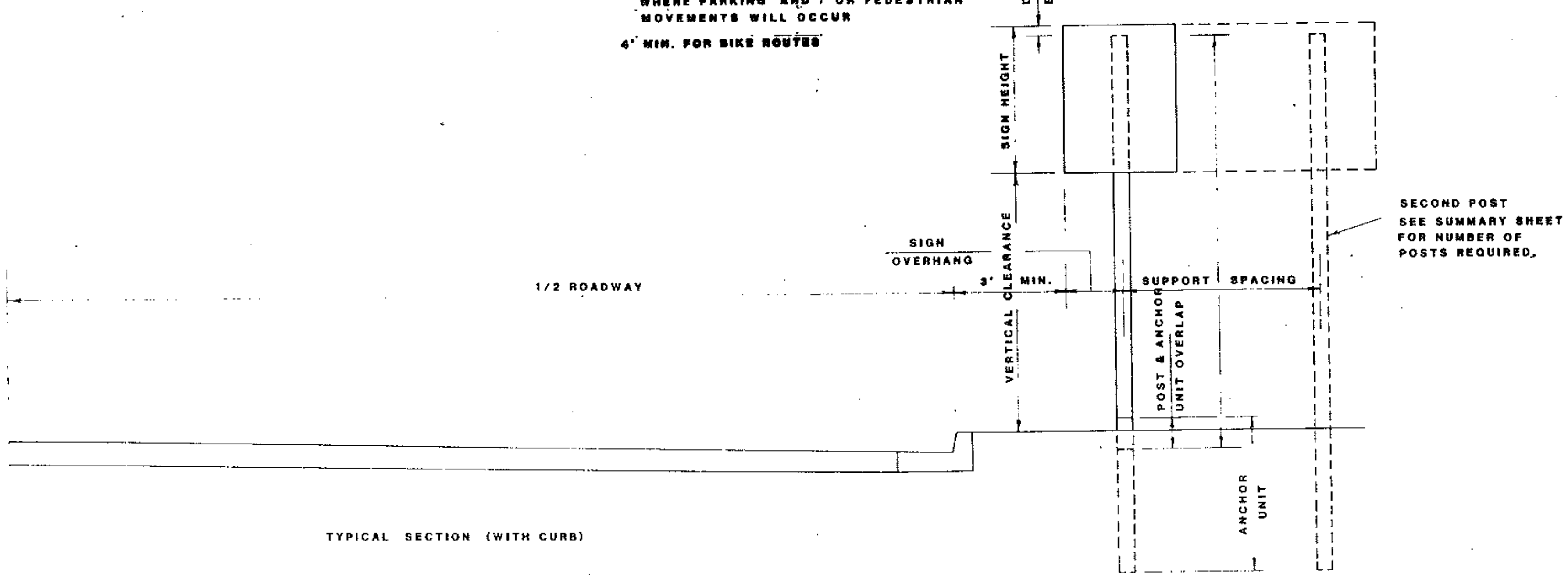
TYPICAL SECTION (WITHOUT CURB)



HINGE LOCATION DETAIL
FOR 2 OR MORE POSTS ASSEMBLIES - WITH SLIP BASES.

MINIMUM
VERTICAL CLEARANCE

6' URBAN EXPRESSWAYS
7' IN RESIDENTIAL AND BUSINESS DISTRICTS WHERE PARKING AND / OR PEDESTRIAN MOVEMENTS WILL OCCUR
4' MIN. FOR BIKE ROUTES



TYPICAL SECTION (WITH CURB)

NOTE

PAVEMENT DEPTH-THE PAVEMENT DEPTH USED TO DEVELOP SUMMARY SHEETS SHOULD BE THE ULTIMATE PAVEMENT DEPTH.

SEE PLANS FOR SIGN NUMBERS AND ASSEMBLY NUMBERS.

SIGN PUNCHING AND STRINGERS SHALL BE AS SHOWN ON STANDARDS.

HORIZONTAL CLEARANCE:

THE POST LENGTHS HAVE BEEN COMPUTED USING A HORIZONTAL CLEARANCE OF 16 FEET BETWEEN THE EDGE OF THE DRIVING LANE AND THE EDGE OF THE SIGN.

FOR AN ULTIMATE SHOULDER WIDTH OF 10 FEET, THE DISTRICTS HAVE THE OPTION OF SETTING THE SIGNS OUT TO 18 FEET CLEARANCE. IF THE CLEARANCE IS TO BE INCREASED TO 18 FEET, THE NECESSARY ADJUSTMENT IN SUPPORT LENGTH SHALL BE MADE IN THE FIELD.

10-1-86	
REVISIONS	
DATE	CHANGE
8-1-88	FREEWAYS

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED: [signature]
Design Engineer

MOUNTING DETAILS
PERFORATED TUBE

D-754-24

F-RRS-1-006(005)066

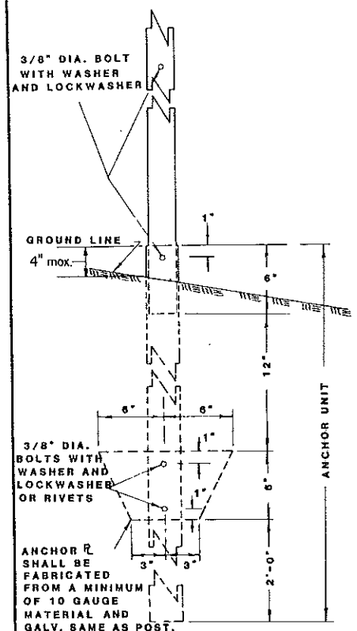
THE SLIP BASE WILL NOT BE MEASURED AND THE COST OF THE SLIP BASES SHALL BE INCLUDED IN THE PRICE BID FOR POSTS.

THE POST SIZE TO BE USED WITH THE SLIP BASE POST SIZE SHALL BE AS FOLLOWS.

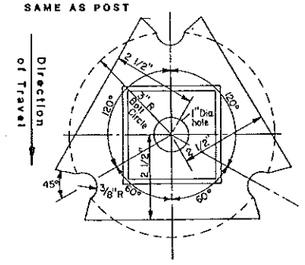
POST SIZE	SLIP BASE POST SIZE
2"X0.105"	2 1/4"X0.105"
2 1/4"X0.105"	2 1/2"X0.105"
2 3/16"X0.135	2 1/2"X0.135"
2 1/2"X0.105 or .135	2 7/8"X0.155"

No shiming will be allowed between post and slip base post.

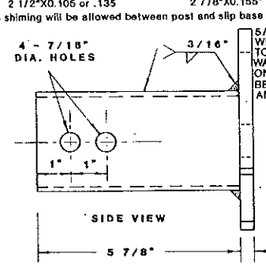
SLIP BASE SHALL BE FABRICATED FROM MATERIALS AND GALVINIZED SAME AS POST



ANCHOR UNIT AND POST SLEEVE ASSEMBLY



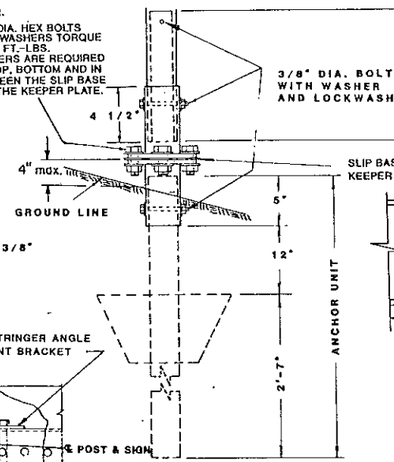
TOP VIEW



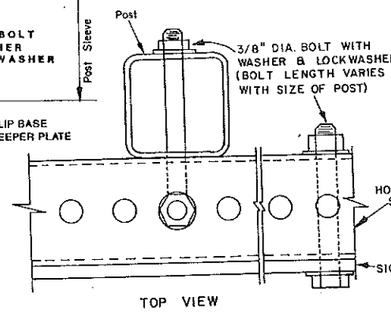
SIDE VIEW

5/8" DIA. HEX BOLTS WITH WASHERS TORQUE TO 5 FT.-LBS. WASHERS ARE REQUIRED ON TOP, BOTTOM AND IN BETWEEN THE SLIP BASE AND THE KEEPER PLATE.

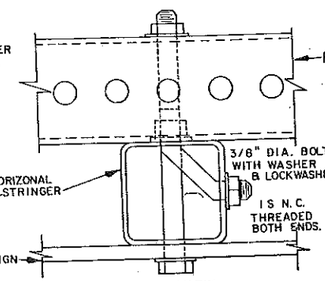
PUNCH ROUND AND PARTIAL THROUGH ANGLE SO THAT EXCESS METAL FITS STRINGER AND POST HOLES.



SLIP BASE ANCHOR UNIT AND POST SLEEVE ASSEMBLY



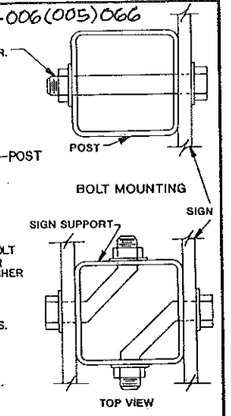
TOP VIEW



SIDE VIEW

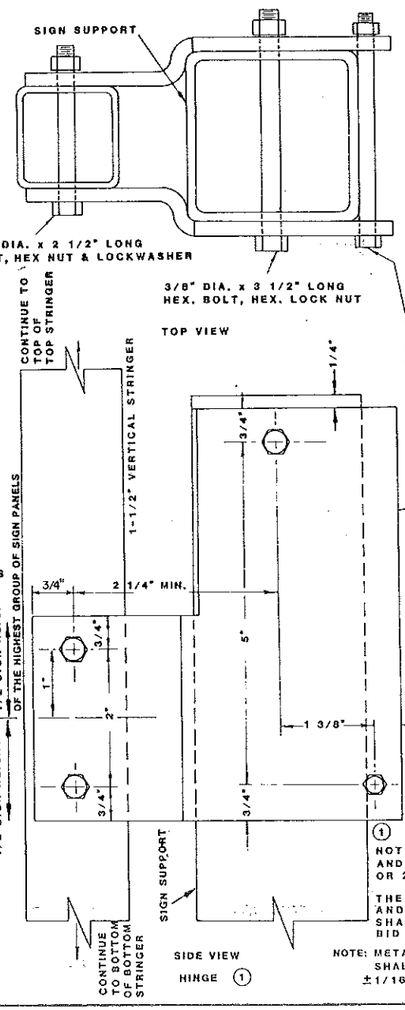
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)

ALTERNATE A



TOP VIEW

BACK TO BACK MOUNTING

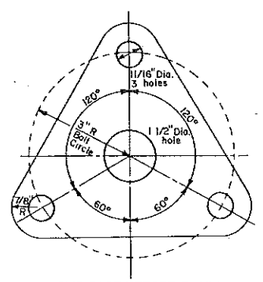


1/4" DIA. x 3 1/4" LONG HEX. BOLT, HEX. NUT AND LOCKWASHER

(1) NOT REQUIRED ON ONE POST ASSEMBLIES AND TWO POST ASSEMBLIES WITH 2-1/4" OR 2" POSTS.

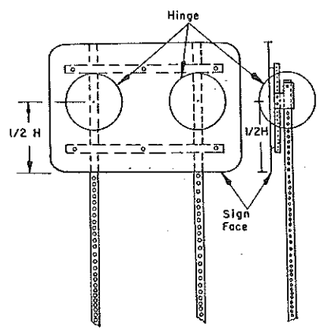
THE HINGE WILL NOT BE MEASURED AND THE COST OF THE HINGES SHALL BE INCLUDED IN THE PRICE BID FOR POSTS.

NOTE: METAL WASHER AND NYLON WASHERS USED ON SIGN FACE SHALL HAVE A MINIMUM OUTSIDE DIAMETER OF 15/16 INCH ±1/16 INCH AND 10 GAUGE THICKNESS.



SLIP BASE KEEPER PLATE

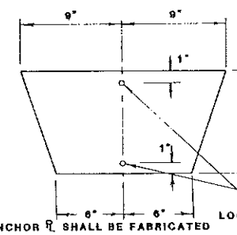
NOTE: THE SLIP BASE KEEPER PLATE SHALL BE FABRICATED FROM ASTM A 466 GRADE A 26 GAUGE MATERIAL AND GALVINIZED AFTER FABRACATION



USE THE HINGES FOR ALL POST ASSEMBLIES EXCEPT:

1. all one post assemblies.
2. all two post assemblies with 2" or 2-1/4" posts.

	TELESCOPING PERFORATED TUBES TYPE I						SQUARE TELESCOPING STEEL POSTS TYPE II					
NUMBER OF POSTS	POST SIZE	WALL THICKNESS GAUGE	SLEEVE SIZE	ANCHOR SIZE	SLIP BASE	HINGE	POST SIZE	WALL THICKNESS GAUGE	SLEEVE SIZE	ANCHOR SIZE	SLIP BASE	HINGE
1	2	12		2 1/4	NO	NO	1 3/4	12		2	NO	NO
1	2 1/4	12		2 1/2	NO	NO	2	12		2 1/4	NO	NO
1	2 3/16	10		2 3/16	YES	NO	2 1/4	12		2 1/2	NO	NO
1	2 1/2	12		2 1/2	YES	NO	2 1/4	12		2 1/2	NO	NO
1	2 1/2	10		2 1/2	YES	NO	2 1/2	12		2 1/2	YES	NO
1	2 1/4	12	2	2 1/2	YES	NO	2 1/2	12		2 1/2	YES	NO
1	2 1/2	12	2 1/4	2 1/2	YES	NO	2 1/4	12	2	2 1/4	YES	NO
2	2	12		2 1/4	NO	NO	1 3/4	12		2	NO	NO
2	2 1/4	12		2 1/2	NO	NO	2	12		2 1/4	NO	NO
2	2 3/16	10		2 3/16	YES	YES	2 1/4	12		2 1/2	NO	NO
2	2 1/2	12		2 1/2	YES	YES	2 1/4	12		2 1/2	NO	NO
2	2 1/2	10		2 1/2	YES	YES	2 1/2	12		2 1/2	YES	YES
2	2 1/4	12	2	2 1/2	YES	YES	2 1/2	12		2 1/2	YES	YES
2	2 1/2	12	2 1/4	2 1/2	YES	YES	2 1/4	12	2	2 1/4	YES	YES
3&4	2 1/2	12		2 1/2	YES	YES	2 1/4	12		2 1/4	YES	YES
3&4	2 1/2	10		2 1/2	YES	YES	2 1/2	12		2 1/2	YES	YES
3&4	2 1/2	12	2 1/4	2 1/2	YES	YES	2 1/4	12	2	2 1/4	YES	YES

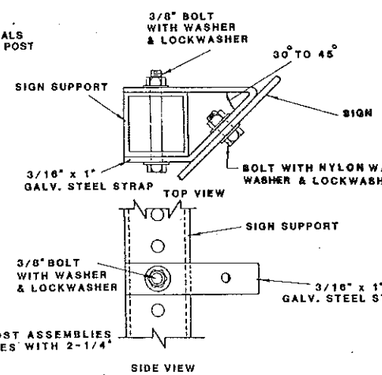


ANCHOR R SHALL BE FABRICATED FROM A MINIMUM OF 10 GAUGE MATERIAL AND GALVINIZED SAME AS POST

ANCHOR PLATE DETAIL
(2 OR MORE POST INSTALLATIONS)

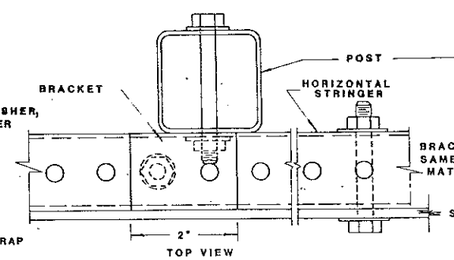
THE 2 3/16" SIZE 10 GAUGE IS SHOWN AS 2.19" SIZE ON THE PLANS. THE 2 1/2" SIZE 10 GAUGE IS SHOWN AS 2.51" SIZE ON THE PLANS.

TELESCOPING PERFORATED TUBES-TYPE I						
TUBE SIZE IN.	WALL THICKNESS IN.	U.S. STANDARD GAUGE	WEIGHT PER FOOT LBS.	MOMENT OF INERTIA IN.4	CROSS SECT. AREA IN. SQ.	SECTION MODULUS IN.3
1 1/2 x 1 1/2	.105	12	1.705	.129	.380	.172
2 x 2	.105	12	2.416	.372	.590	.372
2 1/4 x 2 1/4	.105	12	2.773	.561	.695	.499
2 3/16 x 2 3/16	.135	10	3.432	.605	.841	.590
2 1/2 x 2 1/2	.105	12	3.141	.804	.803	.643
2 1/2 x 2 1/2	.135	10	4.006	.979	1.010	.785
SQUARE TELESCOPING STEEL POSTS-TYPE II						
1 3/4x1 3/4	.105	12	2.304	.232	.486	.265
2 x 2	.105	12	2.854	.372	.590	.372
2 1/4x2 1/4	.105	12	3.004	.564	.697	.501
2 1/2x2 1/2	.105	12	3.354	.803	.802	.642

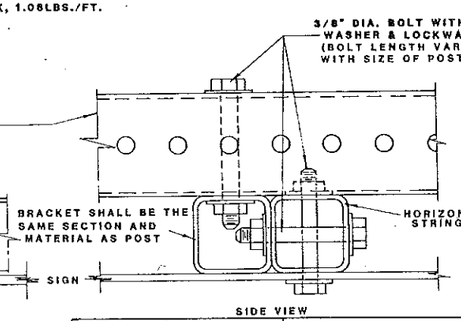


STRAP DETAIL

HORIZONTAL STRINGERS- INLIEU OF PERFORATED TUBES THE CONTRACTOR MAY SUBSTITUTE Z BAR STRINGER. THE Z BAR STRINGERS SHALL BE 1 3/4"x3/16" THICK, 1.08LBS./FT. ALUMINUM ALLOY OR 3.16LBS./FT. STEEL.



TOP VIEW



SIDE VIEW

STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)

ALTERNATE B

NO PARKING SIGNS; ALL NO PARKING SIGNS THAT HAVE DIRECTIONL ARROWS PLACED ON THEIR FACES SHALL BE PLACED AT 30 TO 45 DEGREE ANGLE WITH ONCOMING TRAFFIC. NO PARKING SIGNS PLACED AT THE ABOVE ANGLES MAY HAVE THE SUPPORT TURNED AT THE CORRECT ANGLE UNLESS THE NO PARKING SIGN IS PLACED WITH ANOTHEN SIGN THAT HAS TO BE PLACED AT 90 DEGREE ANGLE WITH ONCOMING TRAFFIC. IN WHICH CASE THE DETAILED ANGLE STRAP SHOULD BE USED TO MOUNT THE NO PARKING SIGN. MATERIAL USED FOR THE ATTACHMENT STRAPS SHALL BE INCLUDED IN THE PRICE BID FOR FLAT SHEET SIGNS. FLAT WASHERS & LOCKWASHERS SHALL BE USED WITH ALL NYLON WASHERS

10-1-86

REVISIONS	
DATE	CHANGE
10-13-86	SLIP BASE GASKET
8-3-87	GALVINIZED &
8-3-87	NOTE
12-1-88	POST SLEEVE
12-1-88	HINGE POST ASSEMBLIES
6-1-89	SLIP BASE ASSEMBLY
1-15-90	CHART
4-30-90	TORQUE

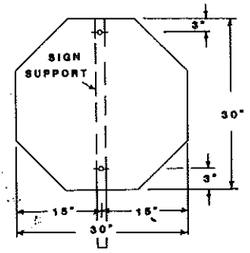
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

APPROVED David K. Sprague
DESIGN ENGINEER

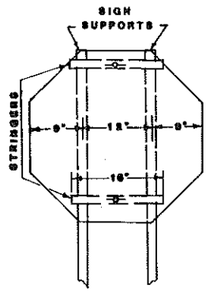
FHWA REGION	STATE	FED. AID PROJECT NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	

D-754-26

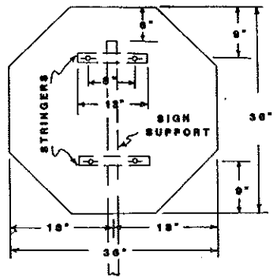
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS
REGULATORY, WARNING, AND GUIDE SIGNS



1 POST

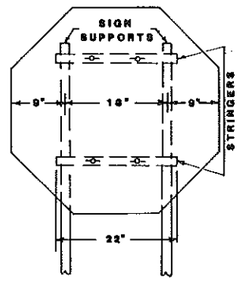


2 POSTS

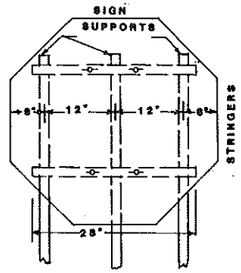


1 POST

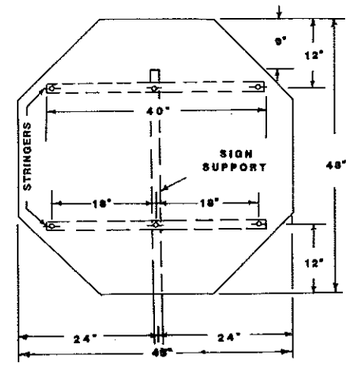
ASSEMBLY NO. 1



2 POSTS

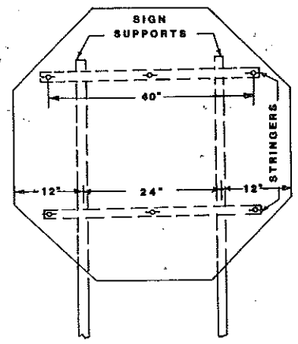


3 POSTS

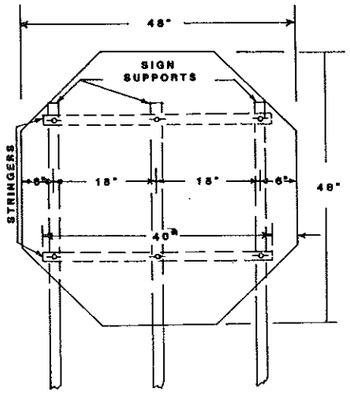


1 POST

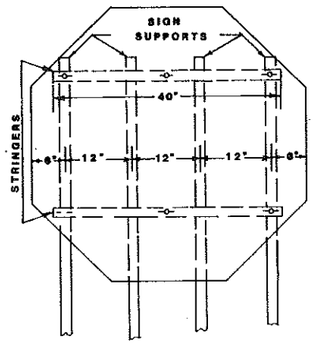
ASSEMBLY NO. 2



2 POSTS

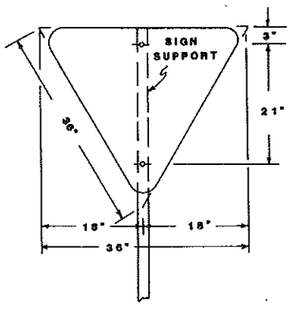


3 POSTS

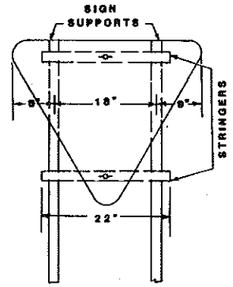


4 POSTS

ASSEMBLY NO. 3



1 POST



2 POSTS

ASSEMBLY NO. 4

NOTE:

Material:

Signing Backing: The sign backing material thickness shall be as follows.

Steel: Signs having a width of less than 30" shall use 14 gauge material. Signs 30" or more shall use 12 gauge material.

Aluminum: Aluminum Alloy 6061-T6 and 5052 -H38 shall have the following minimum thickness: All signs shall be 0.100 inch.

Stringers:

Flange Channel : All stringers shall be flange channel 1.12# per foot and of the length shown.

Square Tube, Perforated: All stringers shall be square tube, perforated 1 1/2"X1 1/2" and of the length shown.

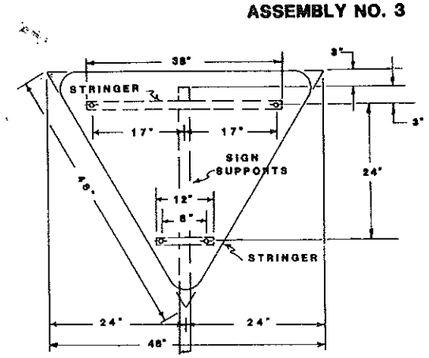
Holes:

Flange Channel: All holes shall be punched round for 3/8" diameter bolts.

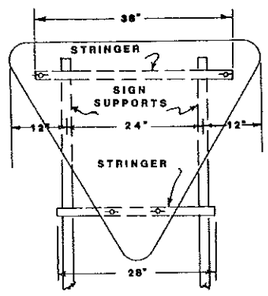
Square Tube, Perforated: All holes shall be punched round for 3/8" diameter bolts.

General:

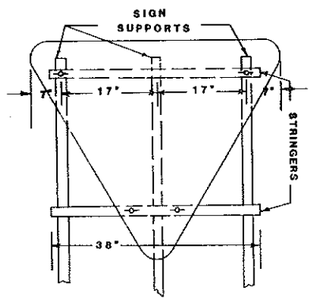
See plans for sign numbers to be used at each location.
See Std. D-754-24 square tube, perforated mounting details.
See Std. D-754-25 for flange channel mounting details.



1 POST



2 POSTS



3 POSTS

ASSEMBLY NO. 5

10-1-86 REVISIONS	
DATE	CHANGE

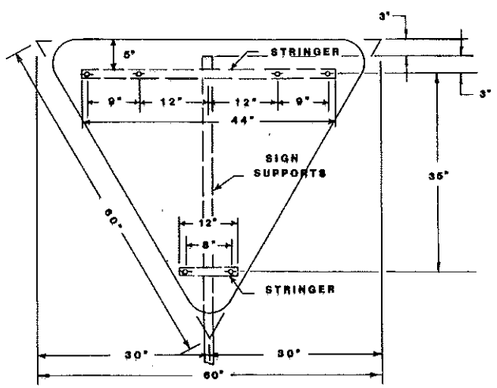
NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

APPROVED: David K. D. Leer
DESIGN ENGINEER

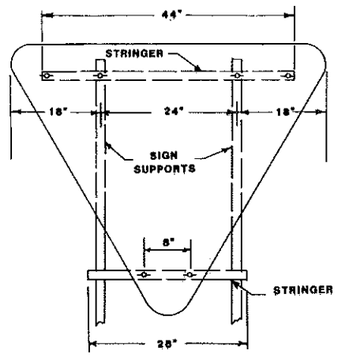
FHWA REGION	STATE	FED. AID PROJECT NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	

D-754-27

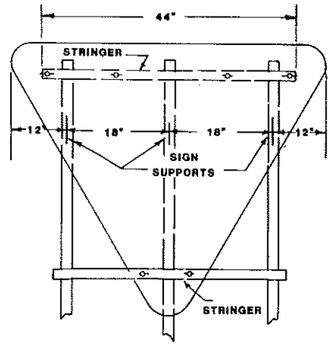
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS
REGULATORY, WARNING, AND GUIDE SIGNS



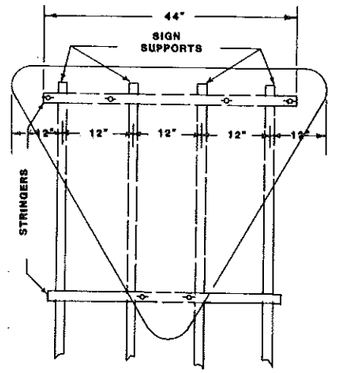
1 POST



2 POSTS

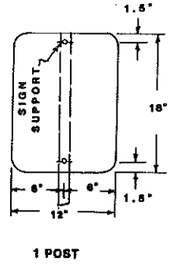


3 POSTS



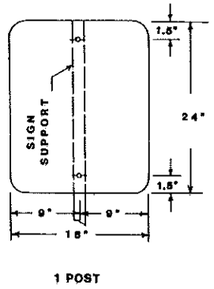
4 POSTS

ASSEMBLY NO. 6

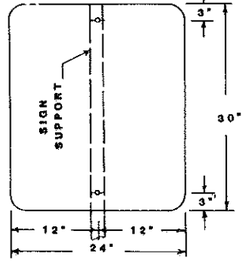


1 POST

ASSEMBLY NO. 7

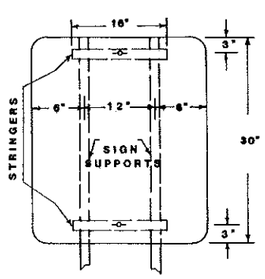


1 POST



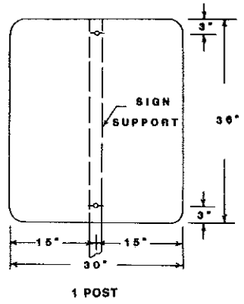
1 POST

ASSEMBLY NO. 8

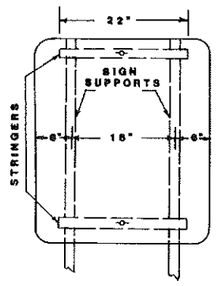


2 POSTS

ASSEMBLY NO. 9

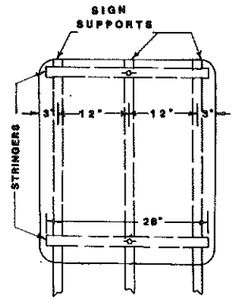


1 POST



2 POSTS

ASSEMBLY NO. 10



3 POSTS

NOTE:

Material:

Sign Backing: The sign backing material thickness shall be as follows.
Steel: Signs having a width of less than 30" shall use 14 gauge material. Signs 30" or more shall use 12 gauge material.
Aluminum: Aluminum Alloy 6061-T6 and 5052-H38 shall have the following minimum thickness: All signs shall be 0.100 inch.

Stringers:

Flange Channel: All stringers shall be flange channel 1.12# per foot and of the length shown.

Square Tube, Perforated: All stringers shall be square tube, perforated 1 1/2"X1 1/2" and of the length shown.

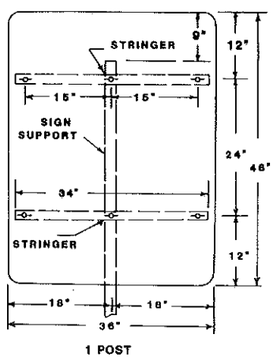
Holes:

Flange Channel: All holes shall be punched round for 3/8" diameter bolts.

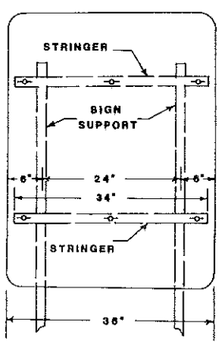
Square Tube, Perforated: All holes shall be punched round for 3/8" diameter bolts.

General:

See plans for sign numbers to be used at each location .
See Std. D-754-24 square tube, perforated mounting details.
See Std. D-754-25 for flange channel mounting details.

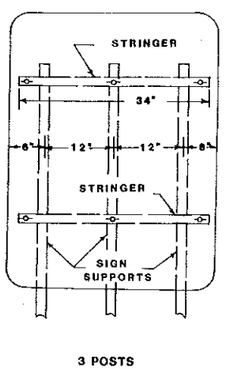


1 POST

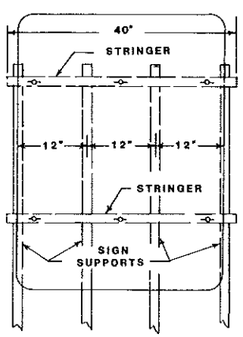


2 POSTS

ASSEMBLY NO. 11



3 POSTS



4 POSTS

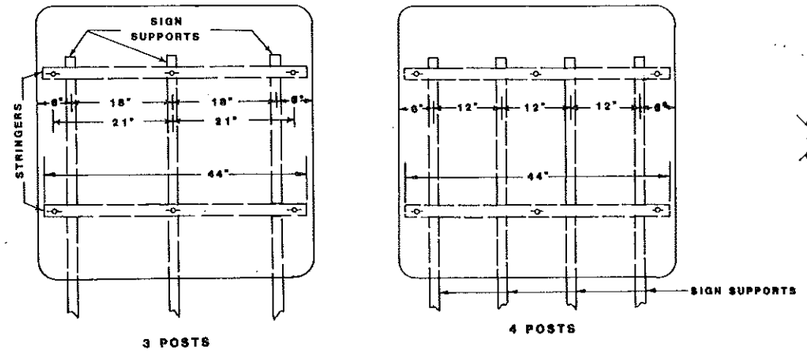
10-1-86	
REVISIONS	
DATE	CHANGE

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED: David K.O. Leer
DESIGN ENGINEER

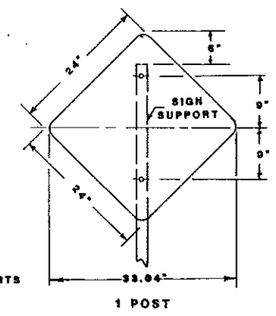
FHWA REGION	STATE	FED. AID PROJECT NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	

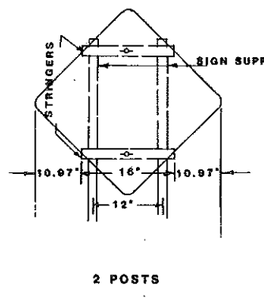
D-754-29

SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS
REGULATORY, WARNING, AND GUIDE SIGNS

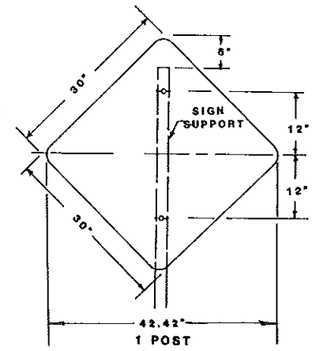


ASSEMBLY NO. 17

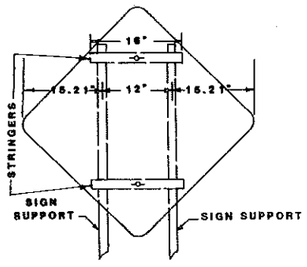


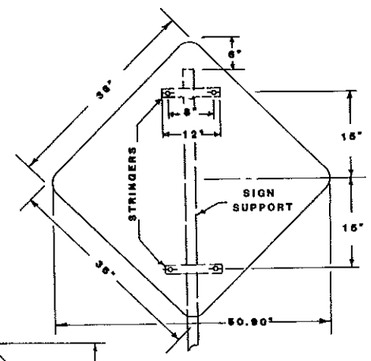


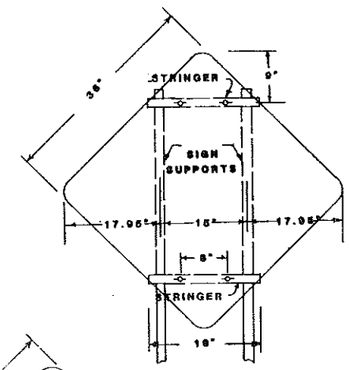
ASSEMBLY NO. 18

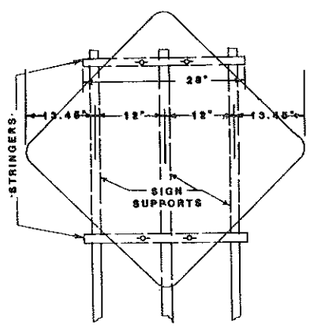


ASSEMBLY NO. 19

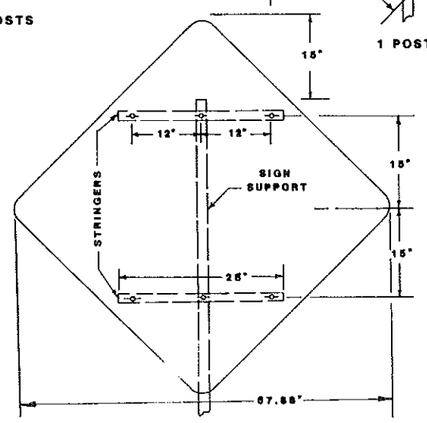


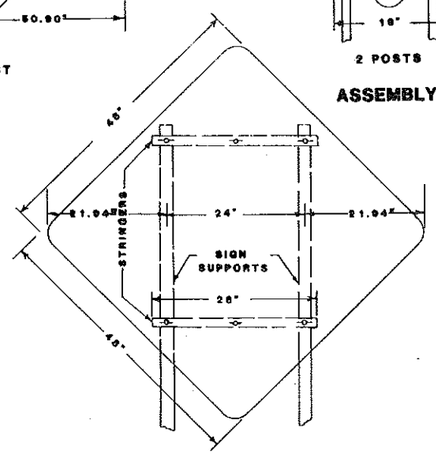


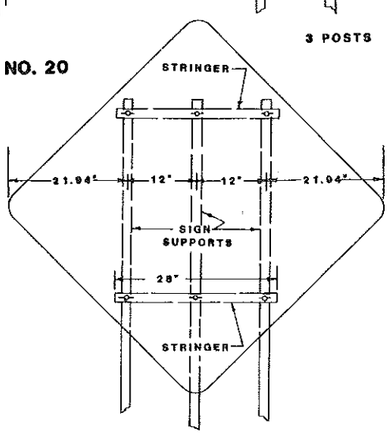




ASSEMBLY NO. 20







ASSEMBLY NO. 21

NOTE:

Material:

Sign Backing: The signing backing material thickness shall be as follows.
Steel: Signs having a width of less than 30" shall use 14 gauge material. Signs over 30" or more shall use 12 gauge material.

Aluminum: Aluminum Alloy 6061-T6 and 5052-H38 shall have the following minimum thickness: All signs shall be 0.100 inch.

Stringers:

Flange Channel : All stringers shall be flange channel 1.12# per foot and of the length shown.

Square Tube, Perforated: All stringers shall be square tube, perforated 1 1/2"X1 1/2" and of the length shown.

Hole:

Flange Channel: All holes shall be punched round for 9/8" diameter bolts.
Square Tube, Perforated: All holes shall be punched round for 3/8" diameter bolts.

General:

See plans for sign numbers to be used at each location.

See Std. D-754-24 for square tube, perforated mounting details.

See Std. D-754-25 for flange channel mounting details.

10-1-86	
REVISIONS	
DATE	CHANGE

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

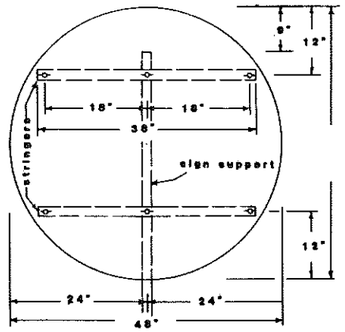
APPROVED: David K. D. Loos
DESIGN ENGINEER

SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS

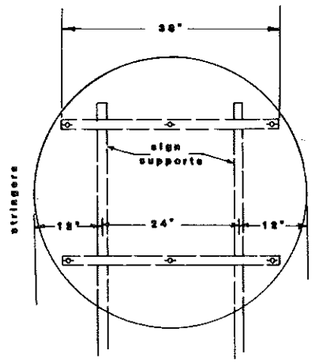
REGULATORY, WARNING, AND GUIDE SIGNS

FHWA REGION	STATE	FED. AID PROJECT NO.	SHEET NO.
8	N.D.	F-RAS-1-006(005)066	

D-754-41

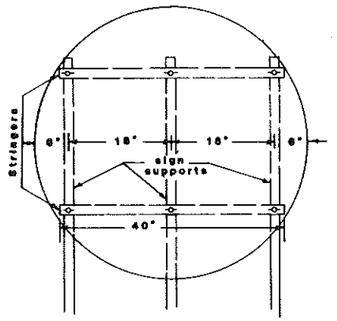


1 POST

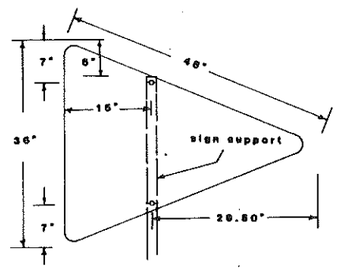


2 POSTS

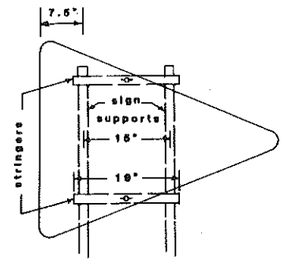
ASSEMBLY NO. 64



3 POSTS

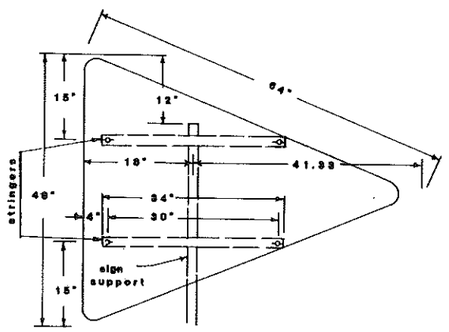


1 POST

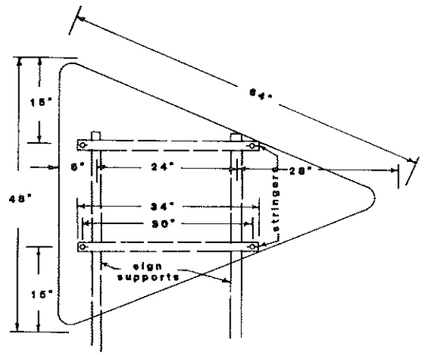


2 POSTS

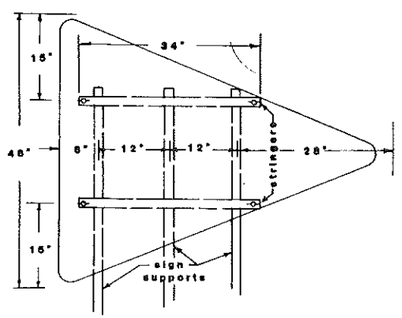
ASSEMBLY NO. 65



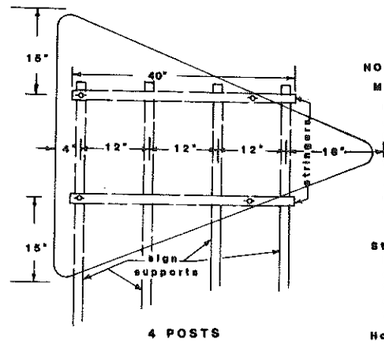
1 POST



2 POSTS

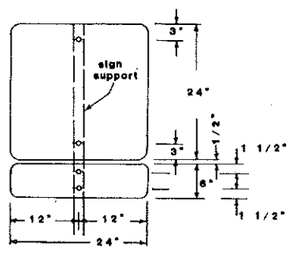


3 POSTS

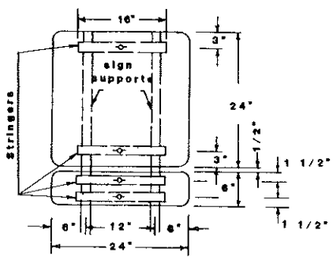


4 POSTS

ASSEMBLY NO. 66



1 POST



2 POSTS

ASSEMBLY NO. 67

NOTE:

Material:

Sign Backing: The sign backing material thickness shall be as follows.
Steel: Signs having a width of less than 30" shall use 14 gauge material. Signs 30" or more shall use 12 gauge material.

Aluminum: Aluminum Alloy 6061-T6 and 5052-H38 shall have the following minimum thickness: All signs shall be 0.100 inch.

Stringers:

Flange Channel: All stringers shall be flange channel 1.12# per foot and of the length shown.
Square Tube, Perforated: All stringers shall be square tube, perforated 1 1/2"X1 1/2" and of the length shown.

Holes:

Flange Channel: All holes shall be punched round for 3/8" diameter bolts.
Square Tube, Perforated: All holes shall be punched round for 3/8" diameter bolts.

General:

See plans for sign numbers to be used at each location.

See Std. D-754-24 for square tube, perforated mounting details.

See Std. D-754-25 for flange channel mounting details.

10-1-86 REVISIONS	
DATE	CHANGE

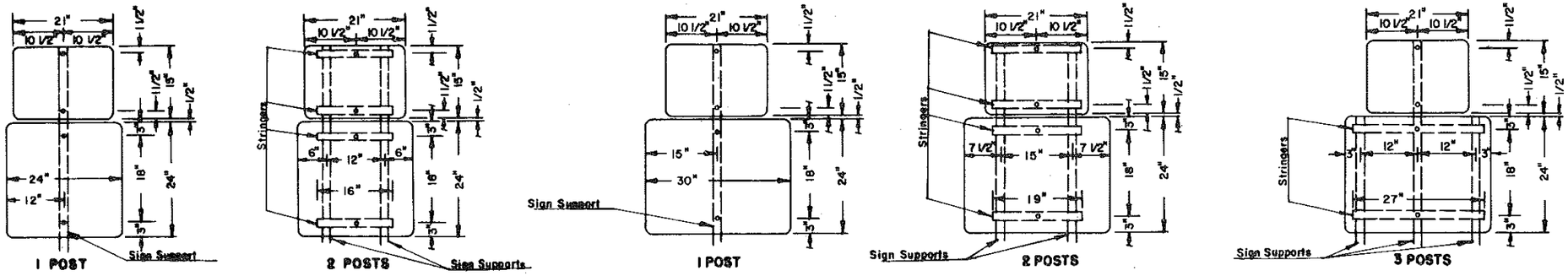
NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

APPROVED: David K.O. Leer
DESIGN ENGINEER

SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS—ROUTE MARKER SIGNS

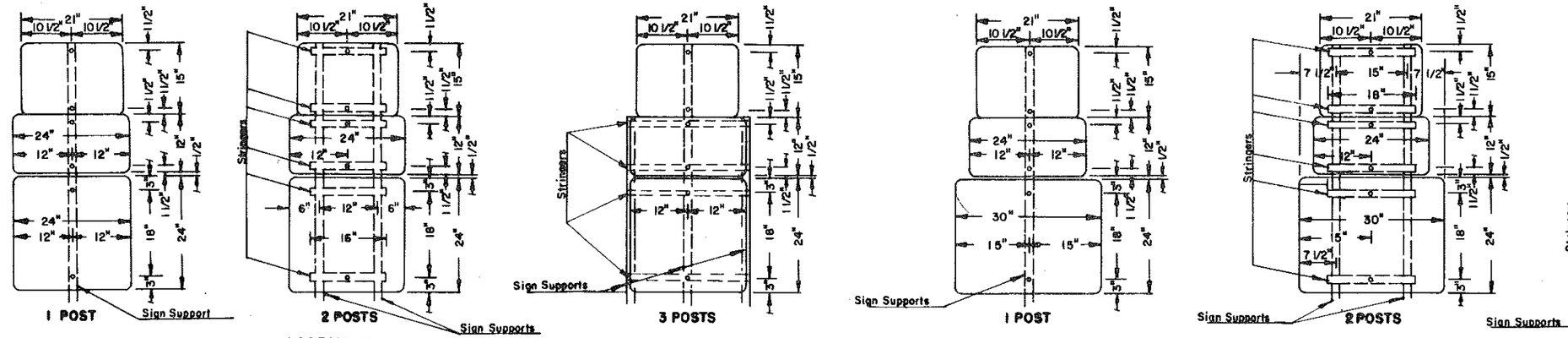
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	

D-754-57



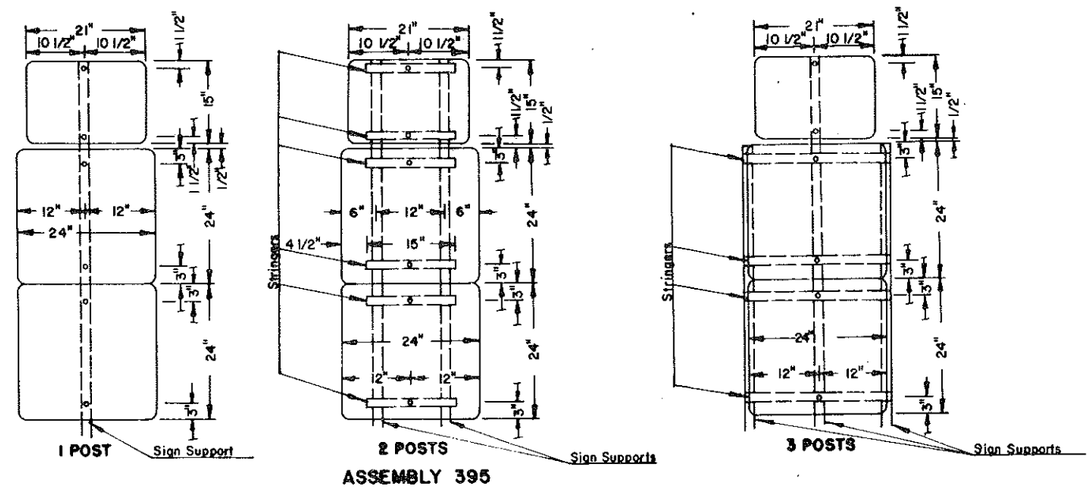
ASSEMBLY 391

ASSEMBLY 392



ASSEMBLY 393

ASSEMBLY 394



ASSEMBLY 395

NOTE:

Material:

Sign Backing: The sign backing material thickness shall be as follows.

Steel: Signs having a width of less than 30" shall use 14 gauge material. Signs 30" or more shall use 12 gauge material

Aluminum: Aluminum Alloy 6061-T6 and 5052H38 shall have the following minimum thickness: All signs shall be 0.100 inch.

Stringers: Flange Channel: All stringers shall be flange channel 1.12 # per foot and of the length shown.

Square Tube, Perforated: All stringers shall be square tube, perforated 1 1/2"X1 1/2" and of the length shown.

Hole: Flange Channel: All holes shall be punched round for 3/8" diameter bolts.

Square Tube, Perforated: All holes shall be punched round for 3/8" diameter bolts.

General: See plans for sign numbers to be used of each location.
See Std. D-754-25 for flange channel mounting details.
See Std. D-754-24 for square tube, perforated mounting details.

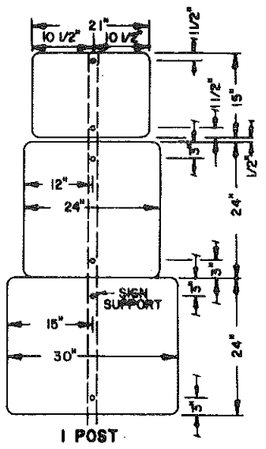
10-1-88	
REVISIONS	
DATE	CHANGE

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED _____
DESIGN ENGINEER

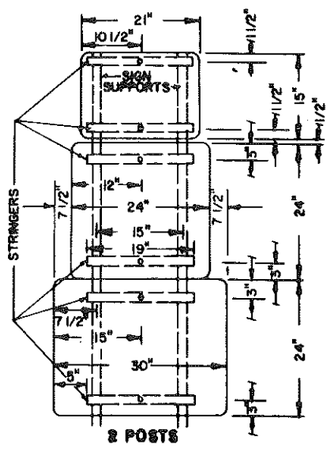
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS – ROUTE MARKER SIGNS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	

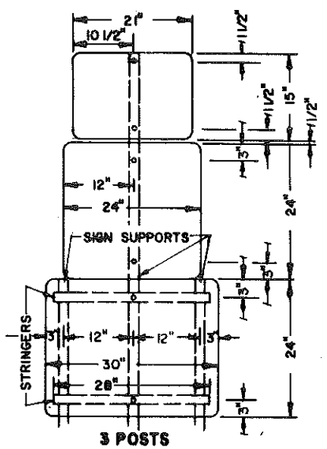
D-754-58



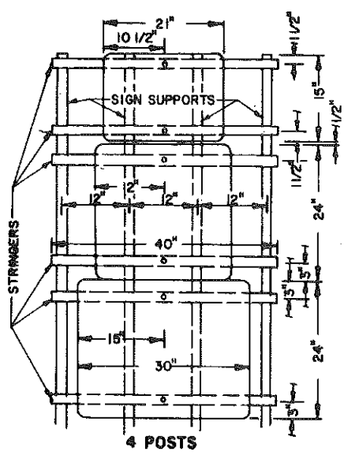
1 POST



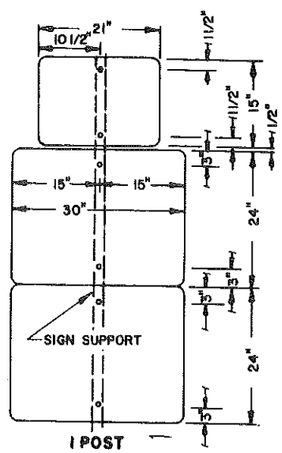
2 POSTS



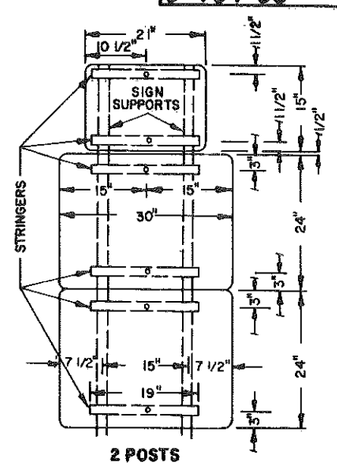
3 POSTS



4 POSTS

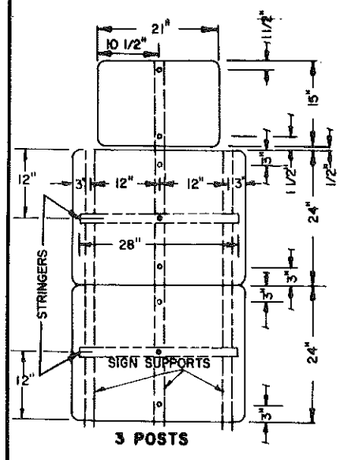


1 POST

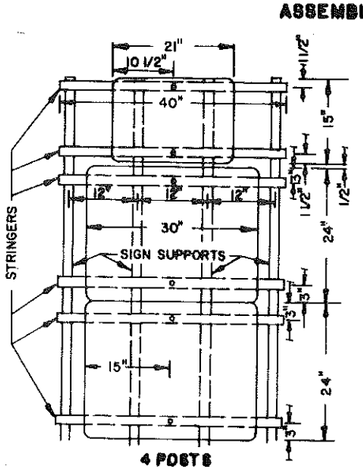


2 POSTS

ASSEMBLY 396

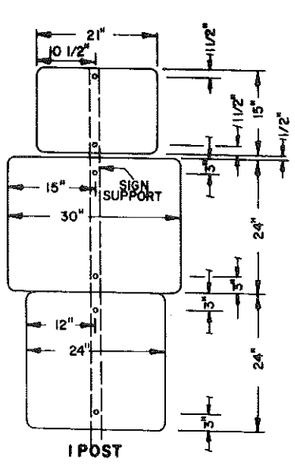


3 POSTS

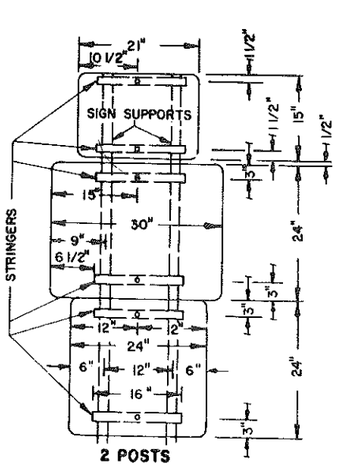


4 POSTS

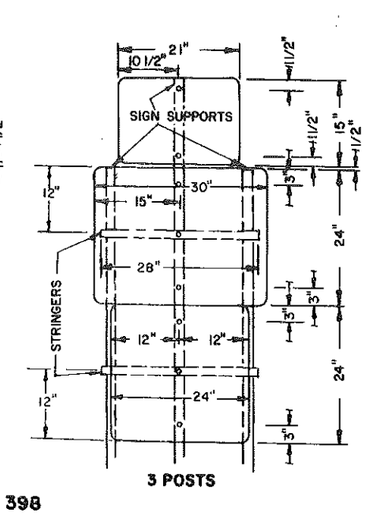
ASSEMBLY 397



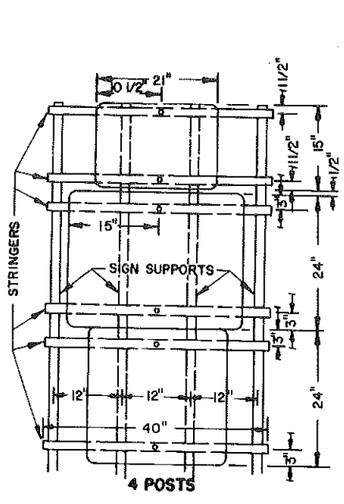
1 POST



2 POSTS

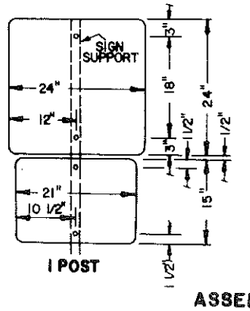


3 POSTS

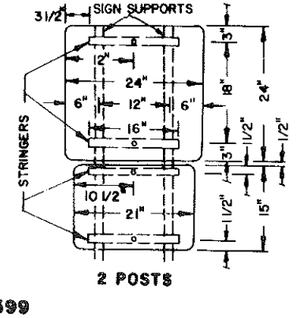


4 POSTS

ASSEMBLY 398



1 POST



2 POSTS

ASSEMBLY 399

NOTE:

Material:

Sign Backing: The sign backing material thickness shall be as follows:
Steel: Signs having a width of less than 30" shall use 14 gauge material.
Signs 30" or more shall use 12 gauge material.

Aluminum: Aluminum Alloy 6061-T6 and 5052-H38 shall have the following minimum thickness: All signs shall be 0.100 inch.

Stringers: Flange Channel: All stringers shall be flange channel 1.12 # per foot and of the length shown.
Square Tube, Perforated: All stringers shall be square tube, perforated 1 1/2" X 1 1/2" and of the length shown.

Hole: Flange Channel: All holes shall be punched round for 3/8" diameter bolts.

Square Tube, Perforated: All holes shall be punched round for 3/8" diameter bolts.

General: See plans for sign numbers to be used at each location.
See Std. D-754-25 for flange channel mounting details.
See Std. D-754-24 for square tube, perforated mounting details.

10-1-86 REVISIONS	
DATE	CHANGE

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED David K.D. Leer
DESIGN ENGINEER

STREET NAME SIGN ASSEMBLY DETAILS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	

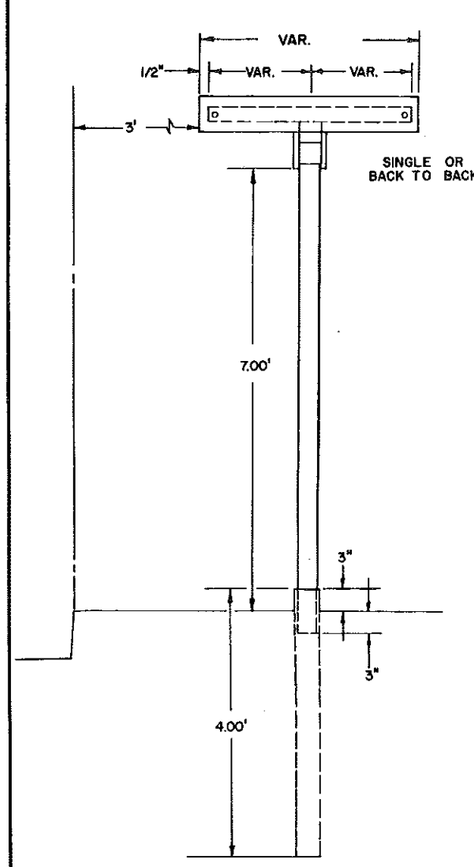
D-754-76

MAXIMUM SUPPORT LENGTH POSSIBLY - PERFORATED TUBE

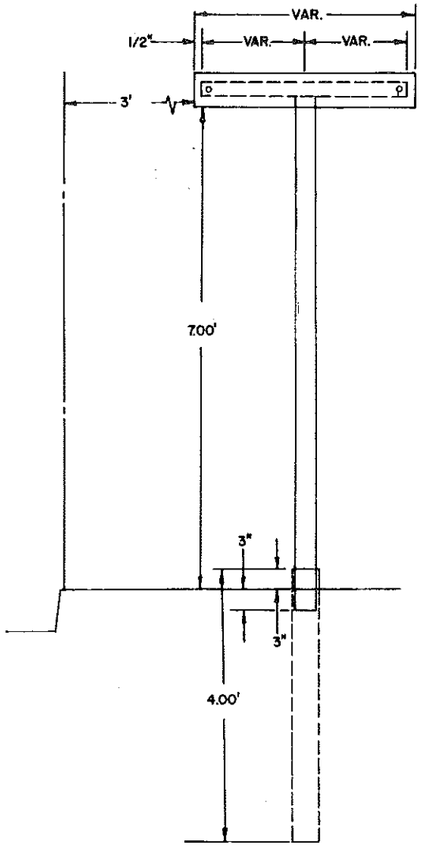
SIGN SIZE	2"	2½"	2 3/16"*	2¼"	2¼"e	2¼"W2"S	2¼"W2½"S
Assemblies 438, 439, 440, 441 and 442							
36x6	284	379	-	-	-	-	-
42x6	244	326	-	-	-	-	-
48x6	215	286	337	-	-	-	-
54x6	191	255	300	327	-	-	-
60x6	173	230	271	294	357	-	-
66x6	157	209	246	268	325	-	-
72x6	180	192	224	246	299	332	-
78x6	166	186	209	228	276	306	400
84x6	154	186	195	211	257	285	372
90x6	144	186	186	198	240	266	347
96x6	135	180	186	186	225	250	326
Assemblies 443, 444							
36x6	193	206	241	262	315	349	-
42x6	162	195	209	226	272	301	390
48x6	148	194	195	200	240	265	343
54x6	134	174	195	195	215	237	307
60x6	119	155	180	195	195	210	271
66x6	109	147	165	178	195	195	248
72x6	-	131	152	165	195	195	228
78x6	-	122	142	153	183	195	222
84x6	-	114	132	143	171	189	197
90x6	-	107	124	134	161	177	195
96x6	-	-	117	126	151	167	195

MAXIMUM SUPPORT LENGTH POSSIBLE - FLANGE CHANNEL

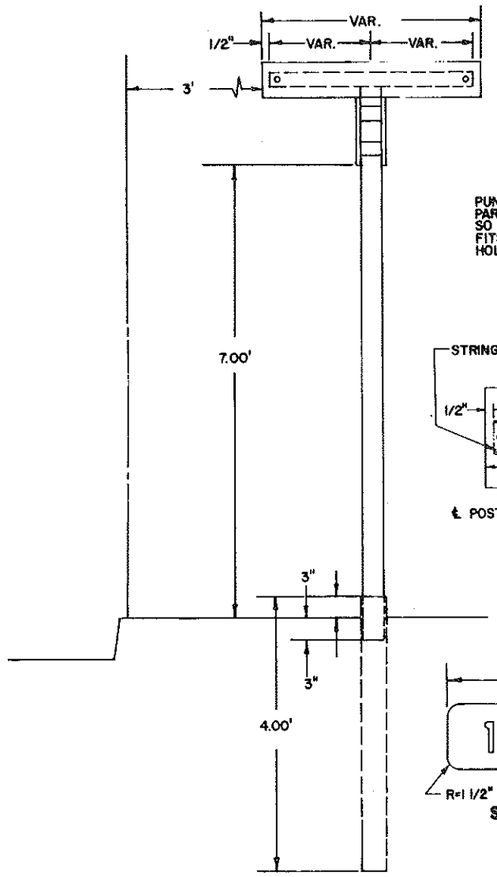
SIGN SIZE	2#	2½#	2½#	2 3/4#	3#	4#
Assemblies 438, 439, 440, 441 and 442						
36x6	236	288	327	-	-	-
42x6	218	246	280	319	-	-
48x6	190	215	245	279	342	-
54x6	184	191	218	248	304	422
60x6	184	184	195	222	273	379
66x6	171	184	184	202	247	345
72x6	155	176	184	184	226	316
78x6	141	161	184	184	208	291
84x6	128	148	171	184	192	269
90x6	117	135	158	181	184	251
96x6	106	124	146	168	184	234
Assemblies 443, 444						
36x6	173	193	193	201	243	343
42x6	149	167	179	193	210	289
48x6	130	146	166	188	193	253
54x6	115	130	148	167	193	225
60x6	-	113	129	147	179	199
66x6	-	-	107	133	162	193
72x6	-	-	106	121	148	193
78x6	-	-	-	110	136	189
84x6	-	-	-	-	124	175
90x6	-	-	-	-	114	163
96x6	-	-	-	-	105	151



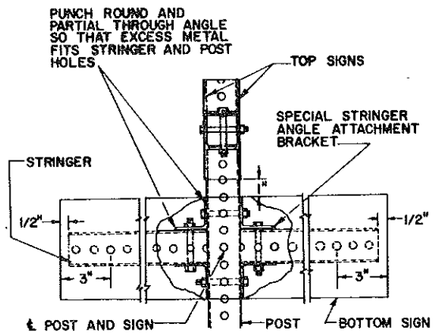
ASSEMBLIES 440,441,442



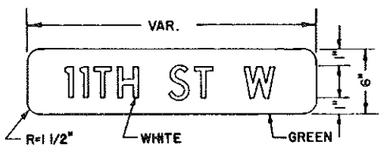
ASSEMBLIES 438,439



ASSEMBLIES 443,444



ATTACHMENT BRACKET DETAIL
(Square Tube, Perforated)



STREET NAME SIGN D3

NOTE: The ground mounted street name sign areas have been calculated using a 6"x36" sign panel. The city shall determine the size needed and inform the contractor of the exact length required to accomodate the message in accordance with following legend.

Size and Series: Street name signs 24", 30", or 36" standard length shall be fabricated using the following size and series capital letters:

LENGTH	STREET NAME OR NUMBER
24" Length	4" B,C,D Series
30" Length	4" B,C,D Series
36" Length	4" A,B,C,D Series

To provide maximum legibility, the widest letter shall be used whenever possible for each of the standard lengths specified. A minimum distance of 1/2" shall be allowed between legend and ends of the sign. The actual area shall be paid for at the contract unit price.

Material:
Sign Backing: The sign backing material thickness shall be as follows:
Steel: 14 Guage
Aluminum: Aluminum Alloy 6061-T6 shall have a minimum thickness of 0.080 inch.
Stringers:
Perforated Tube: All stringers shall be square tube perforated, the same size as support post.
Flange Channel: All stringers shall be flange channel, 1.12# per foot.
Holes: All holes shall be punched round for 3/8" diameter bolts.
General: See Std. D-754-24 for square tube, perforated mounting details.
See Std. D-754-25 for flange channel mounting details.
* 10 guage material has been used in the manufacturing of these support.

Assembly:	438	Single sign
	439	Back to Back
	440	Single sign each direction
	441	Single sign one direction back to back other direction
	442	Back to Back both directions
	443	Back to Back single other direction
Assembly:	444	Back to Back all directions

10-1-08 REVISIONS	
DATE	CHANGE

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
Approved: David K. O'Bar
Design Engineer

LIGHT STANDARD, SIGNAL STANDARD AND SPAN WIRE MOUNTED SIGN ASSEMBLY DETAIL

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	

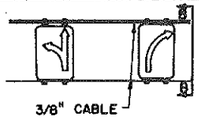
D-754-80

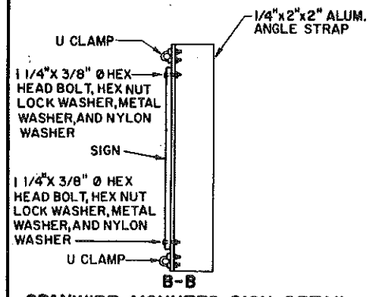
① Z-Bar - Use 1 3/4"x 3/16" Thick 1.08 Lbs./Ft. Aluminum Alloy
In lieu of Z-Bar, two angles bolted together may be used or a channel. (1 3/4" x 1 3/4" x 3/16" angles) (1 3/4"x2"x.188" Channels)

② 3/8" U-Bolt, Hex Nut, Lock Washer & Length depends on Dia. of Mast Arm or Post.

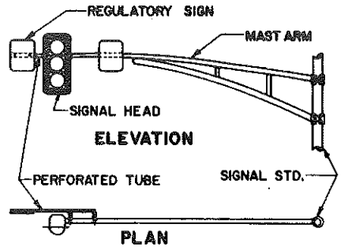
③ 3/8" U-Bolt, Hex Nut, Lock Washer & Length depends on Dia. of Mast Arm.
Paint Perforated Tube the same color and specification as Mast Arm.
2"x2" Maximum support length 9.9 ft.
2 1/2"x2 1/2" Maximum support length 12.6 ft.
2 1/2"x2 1/2" Maximum support length 15.7 ft.

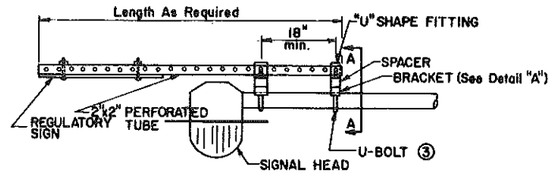
NOTE:
Metal washers and Nylon washers used on sign face shall have a minimum outside dia. of 15/16 inch ± 1/16 inch and 10 gauge thickness.



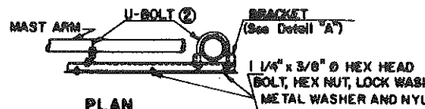


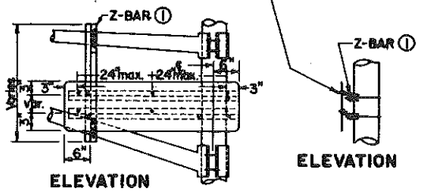
SPANWIRE MOUNTED SIGN DETAIL



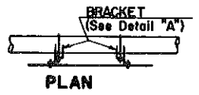


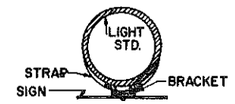
SIGN MOUNTED BEYOND END OF MAST ARM DETAIL





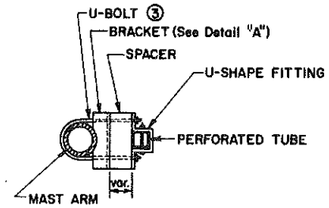
MAST ARM MOUNTED STREET NAME SIGN DETAIL



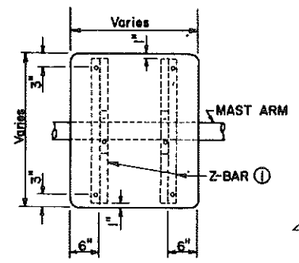


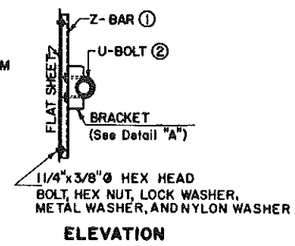
LT. STD. MOUNTED SIGN BRACKET DETAIL
(MAX. 24"x 30" SIGNS)

Bracket shall be of galv. steel consisting of strap & sign attachment bracket similar to the one shown in the detail. Cost of the bracket assembly to be included in the price bid for flat sheet signs. Punching shall be as shown on the Standard Drawings. The Engineer in the field shall determine the exact location of the light standard for sign attachment. There shall be a 7' vertical clearance to the bottom of all signs mounted on light standards.

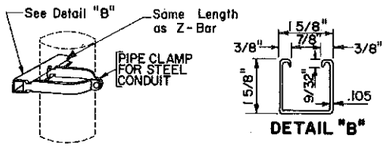


A-A



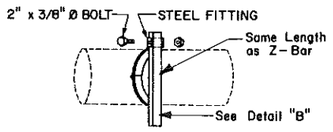


MAST ARM MOUNTED REGULATORY SIGN DETAIL



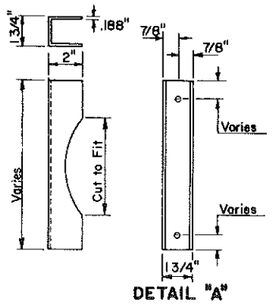
DETAIL "B"

VERTICAL MOUNTING
Two (2) Clamps Required Per Sign



HORIZONTAL MOUNTING
Two(2) Clamps Required Per Sign

ALTERNATE CLAMP MOUNTING



DETAIL "A"

10-1-86	
REVISIONS	
DATE	CHANGE

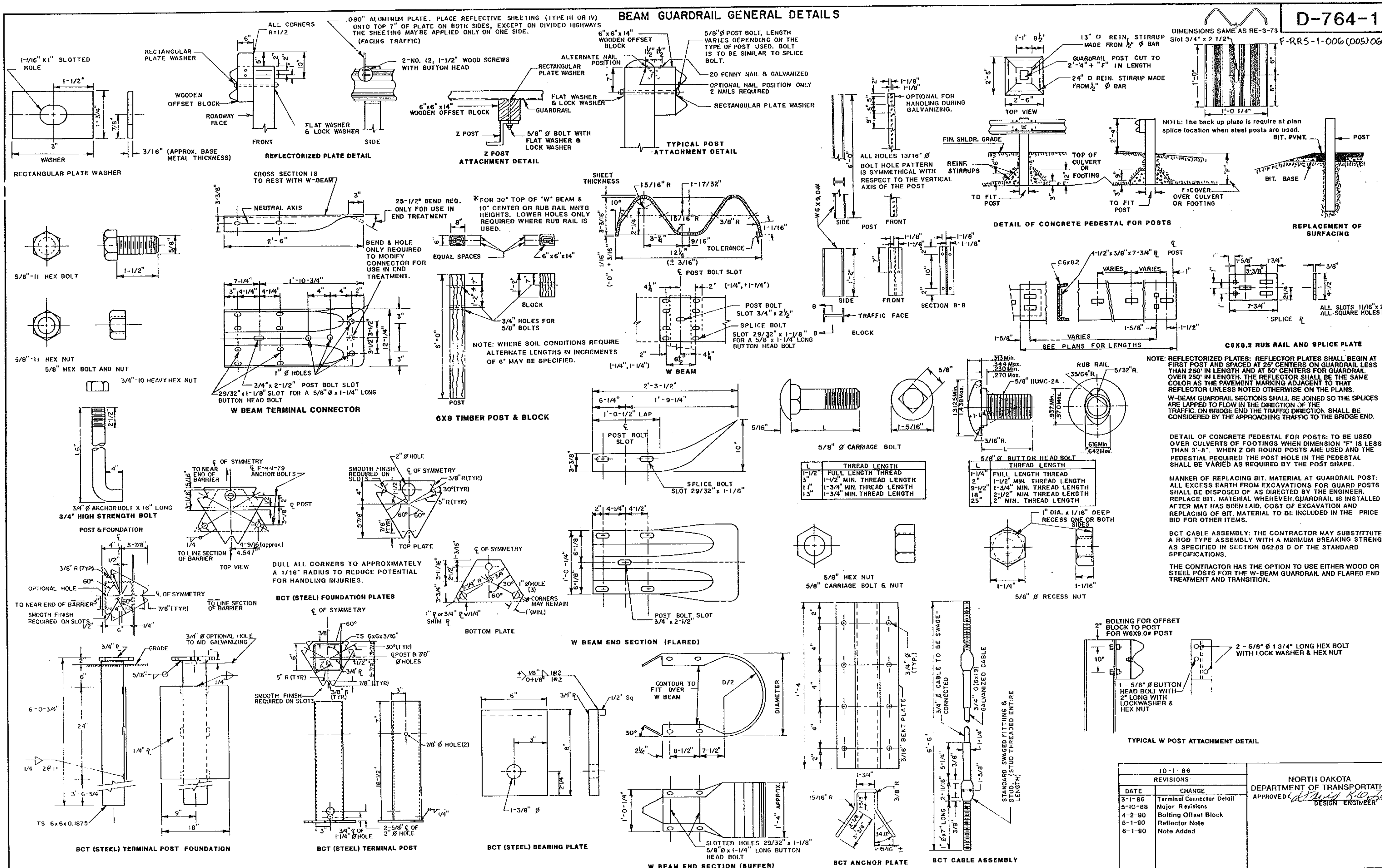
NORTH DAKOTA STATE HIGHWAY DEPARTMENT

APPROVED David K. D. Boon
DESIGN ENGINEER

BEAM GUARDRAIL GENERAL DETAILS

D-764-1

F-RRS-1-006(005)066



5/8" Ø CARRIAGE BOLT

L	THREAD LENGTH
1-1/2"	FULL LENGTH THREAD
3"	1-1/2" MIN. THREAD LENGTH
11"	1-3/4" MIN. THREAD LENGTH
13"	1-3/4" MIN. THREAD LENGTH

5/8" Ø BUTTON HEAD BOLT

L	THREAD LENGTH
1-1/4"	FULL LENGTH THREAD
2"	1-1/2" MIN. THREAD LENGTH
9-1/2"	1-3/4" MIN. THREAD LENGTH
18"	2-1/2" MIN. THREAD LENGTH
25"	2" MIN. THREAD LENGTH

NOTE: REFLECTORIZED PLATES: REFLECTOR PLATES SHALL BEGIN AT FIRST POST AND SPACED AT 25' CENTERS ON GUARDRAIL LESS THAN 250' IN LENGTH AND AT 50' CENTERS FOR GUARDRAIL OVER 250' IN LENGTH. THE REFLECTOR SHALL BE THE SAME COLOR AS THE PAVEMENT MARKING ADJACENT TO THAT REFLECTOR UNLESS NOTED OTHERWISE ON THE PLANS.

W-BEAM GUARDRAIL SECTIONS SHALL BE JOINED SO THE SPLICES ARE LAPPED TO FLOW IN THE DIRECTION OF THE TRAFFIC. ON BRIDGE END THE TRAFFIC DIRECTION SHALL BE CONSIDERED BY THE APPROACHING TRAFFIC TO THE BRIDGE END.

DETAIL OF CONCRETE PEDESTAL FOR POSTS: TO BE USED OVER CULVERTS OF FOOTINGS WHEN DIMENSION "F" IS LESS THAN 3'-8". WHEN Z OR ROUND POSTS ARE USED AND THE PEDESTAL REQUIRED THE POST HOLE IN THE PEDESTAL SHALL BE VARIED AS REQUIRED BY THE POST SHAPE.

MANNER OF REPLACING BIT. MATERIAL AT GUARDRAIL POST: ALL EXCESS EARTH FROM EXCAVATIONS FOR GUARD POSTS SHALL BE DISPOSED OF AS DIRECTED BY THE ENGINEER. REPLACE BIT. MATERIAL WHEREVER GUARDRAIL IS INSTALLED AFTER MAT HAS BEEN LAID. COST OF EXCAVATION AND REPLACING OF BIT. MATERIAL TO BE INCLUDED IN THE PRICE BID FOR OTHER ITEMS.

BCT CABLE ASSEMBLY: THE CONTRACTOR MAY SUBSTITUTE A ROD TYPE ASSEMBLY WITH A MINIMUM BREAKING STRENGTH AS SPECIFIED IN SECTION 862.03 D OF THE STANDARD SPECIFICATIONS.

THE CONTRACTOR HAS THE OPTION TO USE EITHER WOOD OR STEEL POSTS FOR THE W-BEAM GUARDRAIL AND FLARED END TREATMENT AND TRANSITION.

10-1-86

REVISIONS

DATE	CHANGE
3-1-86	Terminal Connector Detail
5-10-88	Major Revisions
4-2-90	Bolting Offset Block
5-1-90	Reflector Note
6-1-90	Note Added

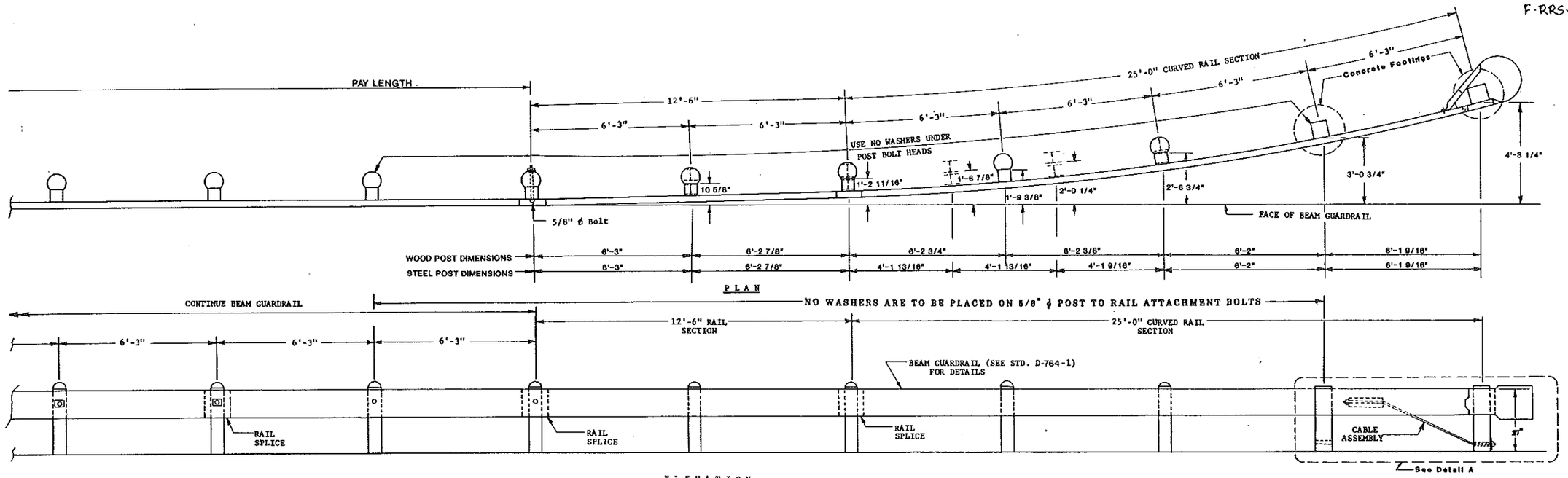
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

APPROVED [signature] DESIGN ENGINEER

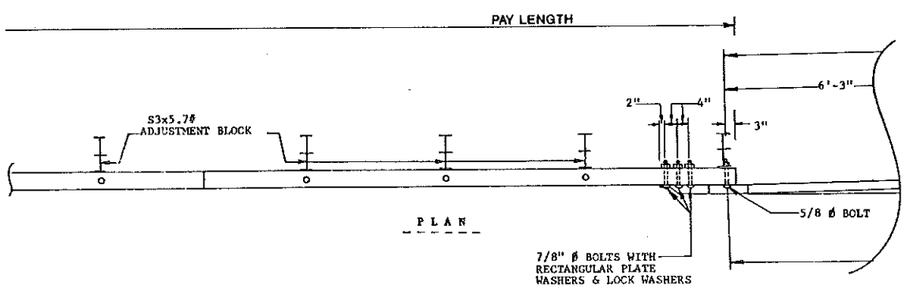
BEAM GUARDRAIL-FLARED END TREATMENT AND TRANSITION

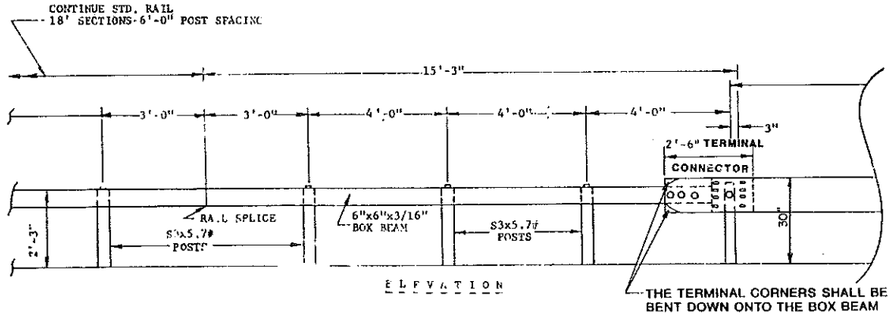
D-764-2

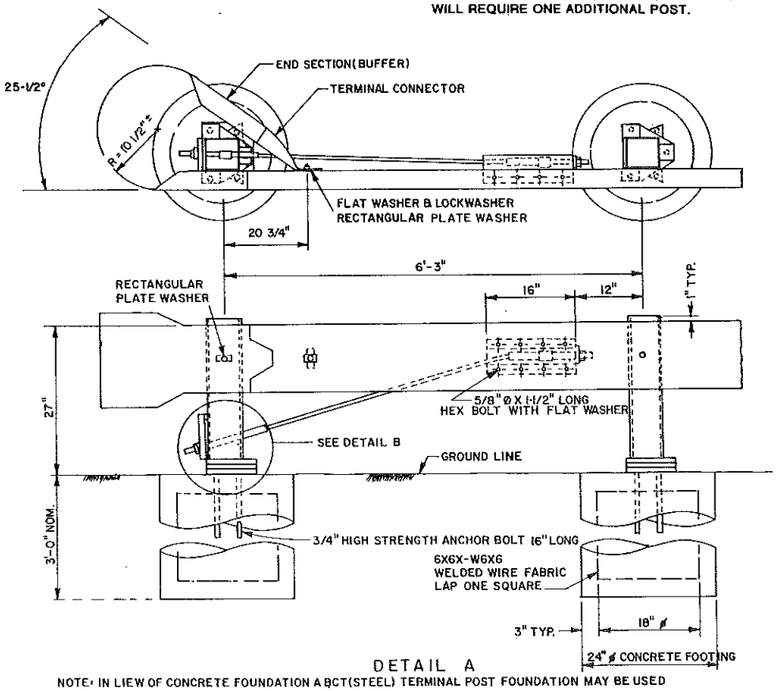
F-RRS-1-006(005)066



NOTE: IF STEEL POSTS ARE USED THE POST SPACING SHALL BE CHANGED AS FOLLOWS. THE POST SPACING WILL REQUIRE ONE ADDITIONAL POST.

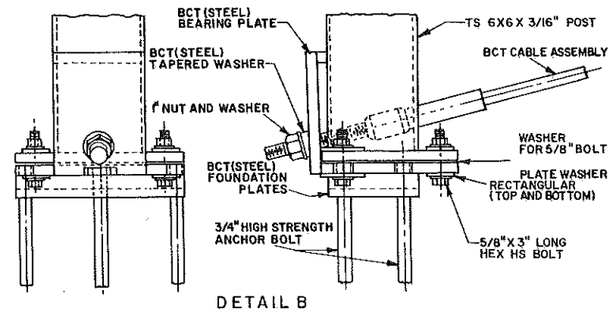






DETAIL A

NOTE: IN LIEW OF CONCRETE FOUNDATION A BCT(STEEL) TERMINAL POST FOUNDATION MAY BE USED



DETAIL B

NOTE: THE BEARING PLATE SHALL HAVE A SINGLE WRAP OF 14-GAUGE GALVANIZED WIRE AROUND THE STEEL POST AND THE PLATE NEAR THE TOP OF THE PLATE SO IT WILL REMAIN IN PLACE IF THE CABLE TENSION IS LOST IN TIME.

10-1-86

REVISIONS	
DATE	CHANGE
2-23-87	Standard Number
2-23-87	Wood Post
3-1-88	Terminal Connector Detail
8-1-88	Detail A, B & Note
4-2-90	Pay Length
8-1-90	Steel Post Spacing

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

APPROVED: _____ Design Engineer

D-764-3

F-RRS-1-006(005)066

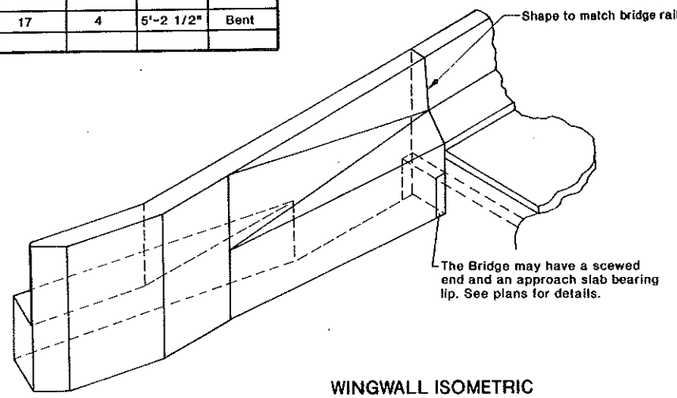
W BEAM GUARD RAIL AT BRIDGE END

General Layout & Details

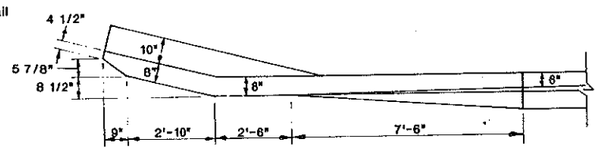
Flared Guard Rail Section

BAR LIST				
MARK	NUMBER	SIZE	LENGTH	SHAPE
401	6	4	13'-3"	Field Bend
402	4	5	13'-3"	Field Bend
403	2	4	4'-0"	Bent
404	9	4	3'-3"	Bent
405	9	4	3'-10"	Bent
406	9	4	4'-10"	Bent
407	20	4	9'-1"	Bent
409	17	4	5'-2 1/2"	Bent

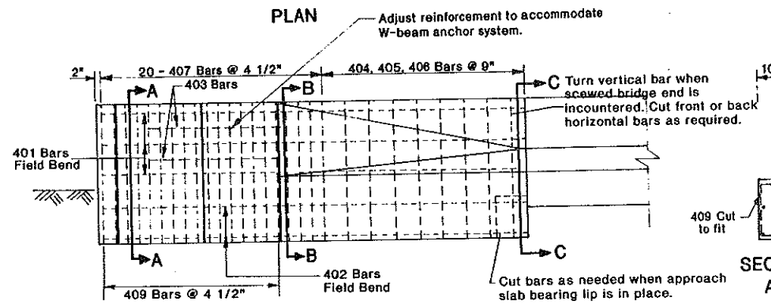
NOTE:
WHEN THE SAFETY SHAPE TRANSITION SECTION IS PRECAST THE JOINT BETWEEN THE BRIDGE RAIL AND THE SAFETY SHAPE SHALL BE SEALED LOW MODULUS SILICONE SEALANT MEETING THE REQUIREMENTS OF SECTION 826.02A4 OR EQUAL. WHEN THE SAFETY SHAPE TRANSITION IS CAST IN PLACE A 1" EXPANSION JOINT FILLER SHALL BE INSTALLED. COST OF SEALANT OR FILLER SHALL BE INCIDENTAL TO "CONCRETE CLASS AE3 FOR SAFETY SHAPE TRANSITION."



WINGWALL ISOMETRIC

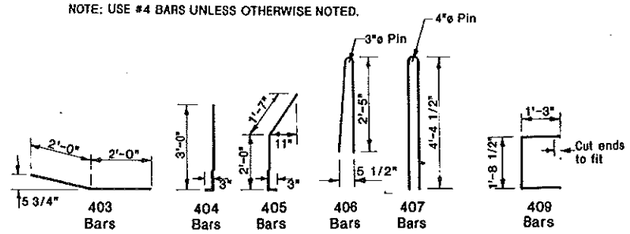


PLAN

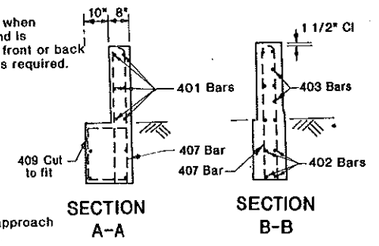


ELEVATION

NOTE: USE #4 BARS UNLESS OTHERWISE NOTED.

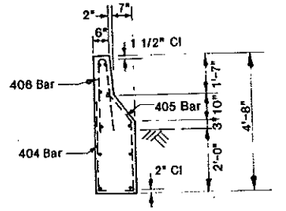


REINFORCING BAR DETAIL



SECTION A-A

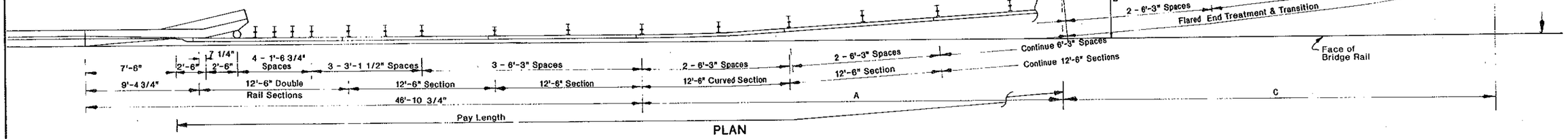
SECTION B-B



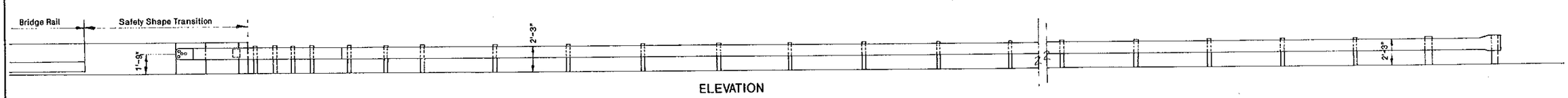
SECTION C-C

SAFETY SHAPE TRANSITION

Estimated AE-3 Concrete 56.3 C.F.
Estimated Reinforcing 365.9 Lbs.



PLAN



ELEVATION

NOTE: THE SAFETY SHAPE TRANSITION SHALL BE MEASURED BY THE NUMBER. THE COST OF EXCAVATION FORMING, AGGREGATE BASE, SHEET METAL, REINFORCING STEEL, EQUIPMENT AND LABOR SHALL BE INCLUDED IN THE PRICE BID FOR "CONCRETE AE3 FOR SAFETY SHAPE TRANSITION"

THE CONTRACTOR HAS THE OPTION TO USE EITHER WOOD OR STEEL POSTS FOR THE W-BEAM GUARDRAIL AND FLARED END TREATMENT AND TRANSITION.

4-28-89

REVISIONS	
DATE	CHANGE
10-10-89	Revised AE-3 Concrete and Note
1-2-90	STANDARD NUMBER
4-2-90	PAY LENGTH
6-1-90	NOTE ADDED
8-1-90	SAFETY SHAPE

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

APPROVED David K.D. Leer
DESIGN ENGINEER

GUARDRAIL AT BRIDGE ENDS
50 MPH DESIGN
LENGTH OF NEED TABLES

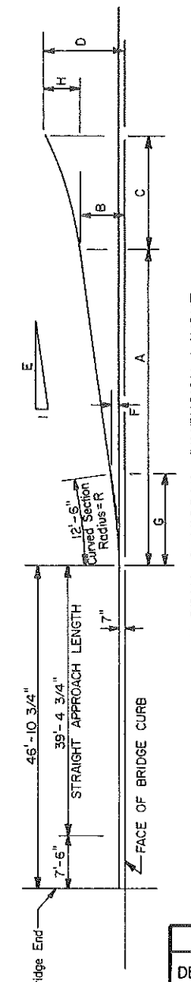
D-764-7

F-RRS-1-006(005)066

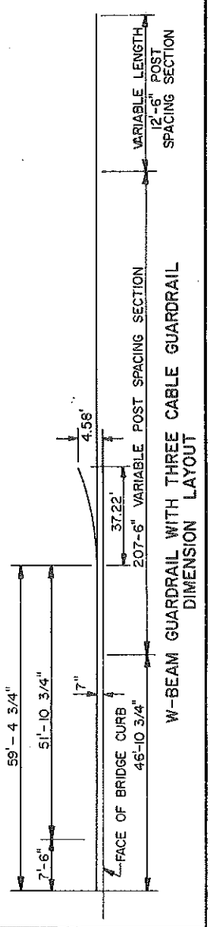
DESIGN TRAFFIC VOLUME

	CLEAR WIDTH OF BRIDGE	FLARED GUARDRAIL SECTION												NON FLARED GUARDRAIL WITH THREE CABLE GUARDRAIL											
			W-BEAM GUARDRAIL																		THREE CABLE GUARDRAIL				
			APPROACH SIDE						OPPOSITE SIDE						APPROACH SIDE						OPPOSITE SIDE				
		STRAIGHT APPROACH LENGTH	A	B	C	D	E	TOTAL W-BEAM LENGTH FT ①	A	B	C	D	E	TOTAL W-BEAM LENGTH FT ①	STRAIGHT APPROACH LENGTH	A	B	C	D	E	TOTAL W-BEAM LENGTH FT ①	A	B	C	D	E	TOTAL W-BEAM LENGTH FT ①	Variable Post Spacing Section	12'-6" Post Spacing Section	TOTAL THREE CABLE LENGTH FT	Variable Post Spacing Section	12'-6" Post Spacing Section	TOTAL THREE CABLE LENGTH FT
		FT	FT	FT	FT	FT			FT	FT	FT	FT			FT	FT	FT	FT	FT			FT	FT	FT	FT			FT	FT	FT	FT	FT	FT
UNDER 250 ADT	44	39.40	0	0	37.22	4.58	0	39.4	0	0	37.22	4.58	0	39.4	51.9	0	0	37.22	4.58	0	51.9	0	0	37.22	4.58	0	51.9	207.5	12.5	220.00	0	0	0
	42																																
	40		0	0	37.22	4.58	0	39.4																									
	38		12.48	1.15	36.71	8.50	11	51.9																									
	36		12.48	1.15		8.50		51.9																									
	34		24.93	2.28		9.63		64.4																									
	32		24.93	2.28		9.63		64.4																									
	30		37.38	3.41		10.77		76.9																									
	28		37.38	3.41		10.77		76.9																									
	26		49.83	4.54		11.90		89.4																									
	24	39.40	49.83	4.54	36.71	11.90	11	89.4	0	0	37.22	4.58	0	39.4	51.9	0	0	37.22	4.58	0	51.9	0	0	37.22	4.58	0	51.9	207.5	12.5	220.00	0	0	0
800-250 ADT	44	39.40	12.48	1.15	36.71	8.50	11	51.9	0	0	37.22	4.58	0	39.4	51.9	0	0	37.22	4.58	0	51.9	0	0	37.22	4.58	0	51.9	207.5	12.5	220.00	0	0	0
	42		12.48	1.15		8.50		51.9																									
	40		24.93	2.28		9.63		64.4																									
	38		24.93	2.28		9.63		64.4																									
	36		37.38	3.41		10.77		76.9																									
	34																																
	32		37.38	3.41		10.77		76.9																									
	30		49.83	4.54		11.90		89.4																									
	28		49.83	4.54		11.90		89.4																									
	26		62.28	5.68		13.03		101.9																									
	24	39.40	62.28	5.68	36.71	13.03	11	101.9	0	0	37.22	4.58	0	39.4	51.9	0	0	37.22	4.58	0	51.9	0	0	37.22	4.58	0	51.9	207.5	12.5	220.00	0	0	0
2000-800 ADT	44	39.40	12.48	1.15	36.71	8.50	11	51.9	0	0	37.22	4.58	0	39.4	51.9	0	0	37.22	4.58	0	51.9	0	0	37.22	4.58	0	51.9	207.5	12.5	220.00	0	0	0
	42		24.93	2.28		9.63		64.4																									
	40		24.93	2.28		9.63		64.4																									
	38		37.38	3.41		10.77		76.9																									
	36		37.38	3.41		10.77		76.9																									
	34		49.83	4.54		11.90		89.4																									
	32		49.83	4.54		11.90		89.4																									
	30		62.28	5.56		13.03		101.9																									
	28		62.28	5.68		13.03		101.9																									
	26		74.73	6.81		14.16		114.4	0	0	37.22	4.58	0	39.4																			
	24	39.40	74.73	6.81	36.71	14.16	11	114.4	12.48	1.15	36.71	8.50	11	51.9	51.9	0	0	37.22	4.58	0	51.9	0	0	37.22	4.58	0	51.9	207.5	12.5	220.00	207.5	12.5	220.0
6000-2000 ADT	44	39.40	37.38	3.41	36.71	10.77	11	76.9	0	0	37.22	4.58	0	39.4	51.9	0	0	37.22	4.58	0	51.9	0	0	37.22	4.58	0	51.9	207.5	12.5	220.00	0	0	0
	42		37.38	3.41		10.77		76.9																									
	40		49.83	4.54		11.90		89.4																									
	38																																
	36		49.83	4.54		11.90		89.4																									
	34		62.28	5.68		13.03		101.9																									
	32		62.28	5.68		13.03		101.9																									
	30		74.73	6.81		14.16		114.4	0	0	37.22	4.58	0	39.4																			
	28		74.73	6.81		14.16		114.4	12.48	1.15	36.71	8.50	11	51.9																			
	26		87.18	7.94		15.29		126.9	12.48	1.15		8.50		51.9																			
	24	39.40	87.18	7.94	36.71	15.29	11	126.9	24.93	2.28	36.71	9.63	11	64.4	51.9	0	0	37.22	4.58	0	51.9	0	0	37.22	4.58	0	51.9	207.5	37.5	245.0	207.5	12.5	220.0
OVER 6000 ADT	44	39.40	49.83	4.54	36.71	11.90	11	89.4	0	0	37.22	4.58	0	39.4	51.9	0	0	37.22	4.58	0	51.9	0	0	37.22	4.58	0	51.9	207.5	12.5	220.0	0	0	0
	42		49.83	4.54		11.90		89.4																									
	40		62.28	5.68		13.03		101.9																									
	38		62.28	5.68		13.03		101.9																									
	36		72.73	6.81		14.16		114.4	0	0	37.22	4.58	0	39.4																			
	34		72.73	6.81		14.16		114.4	12.48	1.15	36.71	4.50	11	31.9																			
	32		87.18	7.94		15.29		126.9	12.48	1.15		8.50		51.9																			
	30								24.93	2.28		9.63		64.4																			
	28		87.18	7.94		15.29		126.9	24.93	2.28		9.63		64.4																			
	26		99.62	9.07		16.42		139.4	37.38	3.41		10.77		76.9																			
	24	39.40	99.62	9.07	36.71	16.42	11	139.4	37.38	3.41	36.71	10.77	11	76.9	51.9	0	0	37.22	4.58	0	51.9	0	0	37.22	4.58	0	51.9	207.5	75.0	282.5	207.5	12.5	220.0

① Does not include Terminal & Transition



W-BEAM GUARDRAIL DIMENSION LAYOUT



W-BEAM GUARDRAIL WITH THREE CABLE GUARDRAIL DIMENSION LAYOUT

DESIGN SPEED	F	G	H	R
	FT	FT	FT	FT
40	0.69	12.47	8.08	112.96
50	0.57	12.48	7.35	137.87
60	0.48	12.49	6.84	162.82
70	0.42	12.49	6.47	187.78

NOTE: On Divided Highways use distance from Roadway Centerline to Bridge Rail X 2 and use this as Clear Roadway Width of Bridge to determine Guardrail Length.

The contractor has the option to use either wood or steel posts for the W-beam guardrail and flared end treatment and transition.

REVISIONS	
DATE	CHANGE
6-1-90	Note Added

11-20-89

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

APPROVED: David K. O'Leer
DESIGN ENGINEER

FHWA REGION	STATE	FED. AID PROJECT NO.	SHEET NO.
8	N. D.	F-BRS-1-006(005)066	

D-770-1

CONCRETE FOUNDATIONS (TRAFFIC SIGNALS & HIGHWAY LIGHTING)

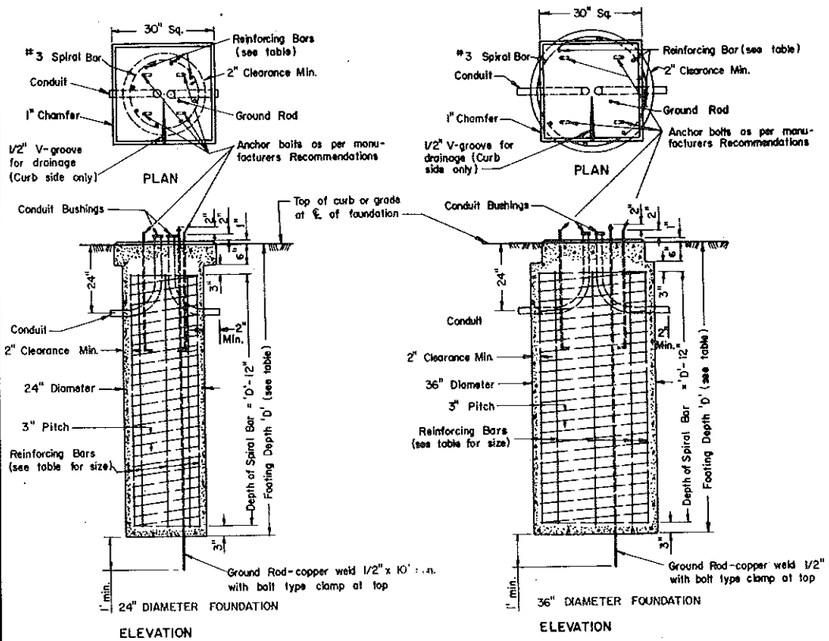
LIGHT & SIGNAL STANDARD FOUNDATION SELECTION TABLE

Description	Reinforcing Bars Required	Footing Depth "D" 24" Diameter	Reinforcing Bars Required	Footing Depth "D" 36" Diameter
Light Standard				
30' Mounting Height	8-#5	6'	8-#4	5'
40' Mounting Height	8-#5	6'	8-#4	5'
50' Mounting Height	8-#5	8'	8-#4	7'
Combination 30' Mounting Height				
0-25' Signal Mast Arm	8-#6	10'	8-#5	8'
26'-44' Signal Mast Arm	8-#6	10'	8-#5	8'
45'-50' Signal Mast Arm	8-#8	11'	8-#7	9'
Combination 40' Mounting Height				
0-25' Signal Mast Arm	8-#6	10'	8-#5	8'
26'-44' Signal Mast Arm	8-#7	11'	8-#6	9'
45'-50 Signal Mast Arm	8-#8	12'	8-#7	10'
Combination 50' Mounting Height				
0-25' Signal Mast Arm	8-#6	10'	8-#5	9'
26'-44' Signal Mast Arm	8-#8	12'	8-#7	10'
45'-50' Signal Mast Arm	8-#8	13'	8-#7	11'
Type IV Signal Standard	8-#7	10'	8-#6	9'
Type I, II, & III, V, VI, & VII Signal Std.	4-#5 ①	4'	4-#5 ①	3'

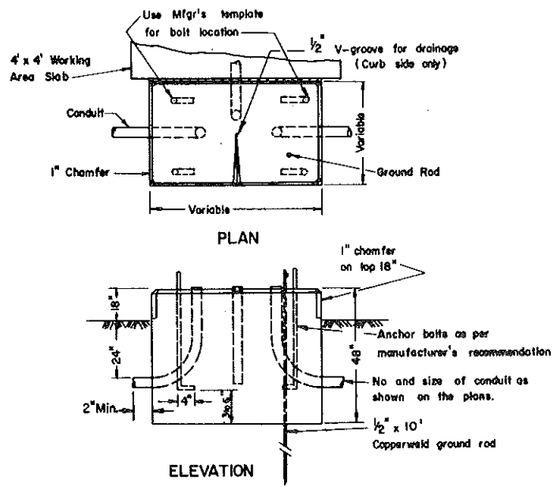
① No reinforcement is required if the anchor bolts extend to within 3" to 6" above the bottom of the foundation.

All reinforcing steel to be Grade 40 or 60.

If the Contractor elects to use a 24" square foundation, the next size smaller reinforcement bars may be substituted for those shown in the table. No substitutions may be made for a 36" square foundation. #4 tie bars on 12" c-c may be substituted for the spiral when a 24" square foundation is used. #4 round tie bars on 12" c-c may be substituted for the spiral when a 24" or 36" round foundation is used. Round tie bars shall have a min. of 12" lap.

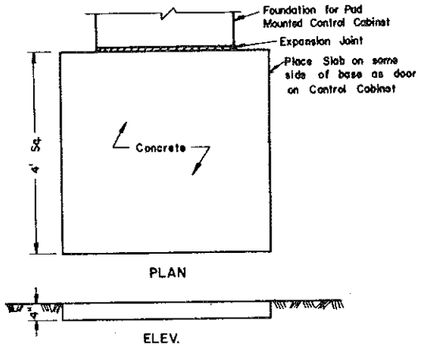


LIGHT & SIGNAL STANDARD FOUNDATION



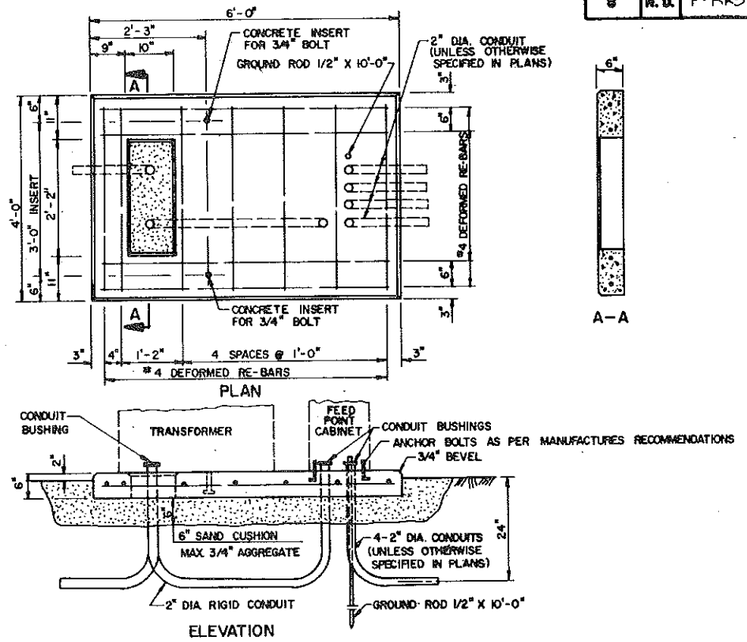
CONTROLLER CABINET FOUNDATION PAD MOUNT

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



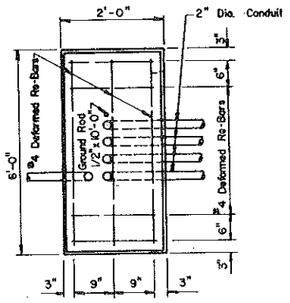
WORKING AREA SLAB

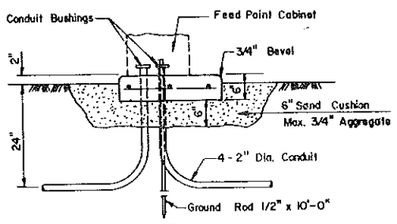
The Working Area Slab shall be installed where shown on the plans, and shall not be bid separately but shall be included in the price bid for Concrete Foundations-Traffic Signals.



TRANSFORMER & FEED POINT CABINET FOUNDATION PAD MOUNT

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





FEED POINT CABINET FOUNDATION PAD MOUNT

The Feed Point Cabinet Foundation Pad Mount shall be bid as Concrete Foundations-Feed Point Pad-Type B

NOTES:

Light & Signal Standard Foundations:

See plans for conduit size, number of bends and correct positioning 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 location of foundations. The grade and exact location shall be established by the Engineer in the field.

Maximum anchor bolt circle for the 24" foundation shall not exceed 18". Maximum anchor bolt circle for the 36" foundation shall not exceed 30".

Pad Mounted Signal Control Cabinet Foundation:

See plans for the number of 90° bends per foundation and correct positioning.

Foundation for Pad Mounted Signal Control Cabinets 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 insure a watertight seal between the control cabinet and the foundation by caulking, except for V grove.

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:

Foundation shall have a wood float finish.

All conduits shown shall be installed. Conduit that is not used at this time shall be plugged.

Feed Point Cabinet Foundation Pad Mounted:

Foundation shall have wood float finish.

All conduits shown shall be installed. Conduit that is not used at this time shall be plugged.

10-1-86 REVISIONS	
DATE	CHANGES

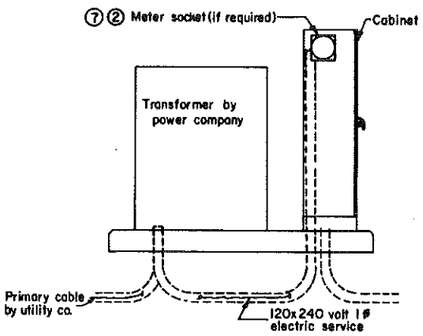
NORTH DAKOTA STATE HIGHWAY DEPARTMENT

APPROVED: [signature] DESIGN ENGINEER

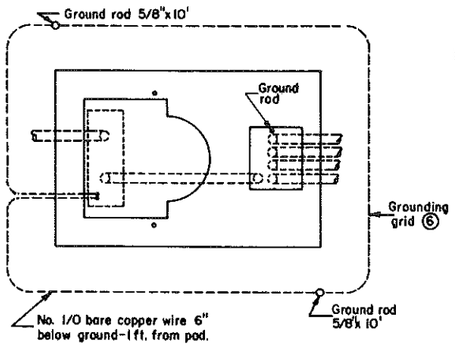
FEED POINTS
(ROADWAY LIGHTING)

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N. D.	F-RRS-1-006(005)066	

D-770 - 2



ELEVATION



PLAN

TRANSFORMER AND CIRCUIT BREAKER CABINET PAD MOUNTED

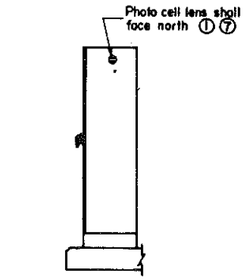
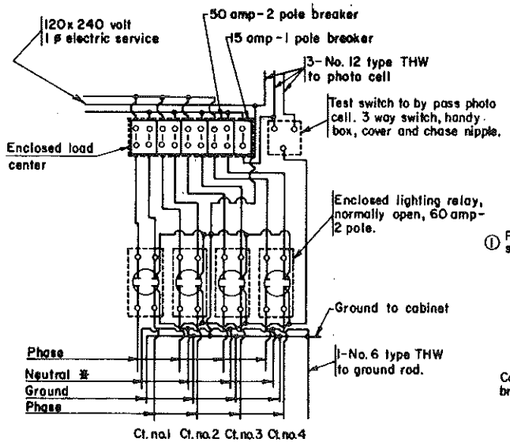


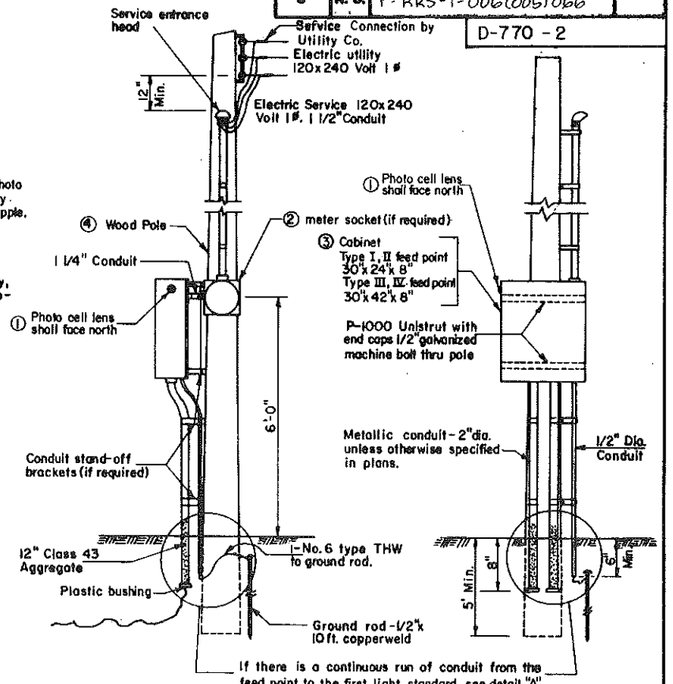
PHOTO CELL MOUNTING DETAIL



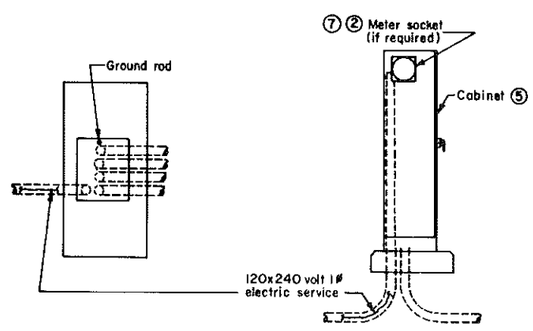
※ Install when festoon circuit is required.

FEED POINT
TYPE IV

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

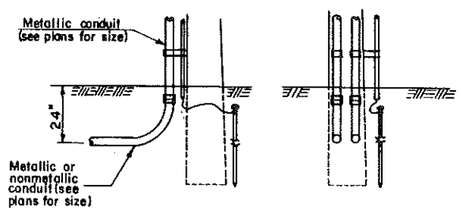


POLE MOUNTED

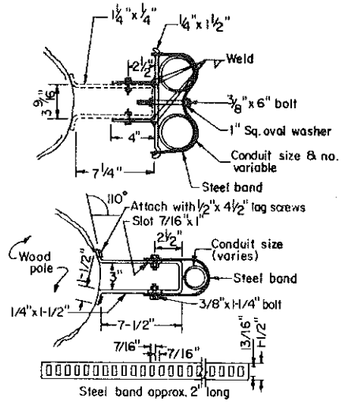


PLAN ELEVATION

CIRCUIT BREAKER CABINET PAD MOUNTED



DETAIL "A"



CONDUIT STANDOFF BRACKET

The conduit standoff brackets may be omitted if not required by the local utility company.

NOTES:

① PHOTO CELL: The Electrical Contractor shall furnish and install the photoelectric cell.

② METER SOCKET: The contractor shall install the meter socket and trim if meter is required by local utility company. Meter to be furnished and installed by utility company.

③ CABINET: Cabinet shall be N.E.M.A. 12 rating with lock drip shield and 1/2" plywood backing, stainless steel hardware. Paint plywood with 2 coats of oil base gray. Cabinet shall be shop coated with one coat of red lead and have two coats of exterior gray enamel.

④ WOOD POLE: Minimum 20 ft. Class VII full length penta pressure treated wood pole. (if required, see layout sheets)

⑤ CABINET: Cabinet shall be 56" high x 26" wide x 14" deep. Minimum 12 ga. steel with provisions for padlock. Cabinet shall be weatherproof. Cabinet shall have one shop coat of red lead and two field coat of exterior dark green enamel.

⑥ GROUNDING GRID: The grounding grid shall have a ground resistance not to exceed 25 ohms. This shall be obtained by one or more 5/8"x 10' copperweld ground rods in parallel or series at two corners. Minimum distance between ground unit assemblies shall be 6'-0".

⑦ METER LOCATION: The Meter (if required) shall not be mounted on the same side of the cabinet as the photo-cell is mounted.

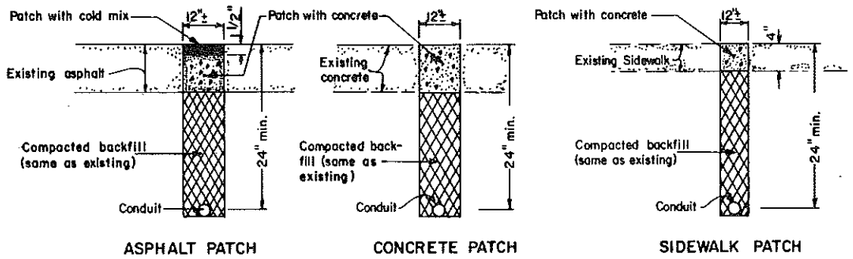
10-1-86 REVISIONS	
DATE	CHANGES

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED: David K.O. Leer
DESIGN ENGINEER

LIGHTING & SIGNAL DETAILS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	

D-770-4



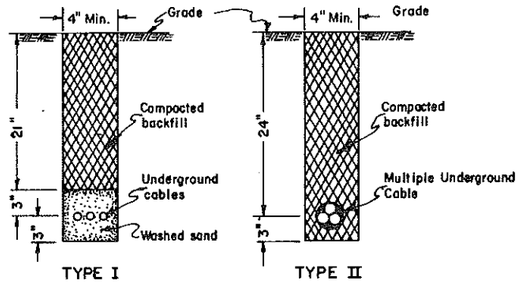
ASPHALT PATCH CONCRETE PATCH SIDEWALK PATCH

SURFACE PATCH DETAILS

NOTE:

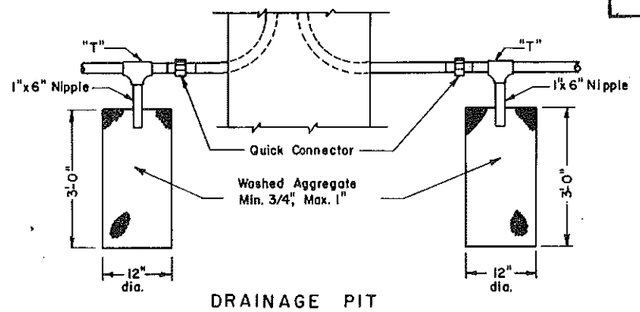
PATCHES: All trenches shall be saw-cut. The replacement concrete shall be P.C.C. pavement and the coarse aggregate gradation, maximum size and method of curing shall be as approved by the Engineer. The cost shall be included in the price bid for Conduit.

Immediately prior to pouring replacement concrete, all surfaces shall be painted with an approved epoxy compound.



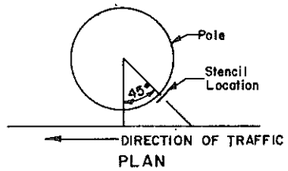
CABLE TRENCH

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".

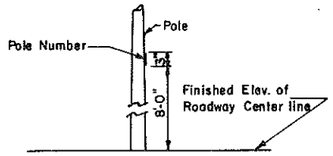


DRAINAGE PIT

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)



PLAN

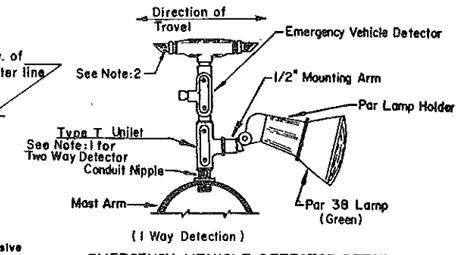


ELEVATION

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.

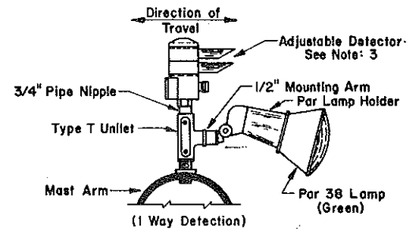


(1 Way Detection)

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.

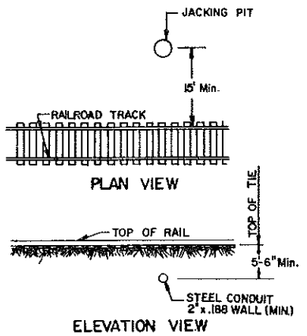


(1 Way Detection)

ALTERNATE EMERGENCY VEHICLE DETECTOR DETAIL (Adjustable)
(Location As Shown In Plans)

Notes:

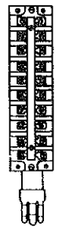
3. Two-way Detector shall have the detector lens rotated to face the direction of travel, and shall have Type X Unilet with two Par lamp holders and lamps (one in each direction).



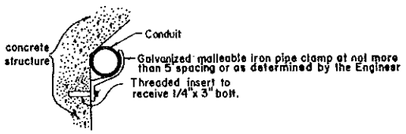
ELEVATION VIEW

RAILROAD TRACK CONDUIT PLACEMENT

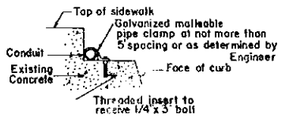
SIDE VIEW



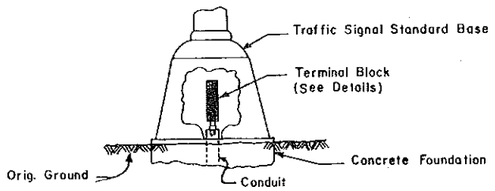
FRONT VIEW



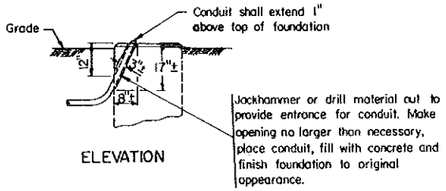
BRIDGE MOUNTED CONDUIT HANGER



CURB MOUNTED CONDUIT



TERMINAL BLOCK
(Rigid Mounted)



ELEVATION

REVISE CONCRETE FOUNDATION

10-1-86 REVISIONS	
DATE	CHANGES

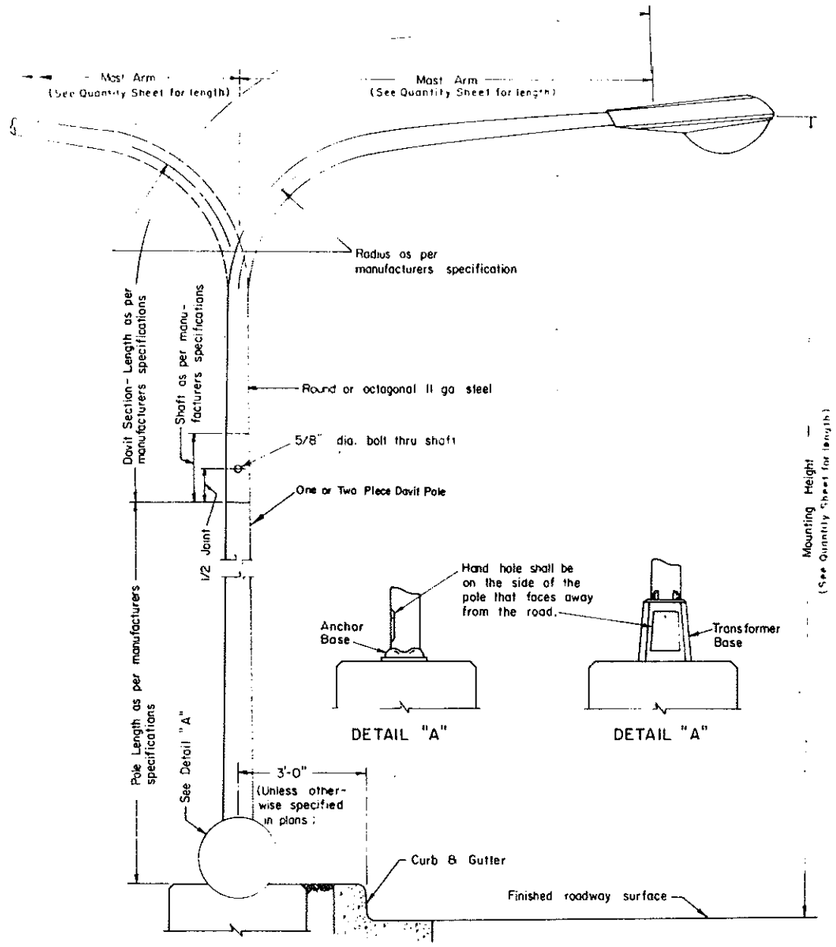
NORTH DAKOTA STATE HIGHWAY DEPARTMENT

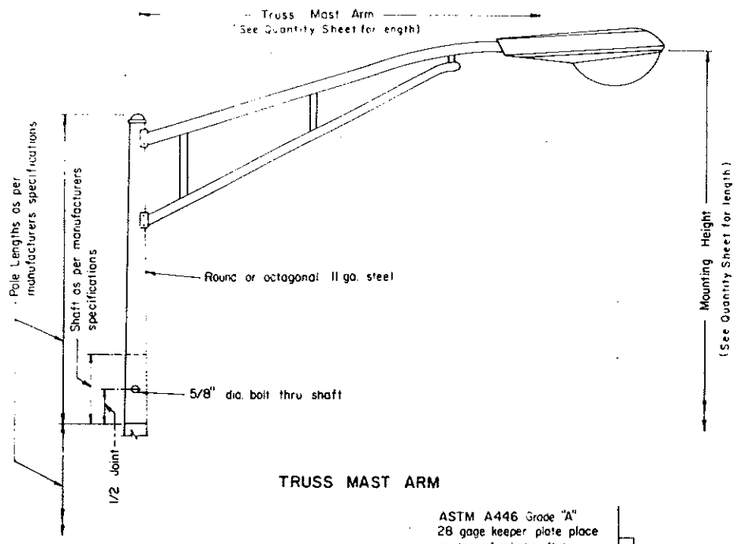
APPROVED: David K.O. Fare
DESIGN ENGINEER

FHWA REGION	STATE	FED AID PROJ. NO	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	

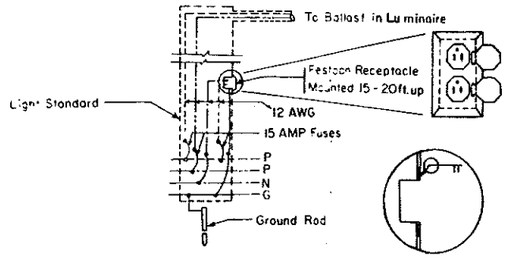
D-770-5

LIGHT STANDARD DETAILS





TRUSS MAST ARM

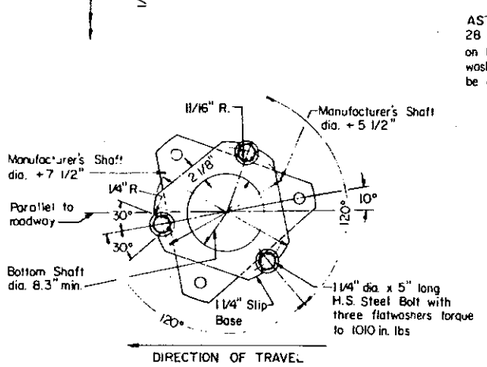


POLE WIRING DIAGRAM

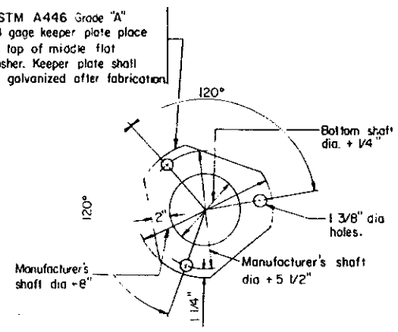
RECEPTACLE MOUNTING DETAIL

Receptacle shall be mounted on the side of the pole that faces the street side.

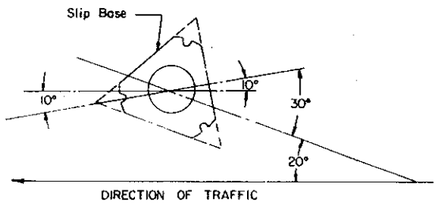
(Festoon Receptacle shall be installed only when specified in the plans.)



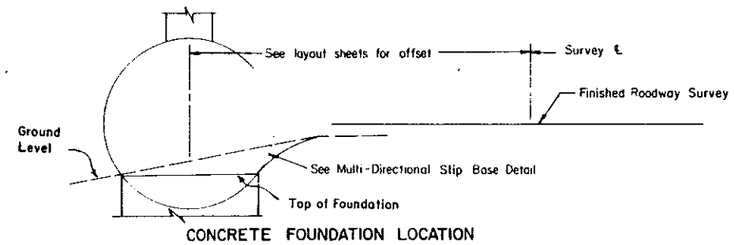
TOP VIEW



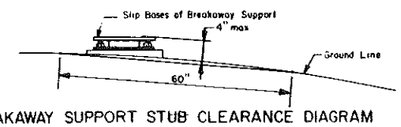
PLAN VIEW
KEEPER PLATE



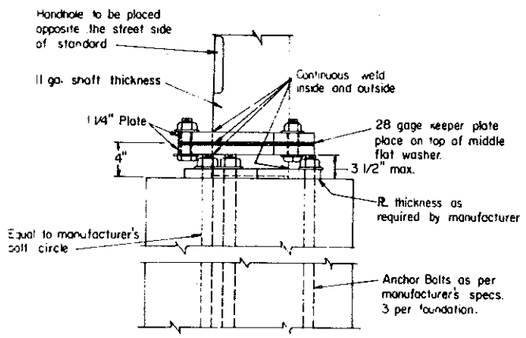
SLIP BASE PLACEMENT DETAIL



CONCRETE FOUNDATION LOCATION



BREAKAWAY SUPPORT STUB CLEARANCE DIAGRAM



SIDE VIEW

STEEL BASE DETAIL
MULTI-DIRECTIONAL SLIP BASE

NOTES:

STEEL STANDARDS: Steel light standard shall be galvanized in accordance with ASTM A123. Marred or scratch areas shall be touchedup after erection.

Mast Arm: See Quantity Sheet for length.

LUMINAIRE: Shall be internal ballast-constant wattage 120 x 240 voltage See layout sheets for type of luminaire, wattage, I.E.S. distribution, operating voltage.

FUSING: Fusing in base, see specifications.

SLIP BASE BOLT TORQUE PROCEDURE:

1. Tighten all bolts the maximum possible with 12" to 15" wrench to bed washers and to clean bolt threads, then loosen.
2. Retighten bolts in a systematic order to prescribed torque.
3. Loosen each bolt and retighten to prescribed torque in same order as initial retightening.
4. Burr threads at junction with nut using center punch to prevent nut loosening.

10-1-88	
REVISIONS	
DATE	CHANGE
6-1-89	Breakaway Support

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT

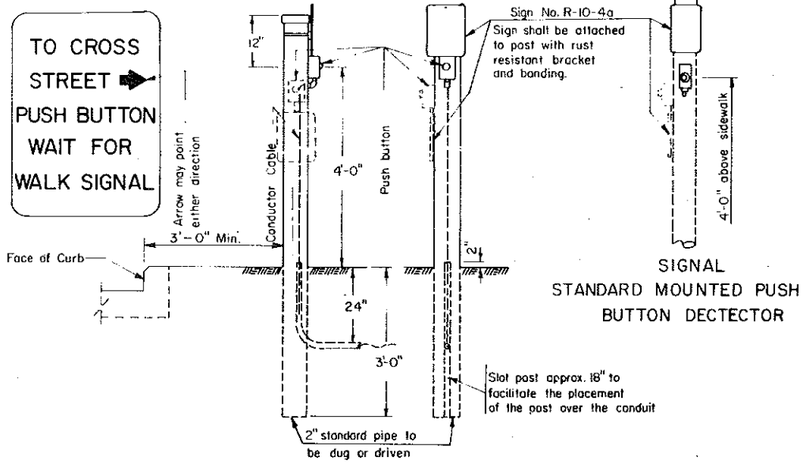
APPROVED: David K.O. Leer
DESIGN ENGINEER

TRAFFIC SIGNAL STANDARDS

FHWA REGION	STATE	FED. AID PROJ. NO	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	
		D-772-2	

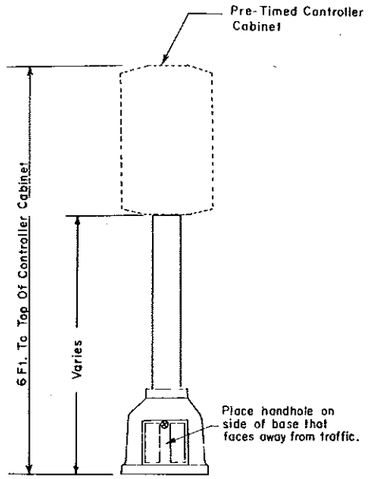
SIGN NO. R-10-4a
(008) Aluminum)
See Standard Sign Layout Booklet for dimensions and legend series.

The positioning of sign & pushbutton & direction of arrow shall clearly indicate which crosswalk is actuated by the push button.

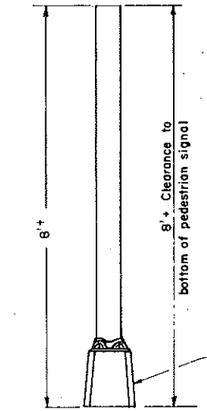


SIGNAL
STANDARD MOUNTED PUSH
BUTTON DECTECTOR

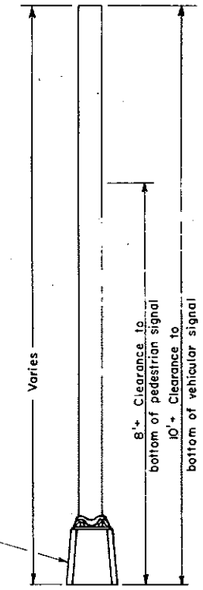
PEDESTRIAN PUSH BUTTON POST
DETAILS



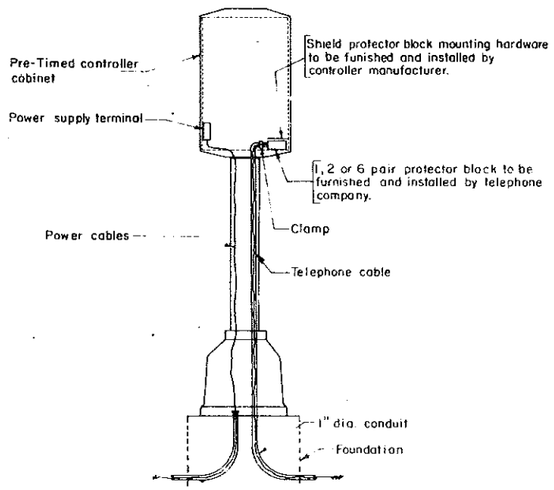
TYPE I



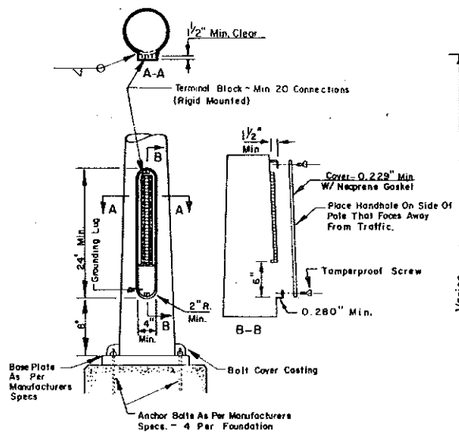
TYPE II



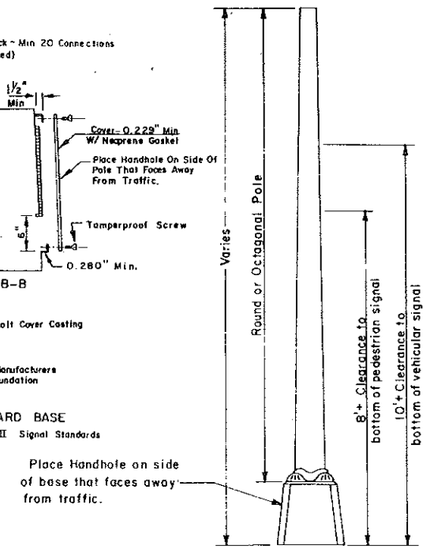
TYPE III



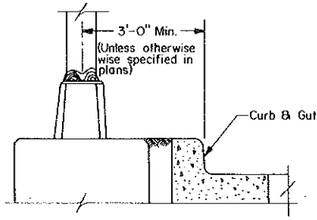
TELEPHONE INTERCONNECT
SCHEMATICS DETAIL
(Control circuits not shown)

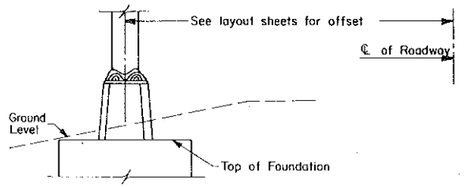


ALTERNATE SIGNAL STANDARD BASE
For Use Only With Type V, VI, & VII Signal Standards



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 ℄ 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.

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

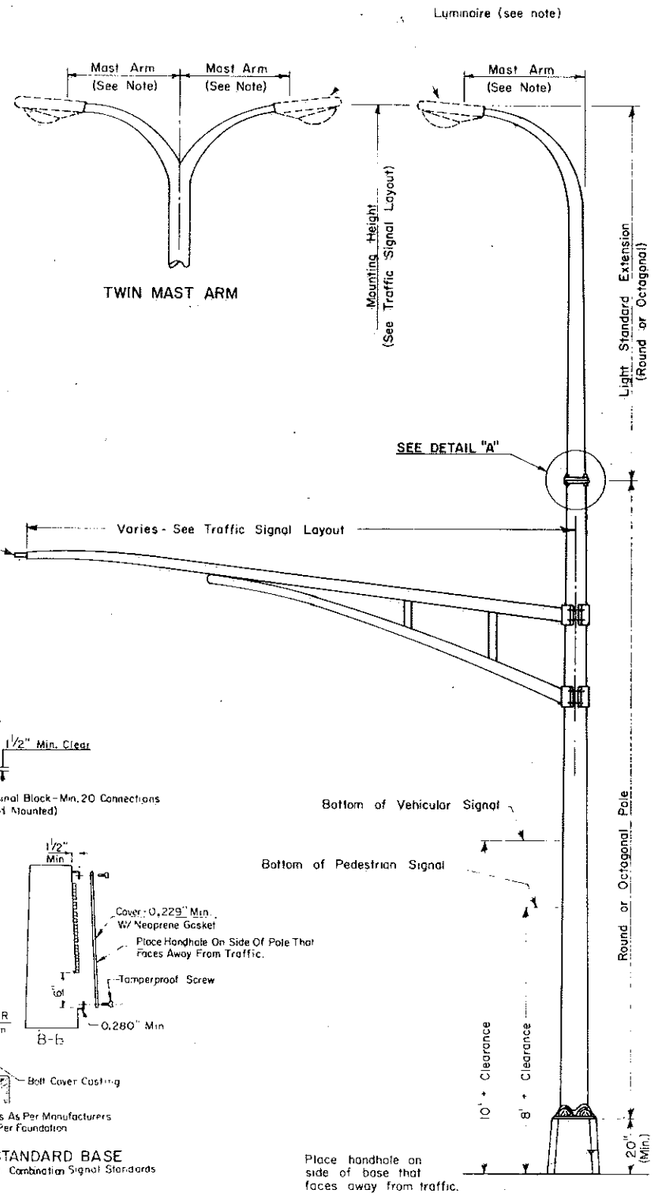
10-1-86 REVISIONS	
DATE	CHANGES
12-1-88	Min. Clearance

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED: David K.D. Leer
DESIGN ENGINEER

TRAFFIC SIGNAL STANDARDS
(Mast Arm Type)

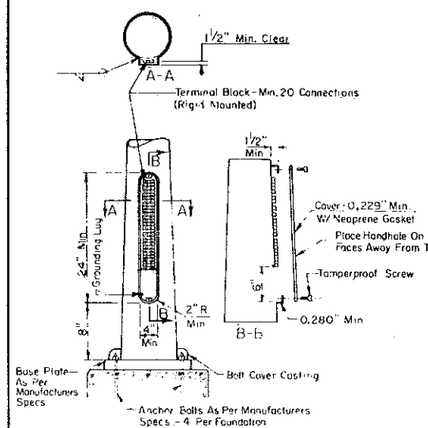
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N. D.	F-RRS-1-006(005)D66	

D-772-3

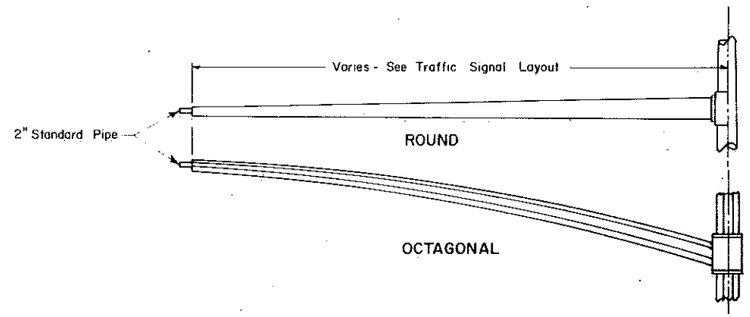


TWIN MAST ARM

COMBINATION SIGNAL AND LIGHT STANDARD

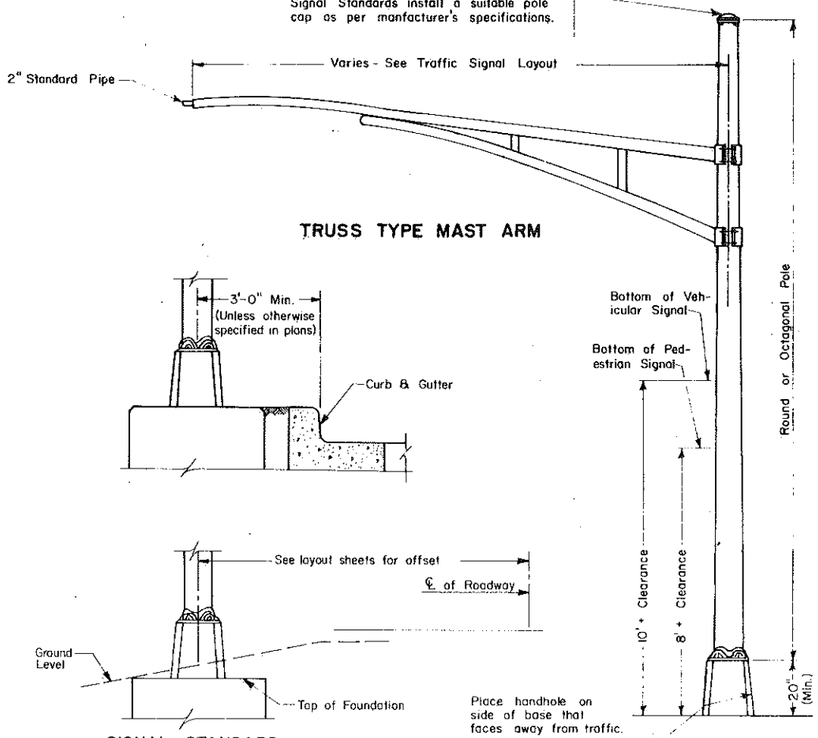


ALTERNATE SIGNAL STANDARD BASE
For Use Only With Type IV & Combination Signal Standards



MONOTUBE TYPE MAST ARMS

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 manfacturer's specifications.

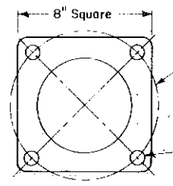


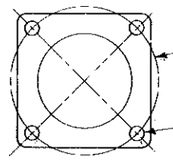
TRUSS TYPE MAST ARM

SIGNAL STANDARD
MIN. CLEARANCE DETAIL

Place handhole on side of base that faces away from traffic.

TYPE IV SIGNAL STANDARD





DETAIL "A"

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

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

* The Light Standard Extension for these signal standards shall be installed at a later date under a seperate 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 A123.

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 16 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.

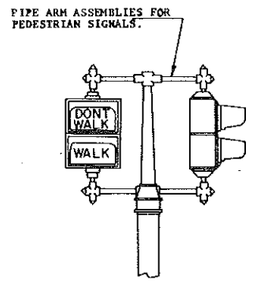
REVISIONS	
DATE	CHANGES
10-1-86	
12-1-88	Min. Clearance

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED: David K.D. Baer
DESIGN ENGINEER

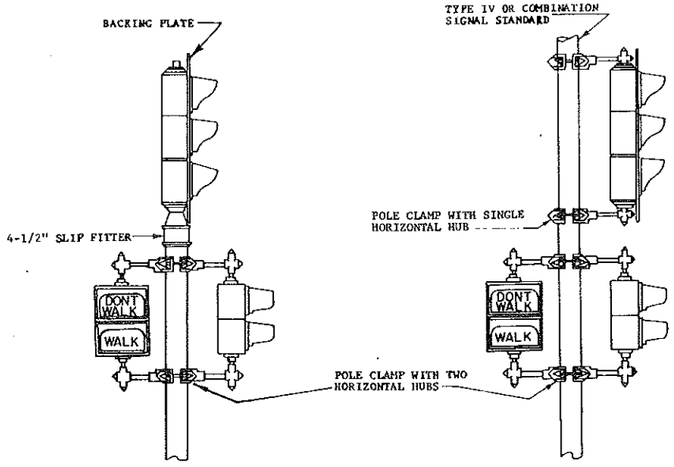
TRAFFIC SIGNAL HEAD MOUNTING

D-772-4

F-RRS-1-006(005)060

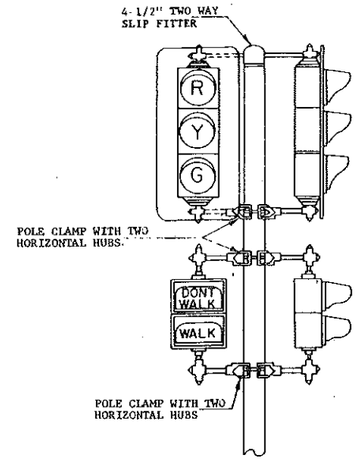


TYPE II
PEDESTAL MOUNTED PEDESTRIAN

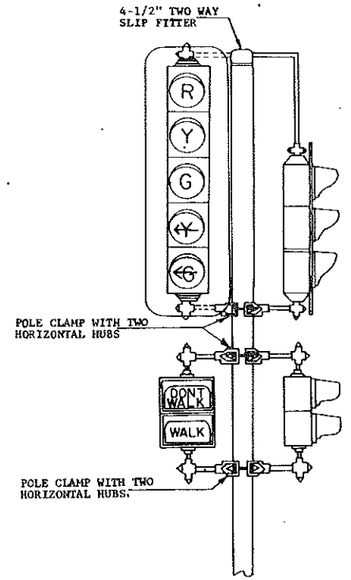


TYPE III
PEDESTAL MOUNTED - VEHICULAR
POST MOUNTED - PEDESTRIAN.

TYPE IV
POST MOUNTED - VEHICULAR
POST MOUNTED - PEDESTRIAN



TYPE V
POST MOUNTED - VEHICULAR
POST MOUNTED - PEDESTRIAN



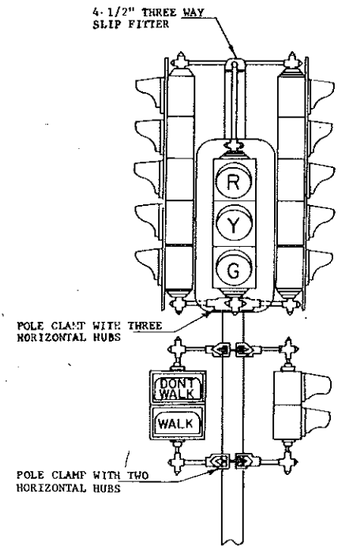
NOTES:

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.

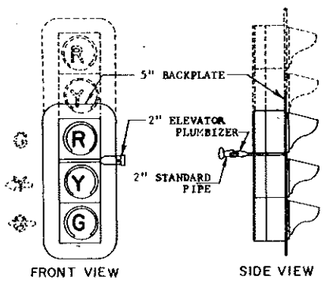
SIGNAL HEADS: SEE TRAFFIC SIGNAL LAYOUT FOR CORRECT MOUNTING POSITION, NUMBERS, SIZE AND ARRANGEMENT OF LENSES.

POLE CLAMPS: A POLE PLATE WITH SUITABLE SANDING 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.

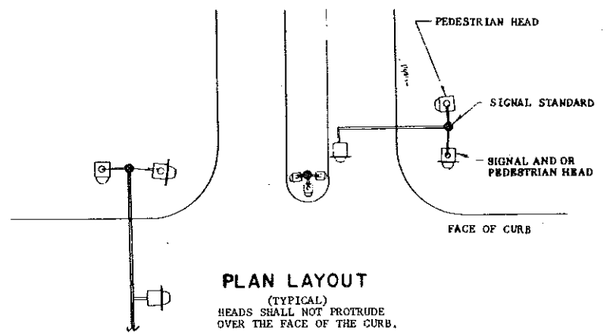


TYPE VII
POST MOUNTED - VEHICULAR
POST MOUNTED - PEDESTRIAN



END MOUNTED MID-SPAN MOUNTED
MAST ARM RIGID MOUNTED SIGNAL HEADS

TYPE VI
POST MOUNTED - VEHICULAR
POST MOUNTED - PEDESTRIAN



PLAN LAYOUT
(TYPICAL)
HEADS SHALL NOT PROTRUDE OVER THE FACE OF THE CURB.

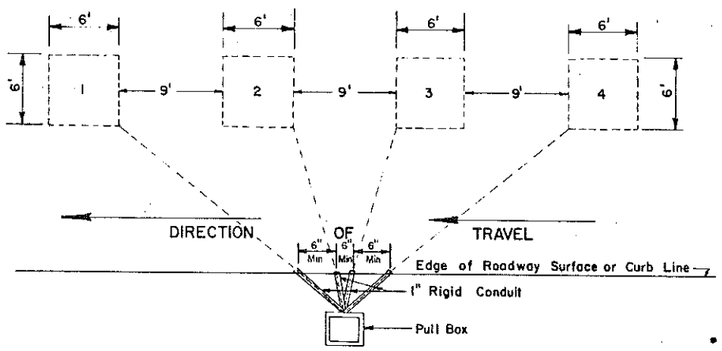
10-1-86 REVISIONS	
DATE	CHANGES
5-1-90	PLAN LAYOUT

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED: David K.O. Leer
DESIGN ENGINEER

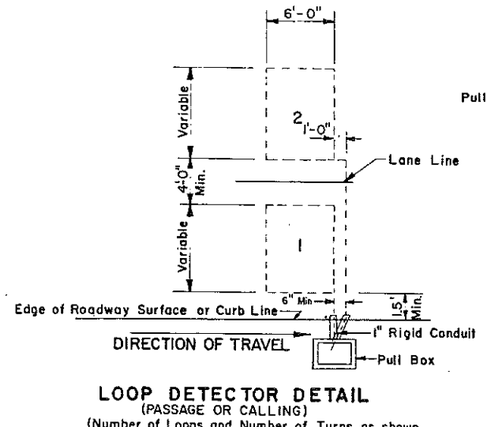
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-RRS-1-006(005)066	

D-772-5

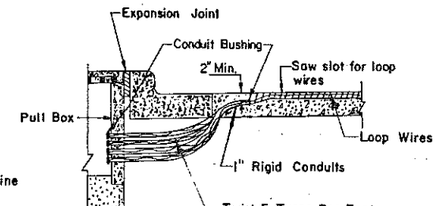
LOOP DETECTORS
DETAILS



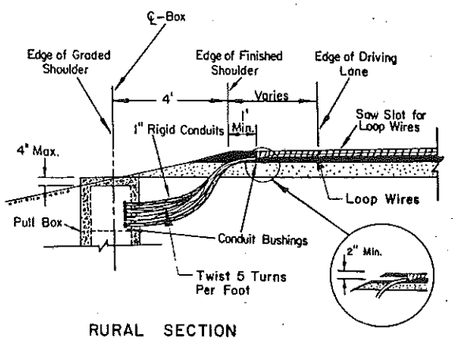
MULTIPLE LOOP DETECTOR DETAIL
(PRESENCE LOOPS)



LOOP DETECTOR DETAIL
(PASSAGE OR CALLING)
(Number of Loops and Number of Turns as shown in the Plans)

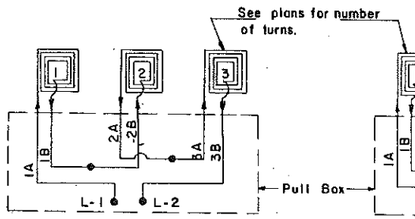


CURB SECTION

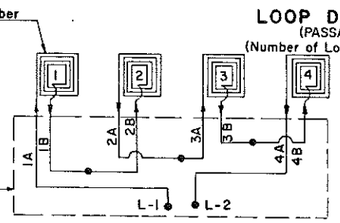


RURAL SECTION

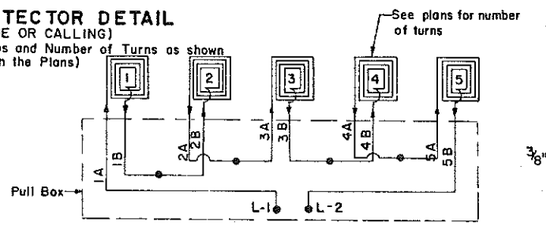
SAW SLOT TO PULL BOX
DETAILS



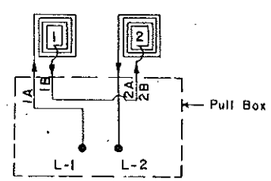
MULTIPLE LOOP CONNECTION
All conductors shall be labeled in the pull box as shown. (1A, 1B, 2A, etc.)
The loop connections shall be spliced in the pull box: 1A to L-1, 1B to 2B, 2A to 3A, and 3B to L-2



MULTIPLE LOOP CONNECTION
All conductors shall be labeled in the pull box as shown. (1A, 1B, 2A, etc.)
The loop connections shall be spliced in the pull box: 1A to L-1, 1B to 2B, 2A to 3A, 3B to 4B, and 4A to L-2



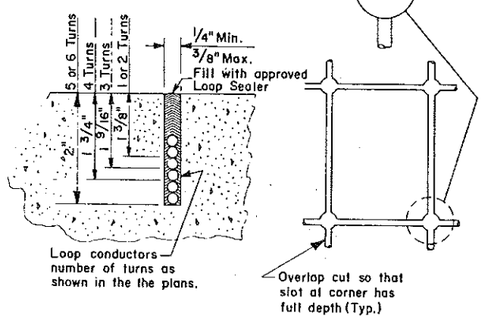
MULTIPLE LOOP CONNECTION
All conductors shall be labeled in the pull box as shown. (1A, 1B, 2A, etc.)
The loop connections shall be spliced in the pull box: 1A to L-1, 1B to 2B, 2A to 3A, 3B to 4B, 4A to 5A, and 5B to L-2



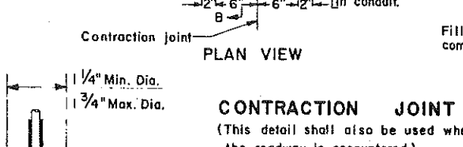
MULTIPLE LOOP CONNECTION
All conductors shall be labeled in the pull box as shown. (1A, 1B, 2A, etc.)
The loop connections shall be spliced in the pull box: 1A to L1, 1B to 2B, and 2A to L2.

NOTES:

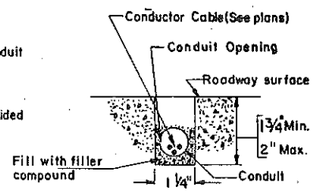
1. Each loop shall be saw cut in the roadway.
2. The number of turns, size of loop and size of conductor shall be as shown on the plans. The first loop dimension figure is the length in the direction of travel and the second dimension is the width across the traffic lane.
3. The lead routing shall be in separate slots to conduit leading to pull box to minimize interaction.



SAW SLOT DETAILS
Drill detecter loop corners 2" deep then saw pavement slots to form loops. Dimensions and location shall be as shown in plans.

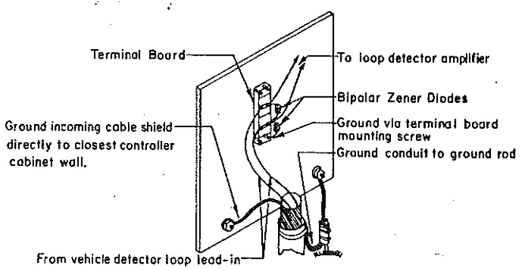


PLAN VIEW



SECTION BB

CONTRACTION JOINT DETAIL
(This detail shall also be used whenever a crack in the roadway is encountered.)



LOOP LEAD-IN CONDUCTOR LIGHTNING PROTECTION

10-1-86 REVISIONS	
DATE	CHANGES
8-3-87	NOTE
11-20-89	RIGID CONDUIT AT CURB SPACING
12-8-89	MULTIPLE LOOP CONNECTION

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
APPROVED: David K.O. Leer
DESIGN ENGINEER