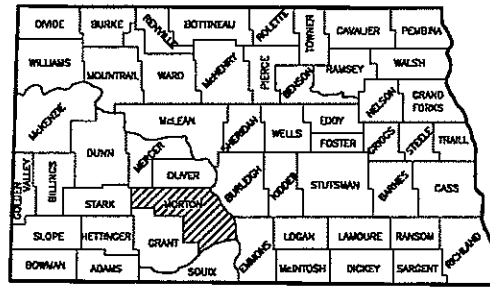


JOB# 22

FHWA REGION	STATE	PROJECT	SHEET NO.
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CITY OF MANDAN
 FORTY-SIXTH AVENUE SE TRAIL
 PROJECT NO. TEU-1-988(010)021
 HOT BITUMINOUS PAVING, GRADING
 AND INCIDENTALS



STATE OF NORTH DAKOTA

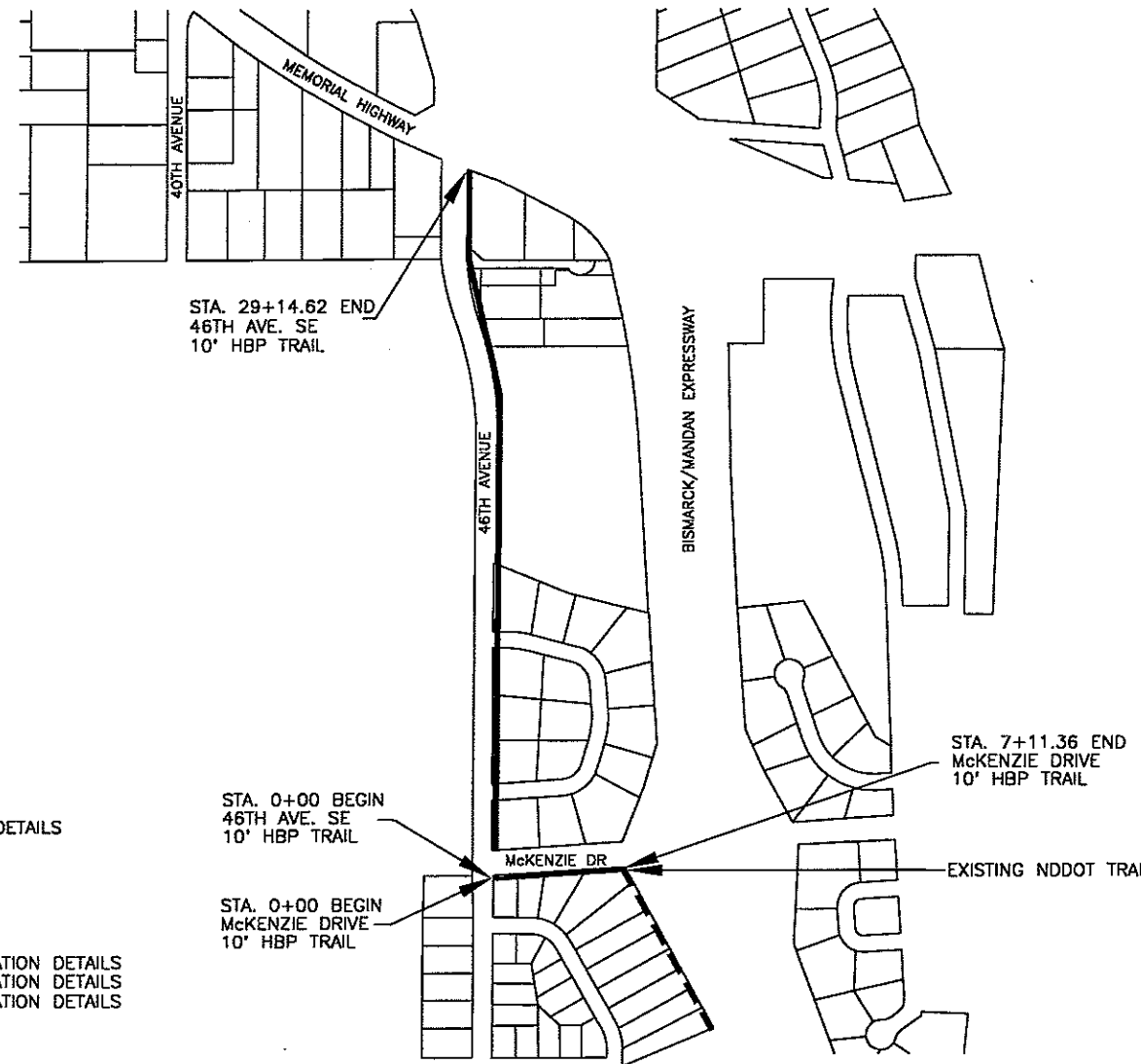
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ANY QUESTIONS REGARDING THESE PLANS CAN BE DIRECTED TO:
 TERRY RAGAN, P.E.
 KADRNAS, LEE & JACKSON
 PO BOX 1157
 BISMARCK, ND 58502-1157
 (701)-255-0076 PHONE
 (701)-255-0943 FAX



LENGTH OF PROJECT

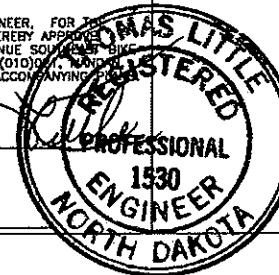
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TEU-1-988(010)021	0.687	0.687

Prime-Northern Imp.
 3D
 Midwest Testing
 Start Mid July on 19th St.
 46th there after
 Troop of Kenen 30 on site most of time
 Terry & Richard

APPROVAL OF CITY ENGINEER

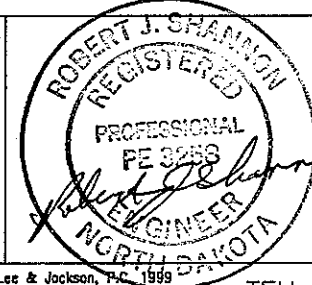
I, THOMAS R. LITTLE, P.E., CITY ENGINEER, FOR THE CITY OF MANDAN, NORTH DAKOTA, HEREBY APPROVE THESE PLANS FOR FORTY-SIXTH AVENUE SE TRAIL PROJECT NUMBER TEU-1-988(010)021, NORTH DAKOTA AS SHOWN ON THE ACCOMPANYING

THOMAS R. LITTLE, P.E.
 CITY ENGINEER
 MANDAN, NORTH DAKOTA
 DATE: 2/10/99



I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF NORTH DAKOTA.

ROBERT J. SHANNON, P.E.
 PROJECT MANAGER
 BISMARCK, NORTH DAKOTA
 DATE: 2/8/99



Kadrmas
 Lee &
 Jackson
 Consulting Engineers
 and Surveyors
 BISMARCK, NORTH DAKOTA















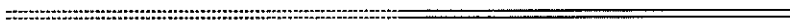
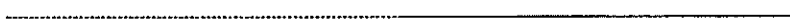







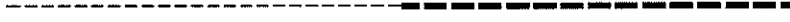



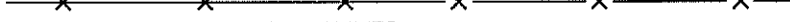


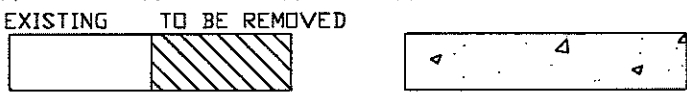
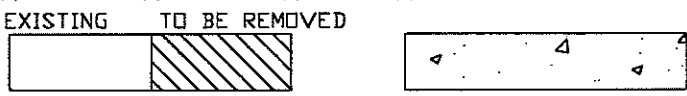






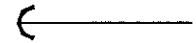























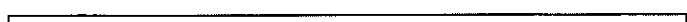











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LEGEND

No Scale

EXISTING	PROPOSED		EXISTING	PROPOSED	
		FIRE HYDRANT			UNDERGROUND ELECTRIC
		GATE VALVE			UNDERGROUND TELEPHONE
		CURB STOP			GAS LINE
		BEND			CURB & GUTTER (CONCRETE)
		TEE			EDGE OF GRAVEL SURFACE
		CROSS			EDGE OF ASPHALT SURFACE
		REDUCER			FENCE
		SLEEVE			SIDEWALK OR DRIVEWAY (CONCRETE)
		SANITARY MANHOLE			SIGN POST
		CURB INLET			GUY WIRE & ANCHOR
		CATCH BASIN			PROPERTY PIN - FOUND/SET
		STORM MANHOLE			TREE - CONIFEROUS/DECIDUOUS
		POWER POLE			HEDGE OR BUSHES
		STREET LIGHT			MAILBOX
		ELECTRICAL JUNCTION BOX			CONTROL POINT
		TELEPHONE PEDESTAL			CULVERT
		WATER MAIN			DRAINAGE DIRECTION
		SANITARY SEWER MAIN			OVERHEAD POWERLINE
		STORM SEWER MAIN			

CONSTRUCTION NOTES

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100 GENERAL

100. P01 UNDERGROUND UTILITIES: THE CONTRACTOR SHALL NOTIFY THE LOCAL UTILITY COMPANIES PRIOR TO THE BEGINNING OF CONSTRUCTION SO THEY MAY DETERMINE THE LOCATION OF ALL UTILITIES IN THE PROJECT AREA. THE ONE CALL NUMBER IS 1-800-795-0555. SUBCUTTING 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 CONSTRUCTION WILL BE MADE AVAILABLE TO THE CONTRACTOR UPON REQUEST TO THE ENGINEER.

TWO DOWN GUYS NEED TO BE RELOCATED NEAR THE NORTH END OF THE PROJECT. MONTANA - DAKOTA UTILITIES CO. (MDU) WILL RELOCATE THESE DOWN GUYS. THE CONTRACTOR SHALL COORDINATE WITH MDU TO HAVE THE DOWN GUYS RELOCATED PRIOR TO WORKING IN THIS AREA. COST OF RELOCATION OF THE DOWN GUYS IS NOT THE RESPONSIBILITY OF THE CONTRACTOR. THE DOWN GUYS ARE IDENTIFIED ON THE PLAN SHEETS.

100. P02 TREES, SHRUBS, AND NATIVE GRASSES: THE CONTRACTOR SHALL EXERCISE 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 UNLESS APPROVED BY THE ENGINEER. THE CONTRACTOR SHALL NOT BE PERMITTED ANY UNNECESSARY EQUIPMENT OPERATIONS UNDER, AROUND OR WITHIN TREE DRIP LINES.

100. P03 EQUIPMENT OPERATING RESTRICTIONS: THE CONTRACTOR SHALL NOT OPERATE HIS EQUIPMENT OUTSIDE THE CORRIDOR SHOWN ON THE PLAN SHEETS. THE CORRIDOR SHALL BE DEFINED AS THE WIDTH OF CUT OR FILL SECTION AS SHOWN ON THE CROSS SECTION SHEETS PLUS THREE FEET ON EACH SIDE. ON FILL SECTIONS UTILIZING GEOGRID, EQUIPMENT SHALL BE RESTRICTED TO OPERATING ONLY ON THE FILL EMBANKMENT WITH ABSOLUTELY NO DRIVING OFF THE FILL EXCEPT FOR MOWING PURPOSES. TRAIL ACCESS POINTS WILL BE AT THOSE POINTS WHERE THE TRAIL CROSSES EXISTING ROADS OR APPROACHES. NO OTHER ACCESS POINTS WILL BE PERMITTED UNLESS WRITTEN PERMISSION IS RECEIVED FROM THE ENGINEER.

100. P04 HANDLING OF RESOURCE DISCOVERIES: SHOULD ANY CULTURAL RESOURCES, I.E., ARTIFACTS, BONE, FIRE HEARHS, HUMAN REMAINS, ETC., BE DISCOVERED DURING CONSTRUCTION, ALL WORK WILL BE HALTED UNTIL THE SITE HAS BEEN INSPECTED BY A PERMITTED ARCHAEOLOGIST. DEPENDING ON THE NATURE OF THE DISCOVERY, THE CONTRACTOR MAY MOVE THE TRAIL CONSTRUCTION OPERATION TO A DIFFERENT SECTION OF THE TRAIL. AFTER THE DISCOVERY, AN ARCHEOLOGIST WILL BE RETAINED BY THE CONTRACTOR TO MONITOR THE REMAINING PORTION OF THE PROJECT. COMPENSATION WILL ONLY BE NEGOTIATED IF THERE ARE NO OTHER SECTIONS OF THE TRAIL REMAINING TO BE CONSTRUCTED AND THE TRAIL CONSTRUCTION IS SHUT DOWN FOR MORE THAN 2 CONSECUTIVE DAYS.

100. P05 BIKE TRAIL: BIKE TRAILS ARE USED BY CYCLISTS, IN LINE SKATERS, WHEEL CHAIRS, JOGGERS, WALKERS, AND ALL OTHER FORMS OF NON-MOTORIZED MODES OF TRANSPORTATION. THESE TRAILS REQUIRE A SURFACE FREE OF DEFECTS AND MUCH SMOOTHER THAN TYPICAL ASPHALT STREETS.

100. P06 PREFORMANCE BOND: ALL SUBCONTRACTORS SHALL PROVIDE TO THE PRIME CONTRACTOR A PERFORMANCE BOND FOR THE WORK THEY WILL PERFORM ON THIS PROJECT. A COPY OF THAT BOND WILL BE PRESENTED TO THE ENGINEER. NO PAYMENT WILL BE MADE FOR ANY WORK DONE BY A SUBCONTRACTOR WHO IS NOT BONDED TO THE PRIME CONTRACTOR. THE PERFORMANCE BOND FOR EACH SUBCONTRACTOR SHALL BE CONSIDERED INCIDENTAL TO THE ITEMS THAT THE SUBCONTRACTOR IS RESPONSIBLE FOR.

100. P07 PRODUCT CERTIFICATIONS: NO PAYMENT WILL BE MADE FOR ANY ITEM REQUIRING CERTIFICATIONS UNTIL THOSE CERTIFICATIONS HAVE BEEN RECEIVED BY THE ENGINEER. COMMON ITEMS REQUIRING CERTIFICATIONS ARE PIPE (BOTH CONCRETE AND CORRIGATED METAL), SEED, SIGNS, FENCE, AND VARIOUS OTHER ITEMS.

100. P08 TESTING: THE CONTRACTOR SHALL PROVIDE AN APPROVED INDEPENDENT TESTING LABORATORY, WHO SHALL BE RESPONSIBLE FOR THE TESTING OF THE SUBGRADE, ASPHALT PAVING, AND CONCRETE. ALL TESTING LOCATIONS WILL BE SELECTED BY THE ENGINEER. ALL TEST RESULTS SHALL BE PROVIDED TO THE ENGINEER FOR APPROVAL. ALL TESTING COSTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

100. P09 MAINTAINING ACCESS: THE CONTRACTOR SHALL MAINTAIN ACCESS TO ALL BUSINESSES ALONG THE PROJECT CORRIDOR AT ALL TIMES.

100. P10 COMPLETION DATE: THE TRAIL SHALL BE COMPLETED ON OR PRIOR TO OCTOBER 15, 1999.

200. EARTHWORK

201. 0295 CLEARING AND GRUBBING: CLEARING AND GRUBBING SHALL BE PERFORMED PRIOR TO THE LANDSCAPE PREPARATION BID ITEM AND SHALL INCLUDE THE REMOVAL OF BRUSH, DEAD FALL, ROCKS, TREE LIMBS AND BRANCHES. THE WIDTH SHALL BE NO LESS THAN 10 FEET ON EITHER SIDE OF THE TRAIL CENTERLINE OUT TO A MAXIMUM OF 5 FEET BEYOND THE CUT OR FILL TOES AS SHOWN ON THE CROSS SECTIONS. TREE LIMBS AND BRANCHES SHALL BE TRIMMED TO A HEIGHT OF 8 FEET ABOVE THE TRAIL, AND A HORIZONTAL DISTANCE OF 8 FEET FROM THE TRAIL CENTERLINE. ALL MATERIAL, LABOR AND INCIDENTAL ITEMS REQUIRED TO COMPLETE THIS ITEM SHALL BE INCLUDED IN THE BID PRICE PER LINEAL FOOT OF CLEARING AND GRUBBING.

201. 0370 0380 0390 REMOVAL OF TREES (SIZE): THE CONTRACTOR SHALL DISPOSE OF ALL TREES OFF SITE. DISPOSAL COSTS SHALL BE INCLUDED IN THE PRICE FOR REMOVAL OF TREES (SIZE). IF THE CONTRACTOR REMOVES ANY TREES, OR DAMAGES ANY TREES BEYOND THE REMOVAL LIMITS, AS STAKED BY THE ENGINEER, THOSE TREES WILL BE REPLACED, ON A TWO TO ONE BASIS, AT THE CONTRACTORS EXPENSE. STUMPS SHALL BE REMOVED TO A DEPTH OF 30 INCHES BELOW EXISTING GRADE LINE. GRINDING OF STUMPS MAY BE SUBSTITUTED FOR STUMP REMOVAL PROVIDED CONTRACTOR DEMONSTRATES THAT THE STUMP IS OBLITERATED THROUGH GRINDING. REMOVAL OF TREES (SIZE), SHALL BE ON A PER EACH BASIS AND SHALL INCLUDE STUMP REMOVAL, AND ALL OTHER COSTS ASSOCIATED WITH THIS ITEM.

201. 0395 STUMP REMOVAL: STUMP REMOVAL SHALL APPLY TO ANY EXISTING STUMP WITHIN THE PROJECT COORIDOR WHICH NEEDS TO BE REMOVED. REMOVAL OF THESE STUMPS SHALL BE PERFORMED AS STATED IN THE PREVIOUS NOT, "REMOVAL OF TREES (SIZE) AND SHALL INCLUDE ALL COSTS ASSOCIATED WITH THE REMOVAL OF THESE EXISTING STUMPS.

203. P01 COMMON EXCAVATION, TYPE A: PAYMENT FOR COMMON EXCAVATION SHALL BE IN ACCORDANCE WITH SECTION 203.03.B OF THE STANDARD SPECIFICATIONS (CONTRACT QUANTITY).

203. 0109 TOPSOIL: TOPSOIL WILL BE REMOVED TO A DEPTH OF 3 INCHES MAXIMUM AND TO A WIDTH AS SHOWN ON THE CROSS SECTIONS. ALL REMOVED TOPSOIL SHALL BE REPLACED AND RAKED TO GRADE PRIOR TO SEEDING. ADDITIONAL RAKING MAY BE REQUIRED AFTER SEEDING TO ELIMINATE SCALPING BY MOWERS. THE BID PRICE FOR TOPSOIL SHALL INCLUDE ALL COSTS ASSOCIATED WITH REMOVAL AND REPLACEMENT OF THE TOPSOIL.

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203.0119 TOPSOIL-IMPORTED: THE CONTRACTOR SHALL IMPORT TOPSOIL FROM AN APPROVED SOURCE. TOPSOIL WILL BE PLACED ALONG BOTH SIDES OF THE TRAIL. IT IS RECOMMENDED THAT THE CONTRACTOR BRING IN THE TOPSOIL PRIOR TO THE PAVING OPERATION, AS NO VEHICLES WILL BE ALLOWED TO ACCESS THE TRAIL FOR TOPSOIL PLACEMENT AFTER THE PLACEMENT OF THE PAVEMENT. TOPSOIL-IMPORTED WILL BE MEASURED BY THE CUBIC YARD USING THE LEGAL LOAD LIMIT VOLUME OF THE TRUCK. THE COST PER CUBIC YARD OF TOPSOIL-IMPORTED SHALL INCLUDE THE COST OF THE TOPSOIL, HAULING, PLACEMENT, RAKING, LABOR, EQUIPMENT, AND ALL OTHER COSTS ASSOCIATED WITH THE COMPLETION OF THIS ITEM.

203.0140 BORROW: BORROW SHALL BE OBTAINED FROM AN OFF SITE SOURCE. THE BORROW SITE SHALL BE APPROVED IN ACCORDANCE WITH SECTION 107.04.B OF THE STANDARD SPECIFICATIONS. MATERIAL SHALL BE APPROVED BY THE ENGINEER PRIOR TO BEING BROUGHT ON SITE. BORROW SHALL BE PLACED IN ACCORDANCE WITH SECTION 203.02.G OF THE STANDARD SPECIFICATIONS. BORROW SHALL BE MEASURED BY THE CUBIC YARD USING THE LEGAL LOAD LIMIT VOLUME OF THE TRUCK. COMPACTION SHALL BE AT $\pm 2\%$ OF OPTIMUM MOISTURE AND 92% OF MAXIMUM DENSITY BASED ON AASHTO T-99. TESTS SHALL BE TAKEN AT 2 PER 500 FEET FOR EACH 8 INCH LIFT, WITH TEST LOCATIONS SELECTED AT RANDOM BY THE ENGINEER. THE BID PRICE PER CUBIC YARD OF BORROW SHALL INCLUDE ALL COSTS ASSOCIATED WITH OBTAINING, HAULING, PLACING, LABOR, EQUIPMENT, AND ALL OTHER ITEMS REQUIRED TO COMPLETE THIS ITEM.

230.0183 SUBGRADE PREPARATION-TYPE B-6IN: THE SUBGRADE SHALL BE SCARIFIED TO A MINIMUM DEPTH OF 6 INCHES, COMPACTED, AND SHAPED TO THE SECTION REQUIRED. COMPACTION SHALL BE AS STATED IN THE PREVIOUS NOTE, 203-0140, BORROW, WITH 2 TESTS PER 500 FEET. ALL COSTS ASSOCIATED WITH THE PREPARATION OF THE SUBGRADE SUCH AS SHAPING, SCARIFYING, COMPACTING, AND TESTING SHALL BE INCLUDED IN THE LINEAL FOOT BID PRICE FOR SUBGRADE PREPARATION-TYPE B-6IN.

300. BASES

302.0301 RECYCLED BASE COURSE: RECYCLED BASE COURSE WILL BE ONE OF THE FOLLOWING:

- 4 INCHES OF SALVAGED BITUMINOUS BASE COURSE;
- 4 INCHES OF SALVAGED CONCRETE BASE COURSE (FREE OF REBAR OR OTHER METAL);
- 4 INCHES BLENDED MATERIAL USING EITHER BITUMINOUS OR CONCRETE WITH CLASS 5 AGGREGATE, BLENDED AT 50 - 50;
- 4 INCHES OF CLASS 5 AGGREGATE;

IF THE CONTRACTOR CHOOSES TO USE A BLENDED BASE COURSE, ALL BLENDING WILL BE COMPLETED PRIOR TO BRINGING THE MATERIAL ONTO THE PROJECT SITE.

THE SALVAGED BITUMINOUS AND SALVAGED CONCRETE BASE MATERIAL SHALL MEET THE FOLLOWING GRADATION:

SQUARE MESH SIEVE SIZE	PERCENT BY WEIGHT PASSING
1-3/4"	100
3/4"	70-100
NO. 4	38-75
NO. 30	12-37
NO. 200	0-12
CLAY AND SOFT PARTICLES	8% MAXIMUM

PAYMENT WILL BE BASED ON A WIDTH OF 1 FOOT WIDER THAN THE PAVEMENT WIDTH AND A DEPTH OF 4 INCHES AS SHOWN ON THE TYPICAL SECTIONS. ANY BASE

MATERIAL BEYOND THIS WIDTH WILL BE DEDUCTED FROM THE TOTAL QUANTITY USING 1.85 TONS/C.Y. AS THE BASIS FOR CONVERSION TO TONS. COMPACTION OF THE BASE SHALL BE IN ACCORDANCE WITH SECTION 203.02H OF THE NDDOT STANDARD SPECIFICATIONS.

400. BITUMINOUS PAVEMENT

408.0170 HOT BITUMINOUS PAVEMENT, CL. 27: THE CONTRACTOR SHALL HAVE AN INDEPENDENT TESTING LABORATORY PERFORM ALL MARSHALL MIX DESIGNS WITH THE AGGREGATE AND ASPHALT TO BE USED FOR THE PROJECT. THE MIX DESIGN SHALL BE SENT TO THE ENGINEER FOR APPROVAL 2 WEEKS PRIOR TO PAVING. THE COST SHALL BE INCLUDED IN THE PER TON BID PRICE FOR "HOT BITUMINOUS PAVEMENT, CL. 27". THE MIX DESIGN SHALL MEET THE FOLLOWING REQUIREMENTS:

STABILITY (MINIMUM) LBS.	1,000
FLOW (HUNDREDTH OF AN INCH)	10-20
PERCENT AIR VOIDS (%)	1-5

THE CONTRACTOR SHALL FURNISH SAMPLES AND INFORM THE ENGINEER TWO WEEKS PRIOR TO PRODUCTION OF ANY STOCKPILES AS TO THE SOURCE OF AGGREGATE USED IN THE MIX DESIGN. ANY CHANGES IN AGGREGATE SOURCES, ASPHALT SOURCES OR OPERATIONS SHALL REQUIRE NEW OR ADDITIONAL MARSHALL MIX DESIGNS AT THE CONTRACTORS' EXPENSE.

OTHER THAN THE MIX DESIGN PROVISIONS OUTLINED HEREIN, ALL OTHER PROVISIONS OF SECTION 408.04B SHALL REMAIN IN FORCE.

408.0170 ORDINARY COMPACTION OF HOT BITUMINOUS PAVEMENT: COMPACTION SHALL BE IN ACCORDANCE WITH SECTION 408.041.2 OF THE STANDARD SPECIFICATIONS, 1997, MODIFIED AS FOLLOWS; THE CONTRACTOR SHALL USE ONE SELF PROPELLED ROLLER SUCH AS A SINGLE DRUM (BOMAG BW 172) OR DOUBLE DRUM (BOMAG BW120) STEEL ROLLER OF ADEQUATE SIZE TO OBTAIN COMPACTION WITHOUT DAMAGE TO THE TRAIL SURFACE OR THE SUBGRADE.

408.P01 HOT BITUMINOUS PAVEMENT: THE FINISHED TRAIL SHALL HAVE A SMOOTH SURFACE; FREE OF SURFACE IRREGULARITIES THAT WOULD CAUSE A HARSH OR UNDESIRABLE RIDE, OR WOULD COMPROMISE THE SAFETY OF TRAIL USERS. SURFACE IRREGULARITIES MAY INCLUDE, BUT ARE NOT LIMITED TO INDENTATIONS, BROKEN EDGES, GROOVES, BLOW-UPS, POP-OUTS, IMPRINTS FROM HEAVY EQUIPMENT TRACKS OR TIRES, ETC. ANY ISOLATED TRIP HAZARDS OF 1/4 INCH OR GREATER HEIGHT OR DEPTH SHALL BE ELIMINATED BY METHODS TO BE APPROVED BY THE ENGINEER. THE FINISHED TRAIL SHALL NOT BE CAPABLE OF HOLDING STANDING WATER ON ANY PORTION. ANY TRAIL SURFACE DETERMINED TO BE IN NONCONFORMANCE WITH THE ABOVE SPECIFICATIONS SHALL BE OVERLAID WITH A ONE INCH MINIMUM DEPTH LIFT OF FINES AT THE CONTRACTOR'S EXPENSE. PRIOR TO ANY OVERLAY, THE TRAIL WILL BE THOROUGHLY SWEEPED, ALL IRREGULARITIES CLEANED, AND THE TRAIL TACKED, ALL AT THE CONTRACTORS' EXPENSE.

SURFACE TENSION CRACKING WILL BE KEPT TO A MINIMUM BY MONITORING THE ROLLING, SURFACE TEMPERATURE, AND IF NEED BE, ADJUSTING THE OIL CONTENT. ADJUSTING THE OIL CONTENT IN THE MIX WILL ONLY BE DONE WITH PERMISSION BY THE ON-SITE ENGINEER.

409.0445 PG 58-28 ASPHALT CEMENT: THE HOT BITUMINOUS PAVEMENT, CLASS 27 SHALL HAVE A MAXIMUM ASPHALT CONTENT OF 7.0%.

CONSTRUCTION NOTES

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700. TRAFFIC CONTROL

704. 100 FLAGGING: FLAGGING HAS BEEN PROVIDED FOR USE DURING THE HAULING OF BORROW, BASE MATERIAL, HOT BITUMINOUS PAVEMENT, AND IMPORTED TOPSOIL SO AS TO NOTIFY THE TRAVELING PUBLIC OF TRUCKS ENTERING AND LEAVING THE ROAD AT VARIOUS LOCATIONS. FLAGGING WILL BE PAID FOR AT AN HOURLY RATE PER FLAGGER AND SHALL INCLUDE ALL TRAINING AND OTHER INCIDENTALS ASSOCIATED WITH THIS ITEM.

708. 2331 SEEDING, TYPE B SPECIAL: THE TRAIL SHALL BE SEEDED WITH THE FOLLOWING MIXTURE: WESTERN WHEAT GRASS (RODAN VARIETY) AT 25 LBS. PURE LIVE SEED PER ACRE, THICKSPIKE WHEAT GRASS (CRITANA VARIETY) AT 16 LBS. PURE LIVE SEED PER ACRE, AND SLENDER WHEAT GRASS (REVNUE VARIETY) AT 10 LBS. PURE LIVE SEED PER ACRE. SEED SHALL BE PLACED WITH A DRILL UNLESS OTHERWISE APPROVED BY THE ENGINEER. ALL SLOPES 2:1 AND STEEPER SHALL BE BROADCAST AND RAKED BY HAND. THE COST OF THE SEED, DRILL, RAKING OF TOPSOIL NEXT TO THE TRAIL, FIRING OF THE AREA, AND ALL OTHER INCIDENTALS SHALL BE INCLUDED IN THE PER ACRE BID PRICE FOR SEEDING, TYPE B SPECIAL. RAKES, DRILL, AND OTHER EQUIPMENT SHALL NOT BE DRAGGED OVER OR ACROSS THE FINISHED ASPHALT TRAIL.

708. 5700 WOOD EXCELSIOR FIBERMAT: WOOD EXCELSIOR FIBERMAT SHALL BE PLACED ALONG THE TRAIL THAT PARALLELS MCKENZIE DRIVE. PRIOR TO PLACEMENT, THE AREAS SHALL BE SEEDED WITH A GRASS MIXTURE AS STATED IN 708.2331, SEEDING, TYPE B SPECIAL. THE MAT WILL COMPLY WITH THE SPECIFICATIONS AS STATED IN SECTION 856.01 OF THE NDDOT STANDARD SPECIFICATIONS. WOOD EXCELSIOR FIBERMAT WILL BE PAID FOR BY THE SQUARE YARD IN PLACE WITH NO LAPS OR SEAMS AND SHALL INCLUDE ALL COSTS ASSOCIATED WITH INSTALLING THIS ITEM IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.

754. 0601 REMOVE AND RESET SIGNS: TRAFFIC SIGNS WILL BE REMOVED AND RESET AS INDICATED ON THE PLANS. EACH SIGN THAT IS RESET WILL BE REQUIRED TO HAVE A NEW BASE. THE NEW BASE, AND ALL EQUIPMENT, LABOR, AND INCIDENTALS SHALL BE INCLUDED IN THE PER EACH BID PRICE FOR REMOVE AND RESET SIGNS.

754. P01 SIGNS: THE SIGNS SHALL BE ENGINEER GRADE. THE PER EACH BID PRICE FOR SIGNS SHALL INCLUDE THE POST AND ALL OTHER MATERIALS, EQUIPMENT, AND LABOR TO INSTALL THE SIGNS IN THE LOCATIONS SHOWN ON THE PLANS. THE POSTS SHALL BE 2-1/4" X 2-1/4" SQUARE TUBE PERFORATED WITH 2-1/2" BASE/SPADE. THE SIGNS SHALL BE ATTACHED TO THE POSTS WITH RIVETS.

PERMANENT TRAFFIC SIGNING WILL BE INSTALLED BY THE CONTRACTOR AS INDICATED IN THE FOLLOWING SIGN LIST:

SIGN LIST - 46TH AVENUE SE TRAIL

STATION	LOCATION	SIGN NO.	DESCRIPTION	QUANTITY
0+18	9' LT.	W11-1A	BICYCLE CROSSING	1
0+20	9' RT.	R1-1	STOP	1
0+60	250' RT.	W11-1	ADVANCE BICYCLE CROSSING	1
0+68	9' RT.	W11-1A	BICYCLE CROSSING	1
0+85	9' LT.	R1-1	STOP	1
0+88	9' RT.	R5-3	NO MOTOR VEHICLES	1
1+19	9' LT.	D11-1	BIKE ROUTE	1
1+19	9' LT.	M7-1L	ARROW LEFT	1
17+78	9' LT.	R5-3	NO MOTOR VEHICLES	1
18+39	9' RT.	R5-3	NO MOTOR VEHICLES	1
21+75	9' LT.	R5-3	NO MOTOR VEHICLES	1
21+79	32' LT.	W11-1	ADVANCE BICYCLE CROSSING	1

STATION	LOCATION	SIGN NO.	DESCRIPTION	QUANTITY
21+79	9' RT.	R1-1	STOP	1
22+38	9' LT.	R1-1	STOP	1
22+46	9' RT.	R5-3	NO MOTOR VEHICLES	1
24+10	9' LT.	R5-3	NO MOTOR VEHICLES	1
24+10	9' RT.	D11-1	BIKE ROUTE	1
24+10	9' RT.	M7-6L	ARROW AHEAD & LEFT	1
24+35	32' LT.	W11-1A	BICYCLE CROSSING	1
24+47	9' RT.	D11-1	BIKE ROUTE	1
24+47	9' RT.	M7-5	ARROW LEFT & RIGHT	1
24+55	22' LT.	R1-1	STOP	1
24+55	65' LT.	W11-1A	BICYCLE CROSSING	1
24+59	9' RT.	R1-1	STOP	1
24+92	9' LT.	R1-1	STOP	1
24+95	9' RT.	R5-3	NO MOTOR VEHICLES	1
26+35	9' RT.	R5-3	NO MOTOR VEHICLES	1
26+70	9' LT.	R5-3	NO MOTOR VEHICLES	1
26+92	46' LT.	W11-1	ADVANCE BICYCLE CROSSING	1
29+14	250' LT.	W11-1	ADVANCE BICYCLE CROSSING	1
28+98	1' LT.	W11-1A	BICYCLE CROSSING	1
29+15	4 AHD.	R1-1	STOP	1

SIGN LIST - MCKENZIE DRIVE SE TRAIL

STATION	LOCATION	SIGN NO.	DESCRIPTION	QUANTITY
0+05	9' LT.	R1-1	STOP	1
0+55	9' RT.	R5-3	NO MOTOR VEHICLES	1
0+73	9' LT.	D11-1	BIKE ROUTE	1
0+73	9' LT.	M7-1R	ARROW RIGHT	1
5+27	9' RT.	W1-2R	CURVE RIGHT	1
6+09	9' LT.	R5-3	NO MOTOR VEHICLES	1
6+09	9' LT.	D11-1	BIKE ROUTE	1
6+31	9' LT.	R1-1	STOP	1
7+18	9' LT.	W1-2L	CURVE LEFT	1

766. 0100 MAILBOX-ALL TYPES: AT STATION 22+38, 9' LT., A GROUPING OF MAILBOXES MOUNTED ON A WOOD PLANK SUSPENDED BETWEEN TWO WOOD POST WILL NEED TO BE RELOCATED TO STATION 22+38, 12' LT. ALL COSTS ASSOCIATED WITH RELOCATING THIS MAILBOX UNIT SHALL BE INCLUDED IN THE PER EACH BID PRICE FOR MAILBOX-ALL TYPES. THE CONTRACTOR SHALL TAKE CARE IN REMOVING THE EXISTING STRUCTURE SO AS TO REUSE THE EXISTING POSTS AND PLANK.

900. ADDITIONAL ITEMS

920. 1216 GEOGRID: THE CONTRACTOR SHALL PLACE GEOGRID IN THOSE AREAS AS INDICATED ON THE PLANS. THE GEOGRID SHALL BE PLACED AND ANCHORED THEN THE CONTRACTOR SHALL START PLACING THE FILL OVER THE GEOGRID. AT NO TIME SHALL ANY EQUIPMENT BE DRIVEN ON THE GEOGRID BEFORE BACKFILLING OR ON THE SURROUNDING GROUND. BACKFILL MATERIAL SHALL BE END DUMPED OR PUSHED ONTO THE GEOGRID TO THE DEPTH SHOWN ON THE DETAIL.

THE GEOGRID SHALL BE OVERLAPPED AT THE SEAMS A MINIMUM OF ONE FOOT OR AS RECOMMENDED BY THE SUPPLIER. ANY DAMAGED GEOGRID SHALL BE REMOVED AND A NEW PIECE INSTALLED OVER THE AREA DAMAGED. THE NEW GEOGRID SHALL LAP THE DAMAGED AREA IN ALL DIRECTIONS BY THREE FEET. GEOGRID SHALL BE PLACED AND OVERLAPPED IN THE DIRECTION THAT THE FILL IS TO BE PLACED. THE GEOGRID SHALL BE SECURED AT THE "UPSTREAM" ROLL ENDS ONLY BY DRIVING STAKES,

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CONSTRUCTION NOTES

STAPLES, HOOKS OR NAILS WITH WASHERS THROUGH THE GRID APERTURES AND INTO THE GROUND.

GEOGRID SHALL MEET THE FOLLOWING REQUIREMENTS WITH THE CONTRACTOR SUBMITTING TO THE ENGINEER A SAMPLE OF THE GEOGRID, CERTIFIED SPECIFICATION SHEETS WITH TEST RESULTS AS SPECIFIED IN THE CHART BELOW AND RECOMMENDED INSTALLATION INSTRUCTIONS.

STRUCTURAL GEOGRID PROPERTIES

PROPERTY	TEST METHOD	UNITS	VALUE
APERTURE SIZE	I.D. CALIPERED	INCHES	3/4 - 1-1/2
OPEN AREA	CORP OF ENGINEERS CW-2215	%	70 MIN.
RIB THICKNESS	ASTM D 1777-64	INCH	0.05 NOM.
JUNCTION THICKNESS	ASTM D 1777-64	INCH	0.16 NOM.
SECANT APERTURE STABILITY MODULES @ 20 cm-kg	GRID APERTURE TEST-UNIVERSITY OF ALASKA, FAIRBANKS	cm-kg/deg	6.50 MIN.
FLEXURAL RIGIDITY MACHINE DIRECTION	ASTM D 1388-64	mg-cm	750,000 MIN.
TENSILE MODULES	GRI GG1-87	lb/ft	18,500 MIN-MACHINE DIRECTION 30,000 MIN.-CROSS MACHINE DIRECTION
JUNCTION STRENGTH	GRI GG2-87	lb/ft	1080 MIN.
JUNCTION EFFICIENCY	GRI GG2-87	%	90 MIN.

THE GEOGRID SHALL BE MEASURED IN PLACE BY THE SQUARE YARD OF AREA COVERED WITH NO ALLOWANCES FOR LAPS OR SEAMS. PAYMENT SHALL BE AT THE CONTRACT PRICE PER SQUARE YARD AND SHALL INCLUDE ALL MATERIALS, LABOR, EQUIPMENT, TOOLS AND OTHER INCIDENTAL ITEMS NECESSARY TO PLACE THE GEOGRID AS SHOWN ON THE PLANS.

970. 0005 LANDSCAPE PREPARATION: PRIOR TO APPLYING ROUNDUP, THE CONTRACTOR SHALL REMOVE ANY ROCKS, DEADFALL, AND GARBAGE FROM THE TRAIL CORRIDOR. THE CONTRACTOR SHALL APPLY ROUNDUP TO THE TRAIL CONSTRUCTION CORRIDOR 10 DAYS PRIOR TO MOWING/MULCHING OF THE CORRIDOR. GRASSES WILL BE MULCHED TO WITHIN 1 INCH OF THE EXISTING GROUND, USING A MULCHING MOWER CAPABLE OF PRODUCING STANDS OF 1 INCH OR LESS IN LENGTH.

970. 110 HERBICIDE WEED CONTROL: THE CONTRACTOR SHALL PLACE A GRANULAR HERBICIDE IN THE AREAS WHERE THE HOT BITUMINOUS PAVEMENT TRAIL WILL BE PLACED. THE HERBICIDE SHALL BE PLACED TO THE WIDTH SHOWN ON THE TYPICAL SECTIONS, (CENTERED ON THE TRAIL CENTERLINE AND INCORPORATED INTO THE SUBGRADE PRIOR TO PLACEMENT OF THE BASE MATERIAL). THE CONTRACTOR SHALL USE NOROSAC 106 AT AN APPLICATION RATE OF 100 - 120 LBS. PER ACRE OR 2.3 - 2.8 LBS. PER 1,000 SF., OR DYCLOMEC 46 AT AN APPLICATION RATE OF 250-300 LBS. PER ACRE OR 5.75-7.0 LBS. PER 1,000 SF., OR AN APPROVED EQUAL. THE HERBICIDE SHALL BE PLACED IMMEDIATELY AHEAD OF THE PLACEMENT OF THE RECYCLED ASPHALT BASE COURSE. COST OF MATERIALS, EQUIPMENT, LABOR AND

INCIDENTALS TO COMPLETE THIS ITEM SHALL BE INCLUDED IN THE BID PRICE PER LINEAL FOOT OF HERBICIDE WEED CONTROL MEASURED ALONG THE TRAIL CENTERLINE.

970. 1000 TREES: THE CONTRACTOR SHALL USE CITY OF BISMARCK FORESTRY DEPARTMENT SPECIFICATIONS FOR TREE AND SHRUB PLANTING. REPLACEMENT SHALL BE ON A 1-FOR-1 BASIS. THE CONTRACTOR SHALL USE BARE ROOT STOCK, WITH A MINIMUM TRUNK DIAMETER OF 1-1/2 INCHES. THE FOLLOWING TYPES AND NUMBERS WILL BE USED:

GREEN ASH	6 EACH
BLACK ASH	5 EACH
AMUR MAPLE	5 EACH
FLOWERING CRAB	5 EACH
AMUR CHOKECHERRY	5 EACH

ALL TREES WILL BE PLANTED IN THE VICINITY OF THE PRAIRIE WEST GOLF COURSE OR DACOTAH CENTENNIAL PARK AS DIRECTED BY THE ENGINEER AND MANDAN PARKS AND RECREATION. BID PRICE PER TREE SHALL INCLUDE THE COST OF THE TREES, TRANSPORTING AND PLANTING OF THE TREES, MULCH AROUND THE TREES, WATERING OF THE TREES AND PROPER MAINTENANCE DURING THE WARRANTY PERIOD OF ONE YEAR AS SPECIFIED IN THE ABOVE MENTIONED SPECIFICATION.

ESTIMATE OF QUANTITIES

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MANDAN 46TH AVENUE SE BIKE TRAIL ESTIMATE OF QUANTITIES				
SPEC	CODE	ITEM	UNIT	QUANTITY
103	0100	CONTRACT BOND	LS	0.6
201	0295	CLEARING AND GRUBBING	LF	1315
201	0370	REMOVAL OF TREES 10IN	EA	12
201	0380	REMOVAL OF TREES 18IN	EA	10
201	0390	REMOVAL OF TREES 30IN	EA	4
201	0395	STUMP REMOVAL	EA	5
202	0112	REMOVAL OF CONCRETE	SY	7
202	0119	SAW CONCRETE	LF	10
202	0130	REMOVAL OF CURB & GUTTER	LF	30
202	0137	REMOVAL OF PAVEMENT	SY	150
202	0153	SAW BITUMINOUS SURFACE-FULL DEPTH	LF	153
203	0101	COMMON EXCAVATION, TYPE A	CY	920
203	0109	TOPSOIL	CY	210
203	0119	TOPSOIL-IMPORTED	CY	100
203	0140	BORROW	CY	350
216	0100	WATER	MGAL	12
230	0183	SUBGRADE PREPARATION, TYPE B (6")	LF	3630
302	0301	RECYCLED BASE COURSE	TON	1050
408	0176	HOT BITUMINOUS PAVEMENT, CL 27	TON	730
409	0445	PG 58-28 ASPHALT CEMENT	TON	51
702	0100	MOBILIZATION	LS	0.6
704	0100	FLAGGING	MHR	40
704	1000	TRAFFIC CONTROL SIGNS	UNIT	294
704	1052	TYPE III BARRICADES	EA	6
704	1060	DELINEATOR DRUMS	EA	15
704	1065	TRAFFIC CONES	EA	20
708	2331	SEEDING, TYPE B SPECIAL	ACRE	3.5
708	5700	WOOD EXCELSIOR FIBERMAT	SY	1600
714	2161	PIPE CONC REINF ARCH 58" X 36" CL III	LF	40
714	3105	END SECT CONC REINF ARCH 58" X 36"	EA	2
714	5010	PIPE CORR STEEL .064IN 15IN	LF	20
714	5015	PIPE CORR STEEL .064IN 18IN	LF	10
714	5805	END SECT CORR STEEL .064IN 15IN	EA	2
714	5810	END SECT CORR STEEL .064IN 18IN	EA	1
748	0100	CURB & GUTTER	LF	153
750	0105	SIDEWALK CONCRETE BIKEWAY	SY	140
750	1025	DRIVEWAY CONCRETE 8 IN-HIGH EARLY STRENGTH	SY	105
752	0922	FENCE REMOVE & RESET	LF	18
754	0601	REMOVE & RESET SIGNS	EA	1
754	0635	12" X 9" SIGNS	EA	4
754	0640	24" X 18" SIGNS	EA	5
754	0650	18" X 18" SIGNS	EA	12
754	0655	24" X 24" SIGNS	EA	11
754	0690	30" X 30" SIGNS	EA	9
762	1124	PAVEMENT MARKINGS PAINTED 24" LINES	LF	480
766	0100	MAILBOX-ALL TYPES	EA	1
920	1216	GEOGRID	SY	340
970	0005	LANDSCAPE PREPARATION	LF	3630
970	0110	HERBICIDE WEED CONTROL	LF	3553
970	1000	TREES	EA	26

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BASIS OF ESTIMATE

BASIS OF ESTIMATE

BORROW

35% ADDITIONAL VOLUME HAS BEEN ADDED TO THE BORROW QUANTITY FOR SHRINKAGE.

WATER

6 GALLONS PER TON FOR RECYCLED BASE COURSE
5 GALLONS PER CUBIC YARD FOR BORROW
12 "M" GALLONS FOR DUST CONTROL

RECYCLED BASE COURSE

1.85 TON PER CUBIC YARD OF RECYCLED BASE COURSE
30 TON PER APPROACH HAS BEEN ADDED TO THE QUANTITIES FOR BASE

HOT BITUMINOUS PAVEMENT, CL. 27

2.00 TON PER CUBIC YARD OF HOT BITUMINOUS PAVEMENT, CL. 27
25 TON PER APPROACH HAS BEEN ADDED TO THE QUANTITIES FOR HBP CL 27

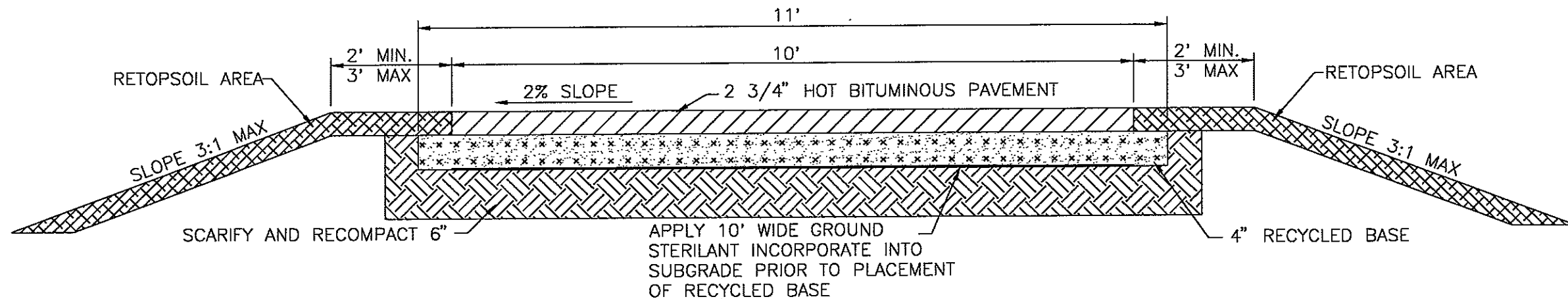
PG 58-28 ASPHALT CEMENT

7.0 % PG 58-28 ASPAHLT CEMENT PER TON OF HOT BITUMINOUS PAVEMENT,
CL. 27

STEEL GALVANIZED POST, 2-1/4" X 2-1/4" SQUARE PERFORATED

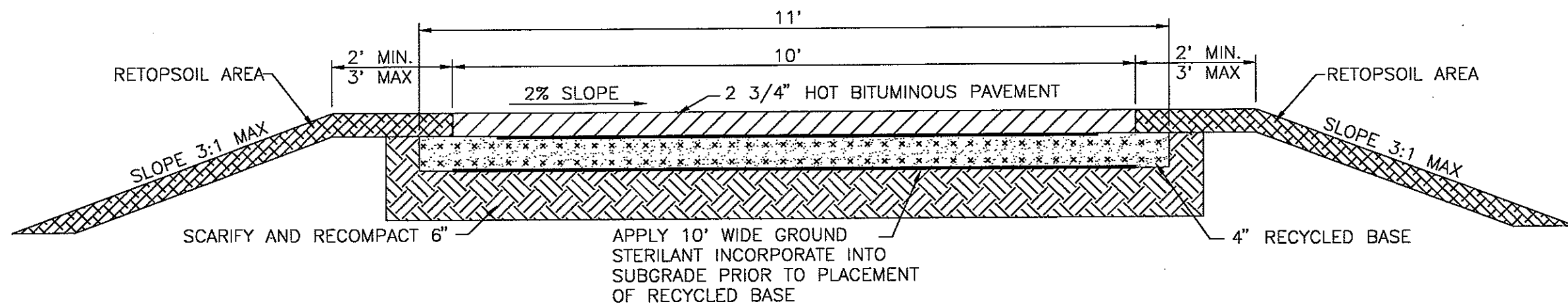
SIGNS D11-1 & W11-1	AVERAGE HEIGHT = 9'
SIGNS R1-2-24, R5-3, ECT.	AVERAGE HEIGHT = 7'
POST WITH DOULBE SIGNS	AVERAGE HEIGHT = 9'

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	ND	TEU-1-988(010)021	9
Kadmas Lee & Jackson		CITY OF MANDAN MANDAN, NORTH DAKOTA	
Consulting Engineers and Surveyors		DATE 1498021	DATE 2/5/99
		DRAWN BY T. KARY	
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TYPICAL TRAIL SECTION
 STA. 6+00 TO STA. 13+00 - 46TH AVE. SE
 STA. 17+00 TO STA. 27+80 - 46TH AVE. SE
 STA. 0+00 TO STA. 1+50 - McKENZIE DR.
 NO SCALE

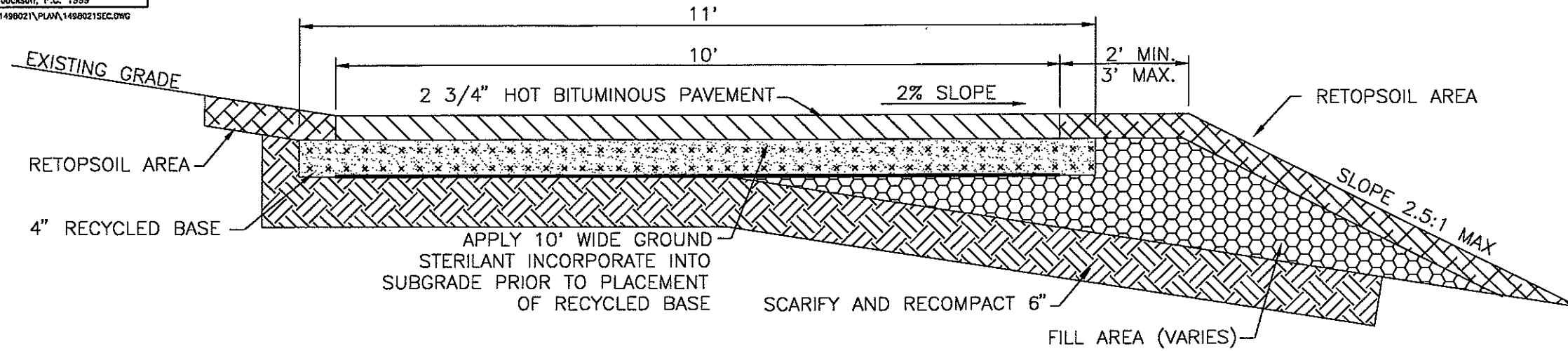
NOTE: CHANGE IN CROSS SLOPE TO BE TRANSITIONED IN 10' MIN. TRAIL LENGTH, EXACT LOCATION TO BE DETERMINED BY THE ENGINEER.



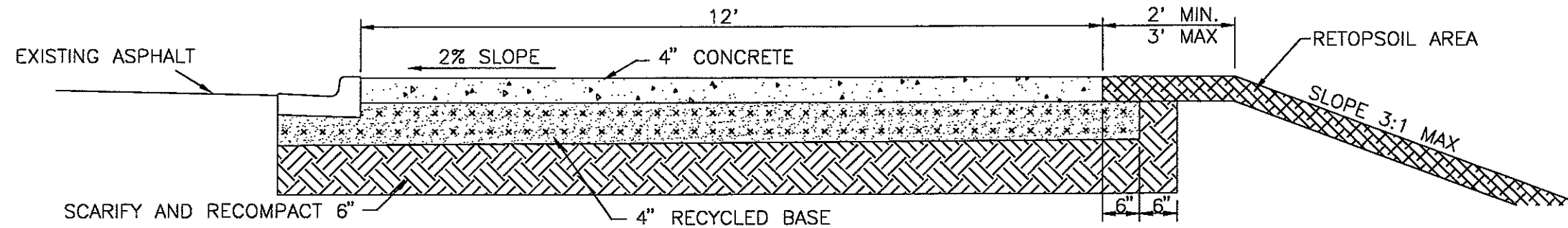
TYPICAL TRAIL SECTION
 STA. 0+00 TO STA. 6+00 - 46TH AVE. SE
 STA. 13+00 TO STA. 17+00 - 46TH AVE. SE
 STA. 1+50 TO STA. 2+00 - McKENZIE DR.
 NO SCALE

FIRMA REGION	STATE	PROJECT NO.	SHEET NO.
	ND	TEU-1-988(010)021	10
CITY OF MANDAN MANDAN, NORTH DAKOTA			
Kadmas Lee & Jackson Consulting Engineers and Surveyors		DWG. NO.: 1498021	DATE: 2/5/99
		DRAWN BY: T. KARY/TJR	CHECKED BY:
© Kadmas, Lee & Jackson, P.C. 1999			

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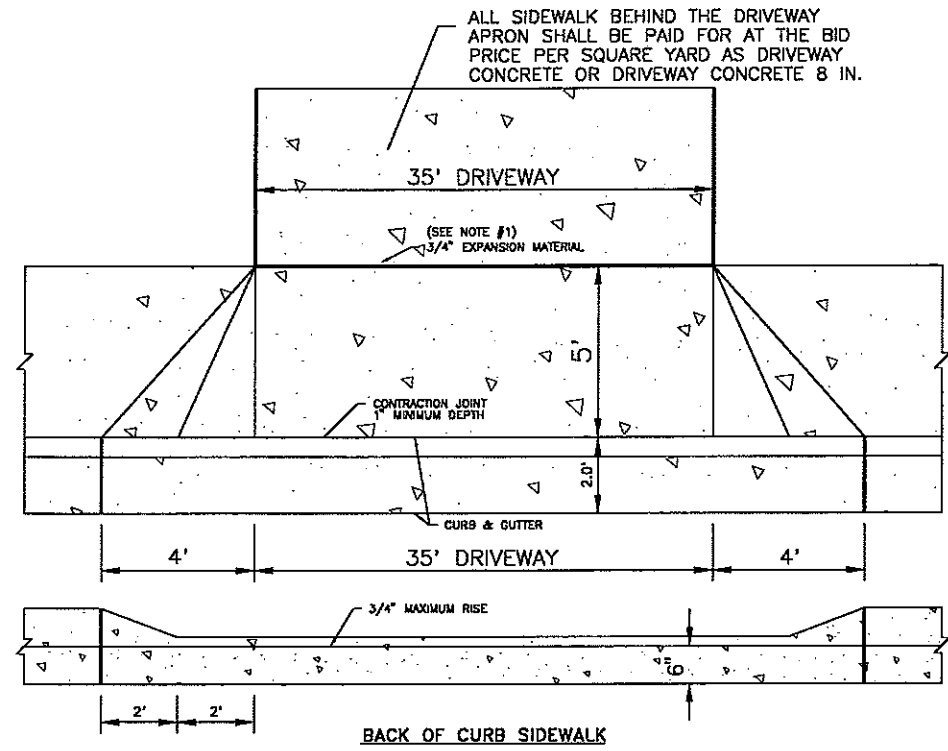
TYPICAL TRAIL SECTION - FILL AREA
 STA. 2+00 TO STA. 7+12 - McKENZIE DR.
 NO SCALE



TYPICAL TRAIL SECTION
 STA. 27+80 TO STA. 29+15 - 46TH AVE. SE
 NO SCALE

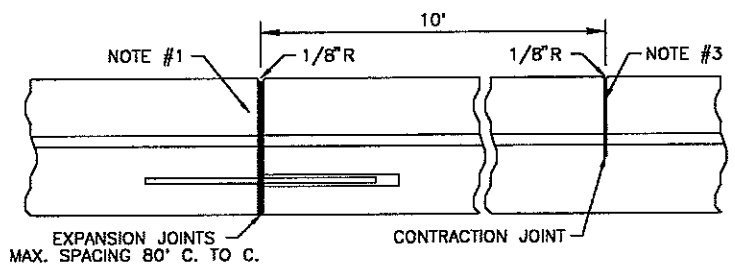
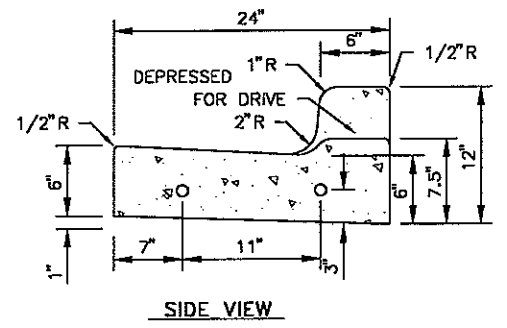
FWHA REGION	STATE	PROJECT NO.	SHEET NO.
	ND	TEU-1-988(010)021	11
Kadmas Lee & Jackson		CITY OF MANDAN MANDAN, NORTH DAKOTA	
Consulting Engineers and Surveyors		DATE	2/5/99
		CHIEF BY	T. KARY
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DETAILS

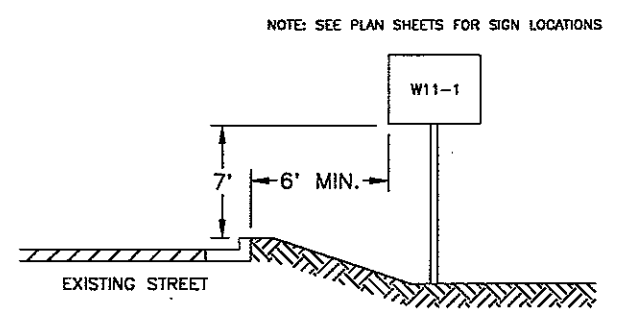
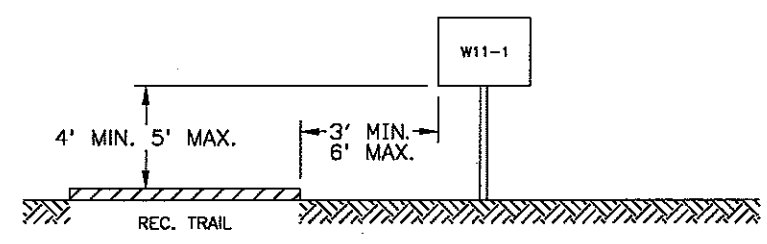


DRIVEWAY DETAIL
STA. 28+07 TO STA. 28+42 - 46TH AVE. SE
NO SCALE

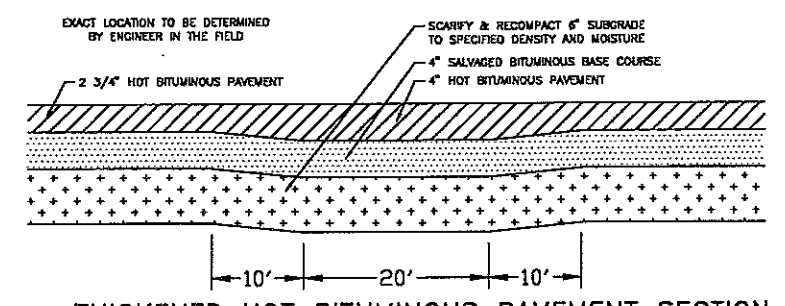
- 3/4" EXPANSION JOINT WITH 3/4"x24" SMOOTH DOWELS & 16" PAPER TUBES. DOWELS SHALL BE GREASED THE FULL LENGTH. ALL PAPER TUBES SHALL BE PLUGGED OR CRIMPED ON ONE END. ALL JOINTS SHALL BE SEALED.
- DOWELS SHALL BE SUPPORTED BY AN APPROVED SUPPORT MADE OF #7 AWG WIRE.
- CONTRACTION JOINT SCORED 1/3 THE DEPTH OF THE CONCRETE. ALL JOINTS SHALL BE SEALED.



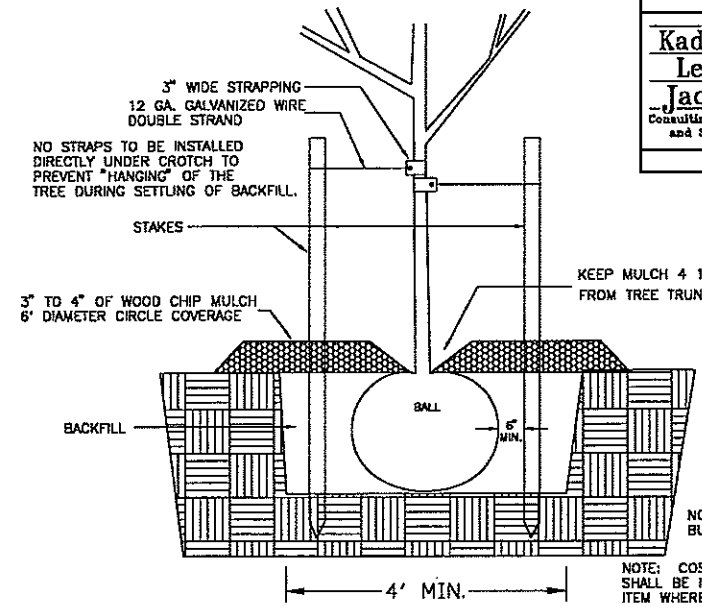
STANDARD CURB & GUTTER DETAIL
NO SCALE



TYPICAL SIGN POSITION DETAIL
NO SCALE



THICKENED HOT BITUMINOUS PAVEMENT SECTION
NO SCALE

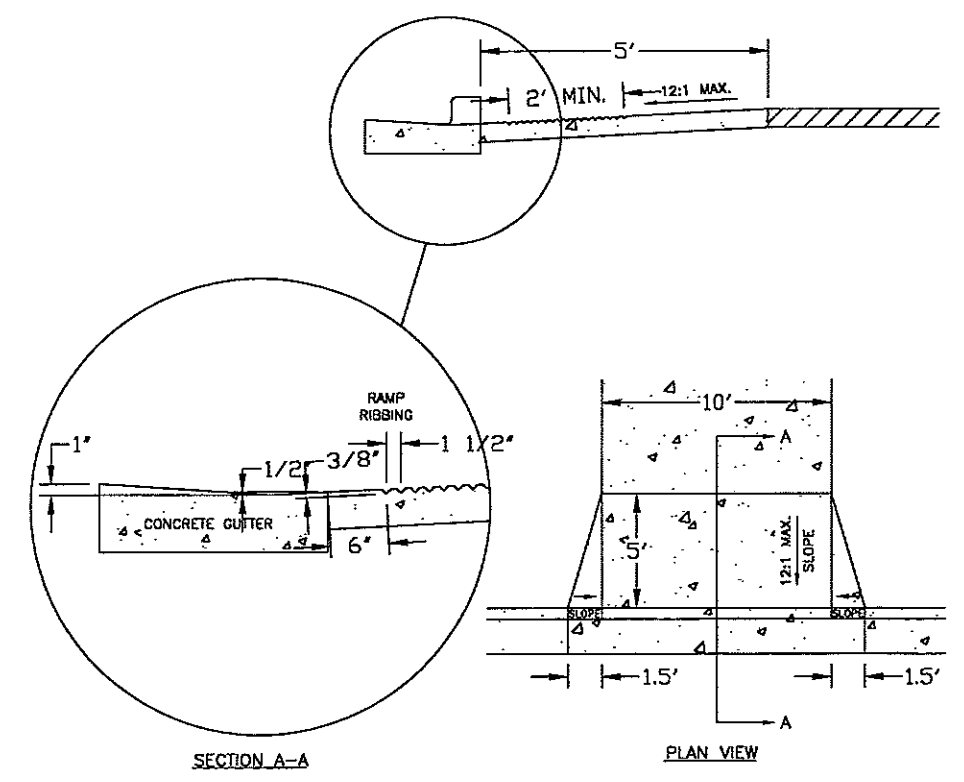


TREE PLANTING DETAIL
NO SCALE

TREE SHALL BEAR SAME RELATION TO FINISH GRADE AS IT BORE TO PREVIOUS EXISTING GRADE AT THE NURSERY.

NOTE: KEEP THE SOIL BALL OF BALLED AND BURLAPPED MATERIALS MOIST PRIOR TO PLANTING.

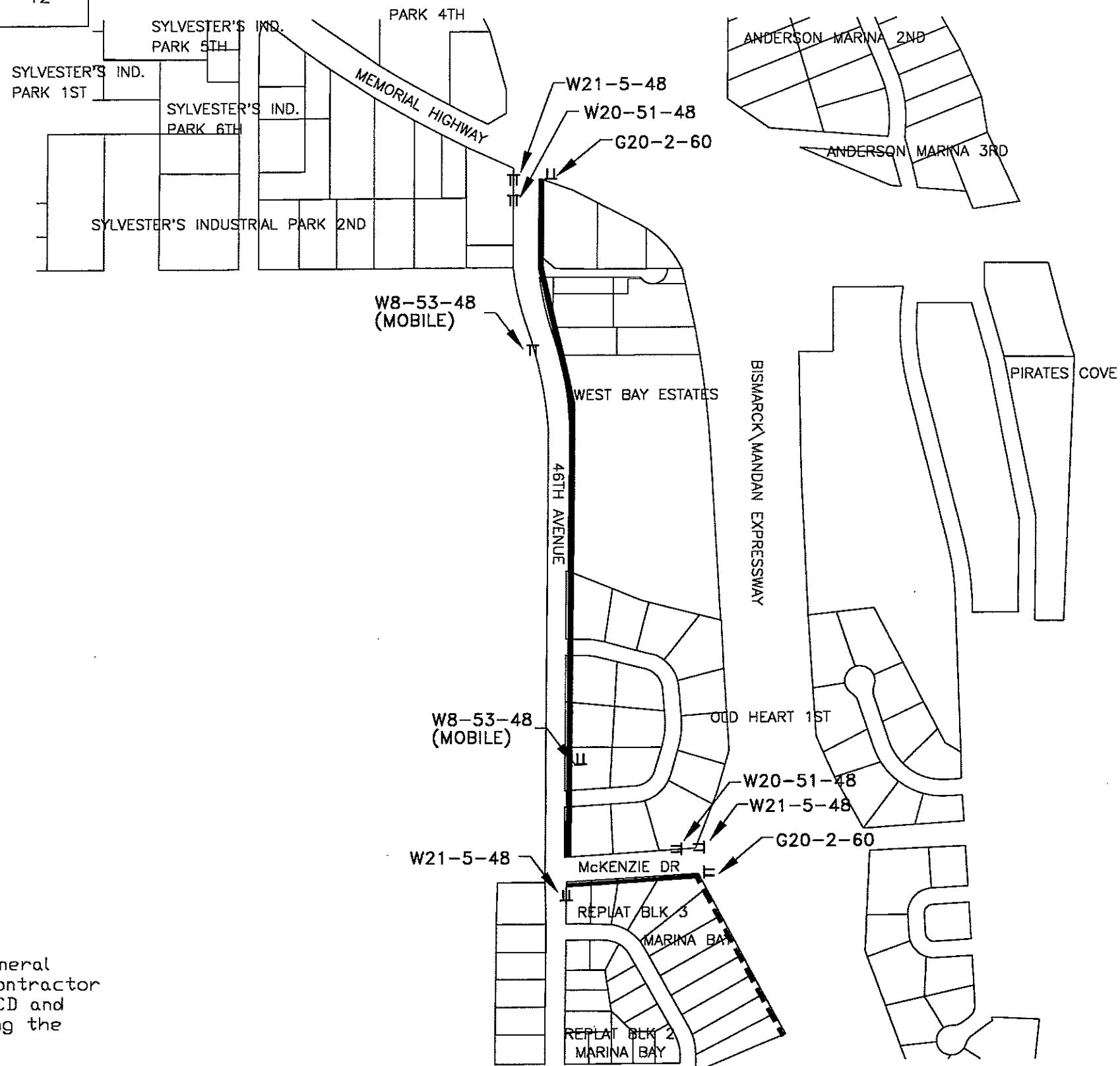
NOTE: COST OF MATERIAL, HARDWARE, AND INSTALLATION SHALL BE INCLUDED IN THE PRICE BID OF EACH ITEM WHERE STAKING IS REQUIRED.



WHEEL CHAIR RAMP DETAILS
NO SCALE

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SIGNING LAYOUT PLAN



The sign layout as shown is for general informational purposes only. The contractor will be required to conform to MUTCD and the Standard Drawings when installing the traffic control signing.

CONSTRUCTION SIGNING LIST

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SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB-TOTAL
R1-1-30	30" x 30"	STOP		17	
R1-1-48	48" x 48"	STOP		34	
R1-2-48	48" x 48"	YIELD TO ONCOMING TRAFFIC		45	
R2-1a-24	24" x 18"	MINIMUM FEE \$40		8	
R2-1-48	48" x 60"	SPEED LIMIT		40	
R2-5c-48	48" x 60"	SPEED ZONE AHEAD		40	
R4-1-48	48" x 60"	DO NOT PASS		40	
R4-7-48	48" x 60"	KEEP RIGHT SYMBOL		40	
R4-8-48	48" x 60"	KEEP LEFT SYMBOL		40	
R10-6-48	48" x 72"	STOP HERE ON RED		44	
R11-2-48	48" x 30"	ROAD CLOSED		26	
R11-2a-48	48" x 30"	STREET CLOSED		26	
R11-3a-60	60" x 30"	ROAD CLOSED _____ MILES AHEAD LOCAL TRAFFIC ONLY		30	
R11-3b-60	60" x 30"	BRIDGE OUT _____ MILES AHEAD LOCAL TRAFFIC ONLY		30	
R11-2a-48	48" x 30"	STREET CLOSED		26	
R11-3c-60	60" x 30"	STREET CLOSED _____ MILES AHEAD LOCAL TRAFFIC ONLY		30	
R11-4a-60	60" x 30"	STREET CLOSED TO THROUGH TRAFFIC		30	
G20-1a-60	60" x 24"	ROAD WORK NEXT _____ MILES		28	
G20-2-60	60" x 24"	END CONSTRUCTION	2	28	56
G20-2a-48	48" x 24"	END ROAD WORK		24	
G20-4-36	36" x 18"	PILOT CAR FOLLOW ME		10	
G20-50a-72	72" x 36"	ROAD WORK NEXT _____ MILES RT & LT ARROWS		38	
G20-52a-72	72" x 24"	ROAD WORK NEXT _____ MILES RT OR LT ARROW		30	
G20-8-48	48" x 36"	TEMPORARY SURFACE NEXT _____ MILES		30	
M1-4-24	24" x 24"	ROUTE MARKER (POST & INSTALLATION ONLY)		10	
M3-1-24	24" x 12"	NORTH (MOUNTED ON ROUTE MARKER POST)		6	
M3-2-24	24" x 12"	EAST (MOUNTED ON ROUTE MARKER POST)		6	
M3-3-24	24" x 12"	SOUTH (MOUNTED ON ROUTE MARKER POST)		6	
M3-4-24	24" x 12"	WEST (MOUNTED ON ROUTE MARKER POST)		6	
M4-8-24	24" x 12"	DETOUR (MOUNTED ON ROUTE MARKER POST)		6	
M4-8a-24	24" x 18"	END DETOUR		8	
M4-9-30	30" x 24"	DETOUR RIGHT OR LEFT ARROW		10	
M4-10-48	18" x 48"	DETOUR ARROW RIGHT OR LEFT		22	
M5-1-21	21" x 15"	ARROW UP RT. OR UP LT. (MOUNTED ON ROUTE MARKER POST)		6	
M6-1-21	21" x 15"	ARROW RT. OR LT. (MOUNTED ON ROUTE MARKER POST)		6	
W1-1-48	48" x 48"	RIGHT OR LEFT SHARP CURVE ARROW		34	
W1-2-48	48" x 48"	RIGHT OR LEFT CURVE ARROW		34	
W1-3-48	48" x 48"	RIGHT OR LEFT SHARP REVERSE CURVE ARROW		34	
W1-4-48	48" x 48"	RIGHT OR LEFT REVERSE CURVE ARROW		34	
W1-6-48	48" x 24"	LEFT OR RIGHT ARROW		24	
W3-1a-48	48" x 48"	STOP AHEAD SYMBOL		34	
W3-2a-48	48" x 48"	YIELD AHEAD SYMBOL		34	
W3-3-48	48" x 48"	SIGNAL AHEAD SYMBOL		34	
W5-1-48	48" x 48"	ROAD NARROWS		34	
W6-3-48	48" x 48"	TWO WAY TRAFFIC SYMBOL		34	
W8-1-48	48" x 48"	BUMP		34	
W8-3a-48	48" x 48"	PAVEMENT ENDS SYMBOL		34	
W8-3a-24	24" x 18"	PAVEMENT END PLAQUE		8	
W8-9-48	48" x 48"	LOW SHOULDER		34	
W8-9a-48	48" x 48"	SHOULDER DROP-OFF		34	
W8-12-48	48" x 48"	NO CENTER STRIPE		34	
W8-11-48	48" x 48"	UNEVEN LANES		34	
W8-51-48	48" x 48"	UNEVEN PAVEMENT		34	
W8-53-48	48" x 48"	TRUCKS ENTERING HIGHWAY		34	
W8-54-48	48" x 48"	TRUCKS ENTERING AHEAD Or _____ FT.		34	68
W8-55-48	48" x 48"	TRUCKS CROSSING AHEAD Or _____ FT.		34	
W13-1-24	24" x 24"	MPH ADVISORY SPEED PLATE		10	
W13-4-48	48" x 60"	RAMP ARROW		40	
W20-1-48	48" x 48"	ROAD CONSTRUCTION - AHEAD, 1/2 MILE, Or FT.		34	
W21-1a-48	48" x 48"	MEN WORKING SYMBOL		34	
W20-2-48	48" x 48"	DETOUR _____ FT.		34	
W20-3-48	48" x 48"	ROAD or STREET CLOSED AHEAD or _____ FT.		34	
W20-4-48	48" x 48"	ONE LANE ROAD AHEAD or _____ FT.		34	
W20-5-48	48" x 48"	RIGHT OR LEFT LANE CLOSED AHEAD or _____ FT.		34	
W20-7a-48	48" x 48"	FLAGGING SYMBOL		34	
W20-7k-24	24" x 18"	FEET		8	
W20-8-48	48" x 48"	STREET CLOSED		34	
W20-7b-48	48" x 48"	BE PREPARED TO STOP		34	
W20-51-48	48" x 48"	EQUIPMENT WORKING	2	34	68
W20-52-54	54" x 12"	NEXT _____ MILES		10	
W21-2-48	48" x 48"	FRESH OIL		34	
W21-4-48	48" x 48"	ROAD WORK		34	
W21-5-48	48" x 48"	SHOULDER WORK	3	34	102
W21-51-48	48" x 48"	MATERIAL ON ROADWAY		34	
W22-8-48	48" x 48"	FRESH OIL LOOSE ROCK		34	
R1-1a-18	18" x 18"	STOP and SLOW PADDLE Back to Back		8	
		TOTAL UNITS			294
	TYPE III	8' LONG BARRICADES		EACH	6
	TYPE II	2' MIN. BARRICADES		EACH	
	TYPE I	6' TO 10' BARRICADES		EACH	
	18" x 36" MIN.	DELINEATOR DRUMS		EACH	15
	28" MIN.	TRAFFIC CONES		EACH	20
	8" to 12" x 24"	VERTICAL PANELS		EACH	
	3" x 8"	DELINEATOR		EACH	
		SEQUENCING ARROW PANEL TYPE C		EACH	

FHWA REGION	STATE	PROJECT NO.	SHEET NO.
	ND	TEU-1-988(010)021	14
Kadmas Lee & Jackson		CITY OF MANDAN MANDAN, NORTH DAKOTA	
CONTRACT NO.	DATE		
1498021	2/5/99		
DESIGNED BY	CHECKED BY		
NMH			
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30" x 30" SIGNS
 STA. 0+18, 9' LT. (W11-1A) - 1 EA
 STA. 0+60, 250' RT. (W11-1) - 1 EA
 STA. 0+68, 9' RT. (W11-1A) - 1 EA

18" x 18" SIGNS
 STA. 0+85, 9' LT. (R1-1) - 1 EA
 STA. 0+20, 9' RT. (R1-1) - 1 EA

TREE REMOVAL - 10"
 STA. 2+31 - 1 EA
 STA. 4+40 - 1 EA
 TREE REMOVAL - 18"
 STA. 2+34 - 1 EA
 STA. 4+70 - 1 EA
 STA. 4+87 - 1 EA

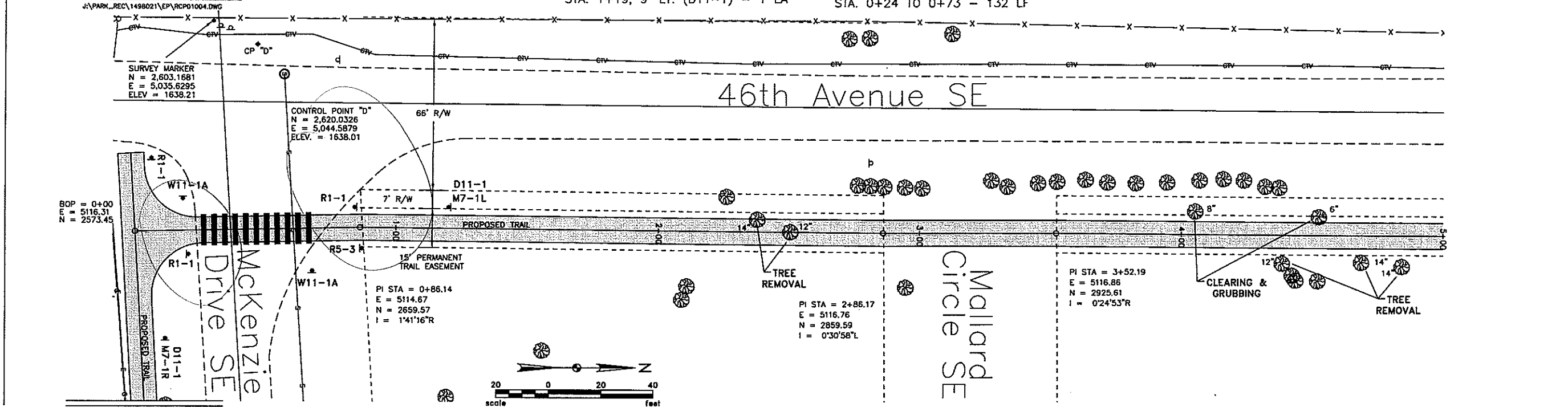
CLEARING AND GRUBBING
 STA. 2+00 TO 5+00 - 300 LF
 HERBICIDE WEED CONTROL
 STA. 0+00 TO 0+25 - 25 LF
 STA. 0+75 TO 5+00 - 25 LF

24" x 24" SIGNS
 STA. 0+88, 9' RT. (R5-3) - 1 EA

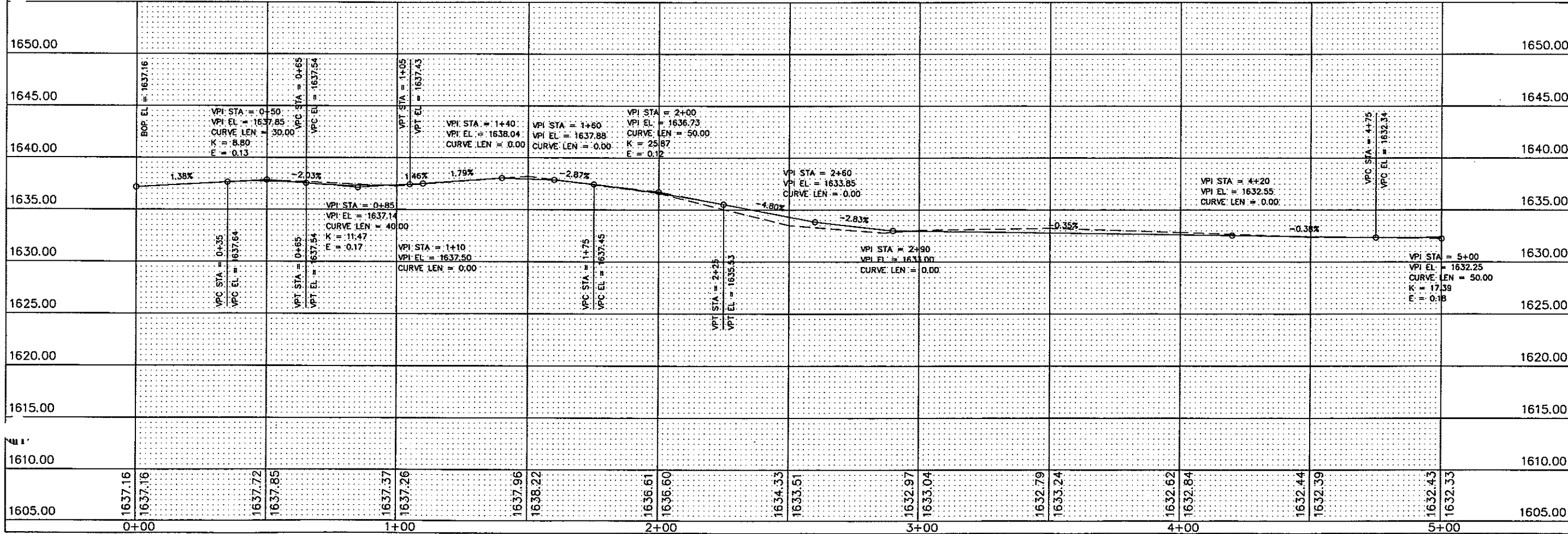
12" x 9" SIGNS
 STA. 1+19, 9' LT. (M7-1L) - 1 EA

24" x 18" SIGNS
 STA. 1+19, 9' LT. (D11-1) - 1 EA

PAVEMENT MARKING, PAINTED 24" LINE
 STA. 0+24 TO 0+73 - 132 LF



EE SHEET 29 - MCKENZIE DRIVE TRAIL



TREE REMOVAL - 10"
STA. 8+40 - 1 EA

TREE REMOVAL - 18"
STA. 6+81 - 1 EA
STA. 8+27 - 1 EA

HERBICIDE WEED CONTROL
STA. 5+00 TO 10+00 - 500 LF

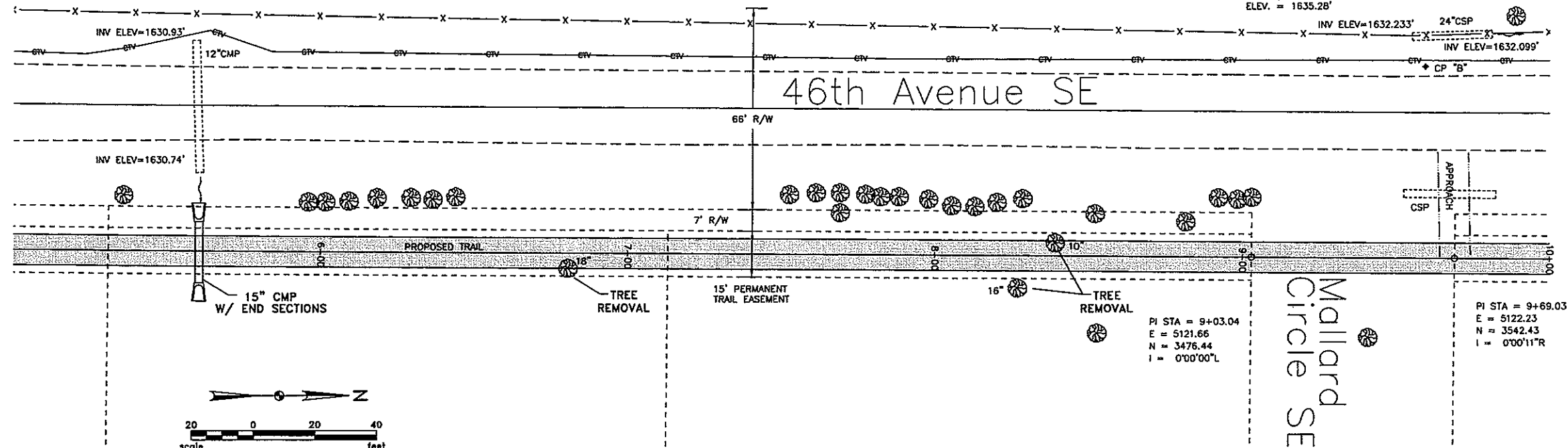
PIPE CORR. STEEL 0.064"x15"
STA. 5+62, 10' RT. TO 10' LT. - 20 LF

END SECT. CORR. STEEL 0.064"x15"
STA. 5+62, 10' RT. - 1 EA
STA. 5+62, 10' LT. - 1 EA

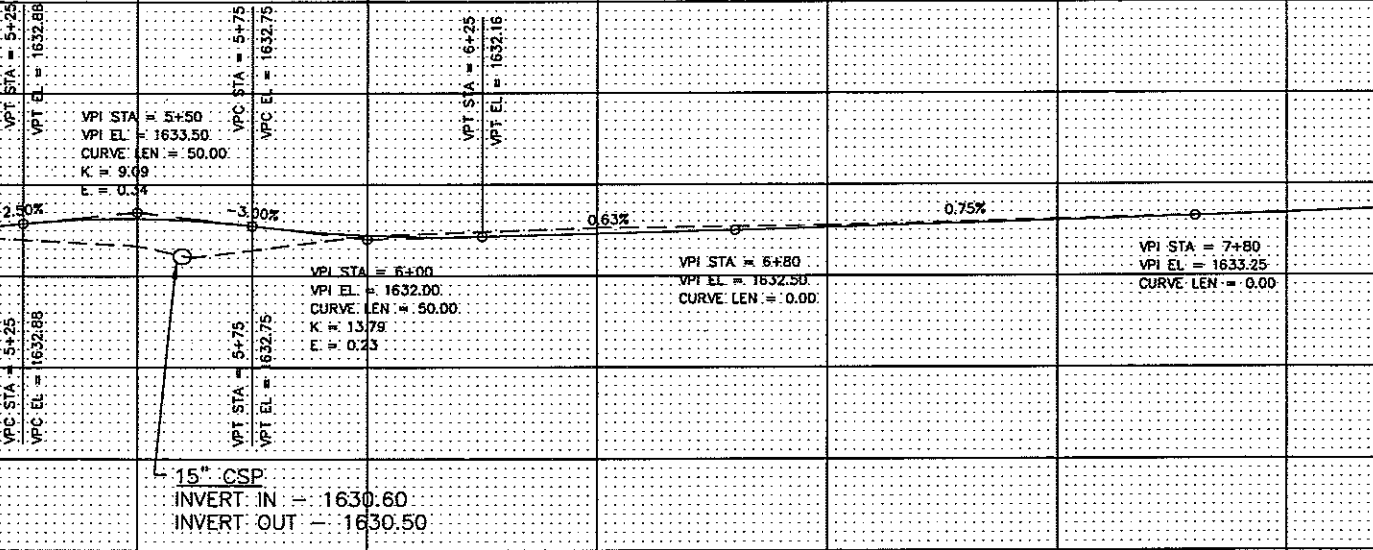
CLEARING AND GRUBBING
STA. 5+90 TO 6+60 - 170 LF
STA. 7+50 TO 9+10 - 160 LF

FHWA REGION	STATE	PROJECT NO.	SHEET NO.
	ND	TEU-1-988(010)021	15
Kadmas Lee & Jackson Consulting Engineers and Surveyors			
CAPR. NO.	DATE	CITY OF MANDAN MANDAN, NORTH DAKOTA	
1498021	2/5/99		
DRWN. BY	CHKD BY		
NMH			
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J:\PARK_REC\1498021\EP\RC02004.DWG			

CONTROL POINT "B"
N = 3,532.7550
E = 5,059.7133
ELEV. = 1635.28'



1650.00																						1650.00	
1645.00																							1645.00
1640.00																							1640.00
1635.00																							1635.00
1630.00																							1630.00
1625.00																							1625.00
1620.00																							1620.00
1615.00																							1615.00
1610.00																							1610.00
1605.00	1632.43	1632.33	1633.16	1631.66	1632.23	1632.20	1632.31	1632.62	1632.65	1632.75	1633.03	1633.09	1633.44	1633.41	1633.90	1634.00	1634.37	1634.05	1634.84	1634.83	1635.30	1635.41	1605.00
	5+00				6+00				7+00				8+00				9+00					10+00	



FHWA REGION	STATE	PROJECT NO.	SHEET NO.
ND	TEU-1-988(010)021	16	
Kadmas Lee & Jackson City of Mandan Mandan, North Dakota			
CIPR. NO.	DATE		
1498021	2/5/99		
DRAWN BY	CHKD BY		
NMH			
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REINF. CONC. ARCH PIPE 58" x 36" C1.111 - SEWER
STA. 12+43 SKEWED 10° AHEAD LT. - 40 LF

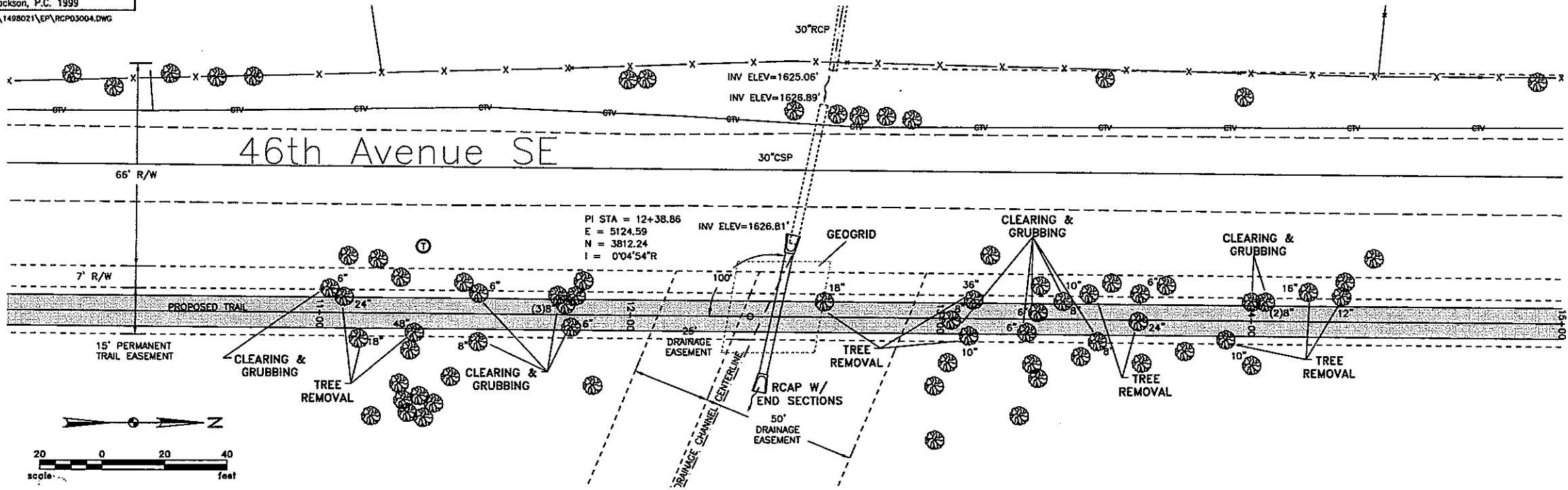
END SECTION CONC. REINF. ARCH 58" x 36"
STA. 12+43, 20' RT - 1 EA
STA. 12+43, 20' LT - 1 EA

CLEARING AND GRUBBING
STA. 10+90 TO STA. 14+40 - 350 LF

HERBICIDE WEED CONTROL
STA. 10+00 TO 15+00 - 500 LF

GEOGRID
STA. 12+28 TO 12+58 - 100 SY

TREE REMOVAL - 10"	TREE REMOVAL - 18"	TREE REMOVAL - 30"
STA. 13+08 - 1 EA	STA. 11+12 - 1 EA	STA. 11+07 - 1 EA
STA. 13+48 - 1 EA	STA. 12+68 - 1 EA	STA. 11+30 - 1 EA
STA. 13+92 - 1 EA	STA. 13+39 - 1 EA	STA. 13+12 - 1 EA
STA. 14+28 - 1 EA	STA. 14+19 - 1 EA	



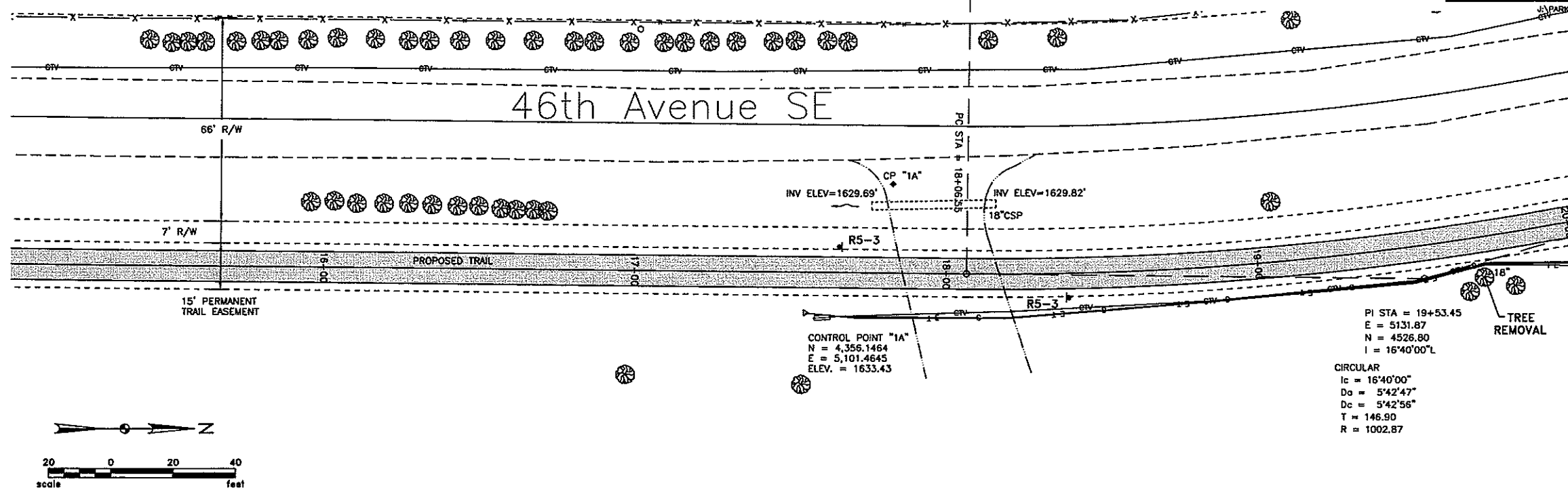
1650.00																		1650.00					
1645.00																		1645.00					
1640.00		VPI STA = 10+30 VPI EL = 1635.58 CURVE LEN = 0.00																1640.00					
1635.00	1.18%		0.12%			VPI STA = 11+00 VPI EL = 1635.66 CURVE LEN = 0.00	VPC STA = 12+35 VPC EL = 1632.57	VPI STA = 12+60 VPI EL = 1632.00 CURVE LEN = 50.00 K = 16.88 E = 0.19	VPT STA = 12+85 VPT EL = 1632.17	VPC STA = 13+25 VPC EL = 1632.44	VPT STA = 13+75 VPT EL = 1632.80					VPI STA = 14+60 VPI EL = 1633.45 CURVE LEN = 0.00	1635.00						
1630.00				2.29%												0.67%		1630.00					
1625.00																0.77%		1625.00					
1620.00																		1620.00					
1615.00																		1615.00					
1610.00																		1610.00					
1605.00	1635.23	1635.41	1635.61	1635.72	1635.66	1635.55	1634.52	1635.23	1633.37	1631.41	1632.30	1626.02	1632.27	1634.71	1632.61	1632.26	1632.99	1632.65	1633.37	1633.35	1633.35	1633.15	1605.00
	10+00				11+00				12+00				13+00				14+00						15+00

58" x 36" RCAP C111 SEWER/FES
INVERT IN - 1625.55
INVERT OUT - 1625.50

24" x 24" SIGNS
 STA. 17+78, 9' LT. (R5-3) - 1 EA TREE REMOVAL - 18"
 STA. 18+39, 9' RT. (R5-3) 1 EA STA. 19+70 - 1 EA

HERBICIDE WEED CONTROL
 STA. 15+00 to 20+00 - 500 LF

FWHA REGION	STATE	PROJECT NO.	SHEET NO.
	ND	TEU-1-988(010)021	17
Kadrmas Lee & Jackson Consulting Engineers and Surveyors		CITY OF MANDAN MANDAN, NORTH DAKOTA	
1498021		DATE	2/5/99
NMH		CHK'D BY	
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1650.00																						1650.00	
1645.00																							1645.00
1640.00																							1640.00
1635.00																							1635.00
1630.00																							1630.00
1625.00																							1625.00
1620.00																							1620.00
1615.00																							1615.00
1610.00																							1610.00
1605.00																							1605.00
	1633.35	1633.15	1633.23	1633.27	1633.12	1632.95	1633.00	1633.23	1632.88	1632.81	1632.75	1633.02	1632.63	1632.87	1632.35	1632.14	1632.07	1631.62	1631.79	1631.13	1632.04	1632.23	
	15+00				16+00				17+00				18+00				19+00				20+00		

FHWA REGION	STATE	PROJECT NO.	SHEET NO.
ND	TEU-1-988(010)021	18	
CITY OF MANDAN MANDAN, NORTH DAKOTA			
1498021 DATE: 2/5/99			
NMH DRAWN BY: NMH CHECKED BY:			
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30" x 30" SIGNS
 STA. 21+79, 32' LT. (W11-1) - 1 EA
 STA. 24+35, 32' LT. (W11-1A) - 1 EA
 STA. 24+55, 65' LT. (W11-1A) - 1 EA

24" x 24" SIGNS
 STA. 21+75, 9' LT. (R5-3) - 1 EA
 STA. 22+46, 9' RT. (R5-3) - 1 EA
 STA. 24+10, 9' LT. (R5-3) - 1 EA
 STA. 24+95, 9' RT. (R5-3) - 1 EA

18" x 18" SIGNS
 STA. 21+79, 9' RT. (R1-1) - 1 EA
 STA. 22+38, 9' LT. (R1-1) - 1 EA
 STA. 24+55, 22' LT. (R1-1) - 1 EA
 STA. 24+59, 9' RT. (R1-1) - 1 EA
 STA. 24+92, 9' LT. (R1-1) - 1 EA

MAILBOX - ALL TYPES
 STA. 22+38, 9' LT. TO 22+38, 12' LT - 1 EA

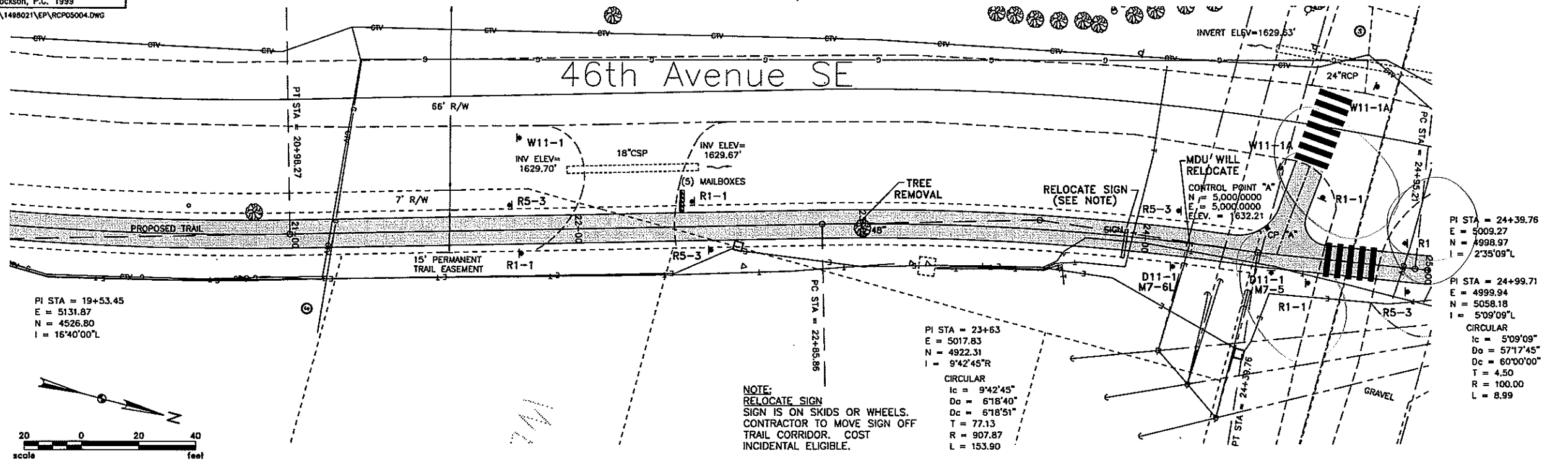
12" x 9" SIGNS
 STA. 24+10, 9' RT. (M7-6L) - 1 EA
 STA. 24+47, 9' RT. (M7-5) - 1 EA

TREE REMOVAL - 10"
 STA. 20+86 - 1 EA

PAVEMENT MARKING - 24" PAINTED LINE
 STA. 24+47, 31' LT. TO 62' LT. - 84 LF
 STA. 24+62 TO 24+82 - 60 LF

HERBICIDE WEED CONTROL
 STA. 20+00 TO 25+00 - 500 LF

TREE REMOVAL - 30"
 STA. 23+00 - 1 EA



1650.00										1650.00
1645.00										1645.00
1640.00										1640.00
1635.00		VPI STA = 21+10 VPI EL = 1632.90 CURVE LEN = 0.00		VPI STA = 22+10 VPI EL = 1633.35 CURVE LEN = 0.00						1635.00
1630.00										1630.00
1625.00					VPI STA = 22+50 VPI EL = 1632.98 CURVE LEN = 0.00	VPI STA = 23+50 VPI EL = 1632.34 CURVE LEN = 0.00	VPI STA = 24+50 VPI EL = 1632.03 CURVE LEN = 0.00			1625.00
1620.00										1620.00
1615.00										1615.00
1610.00										1610.00
1605.00	1632.04 1632.23 1632.43 1633.21 1632.82 1632.78 1633.08 1633.52 1633.30 1633.41 1632.98 1633.02 1632.73 1631.97 1632.49 1632.32 1632.25 1632.26 1632.03 1631.65 1632.35 1632.08									1605.00

20+00 21+00 22+00 23+00 24+00 25+00

30" x 30" SIGNS
 STA. 26+92, 46' LT. (W11-1) - 1 EA
 STA. 29+14, 250' LT. (W11-1) - 1EA
 STA. 28+98, 1' LT. (W11-1A) - 1 EA
 (MOUNTED ON POWER POLE)

24" x 24" SIGNS
 STA. 26+35, 9' RT. (R5-3) - 1 EA
 STA. 26+70, 9' LT. (R5-3) 1 EA

18" x 18" SIGNS
 STA. 29+15, 4' AHD. (R1-1) - 1 EA

CURB AND GUTTER
 STA. 27+20 TO 28+73 - 153 LF

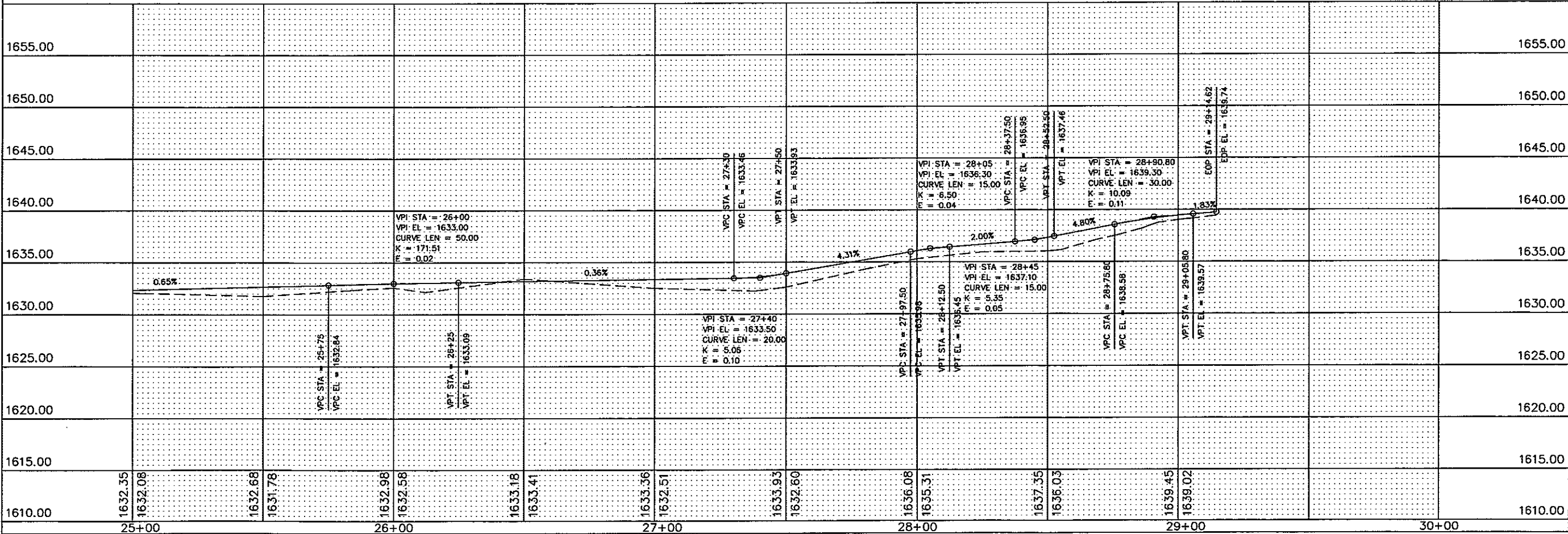
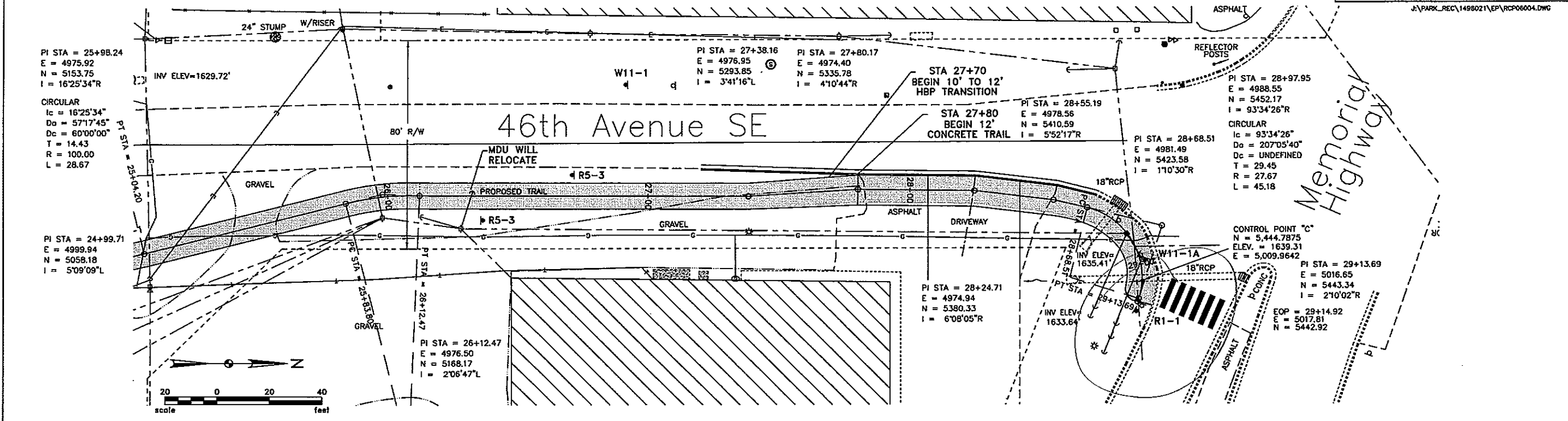
SIDEWALK CONCRETE BIKEWAY
 STA. 27+80 TO 28+07 - 27 LF
 STA. 28+42 TO 29+14.92 - 73 LF

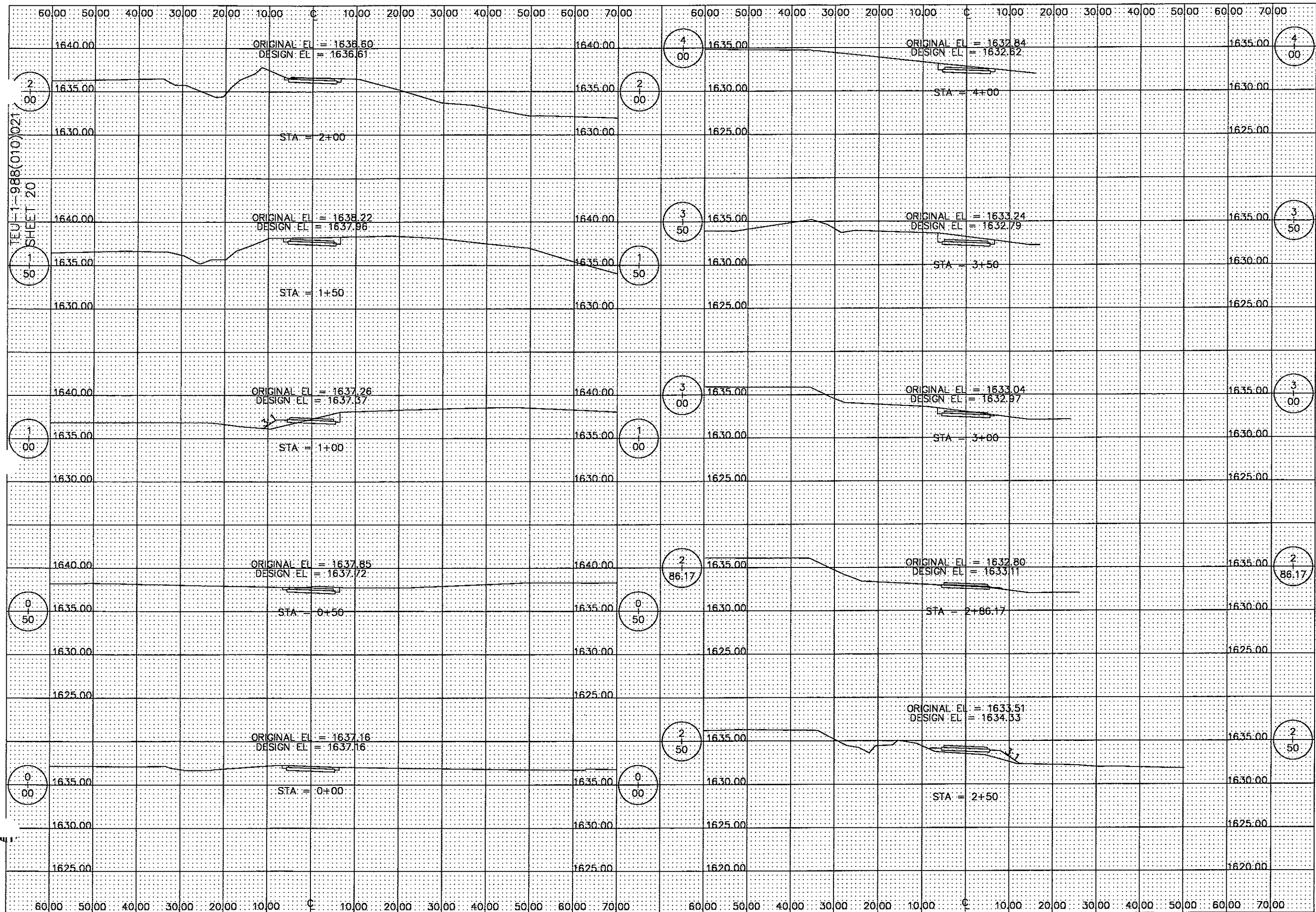
DRIVEWAY CONCRETE 8" - HIGH EARLY STRENGTH
 STA. 28+07 TO 28+42 - 35 LF

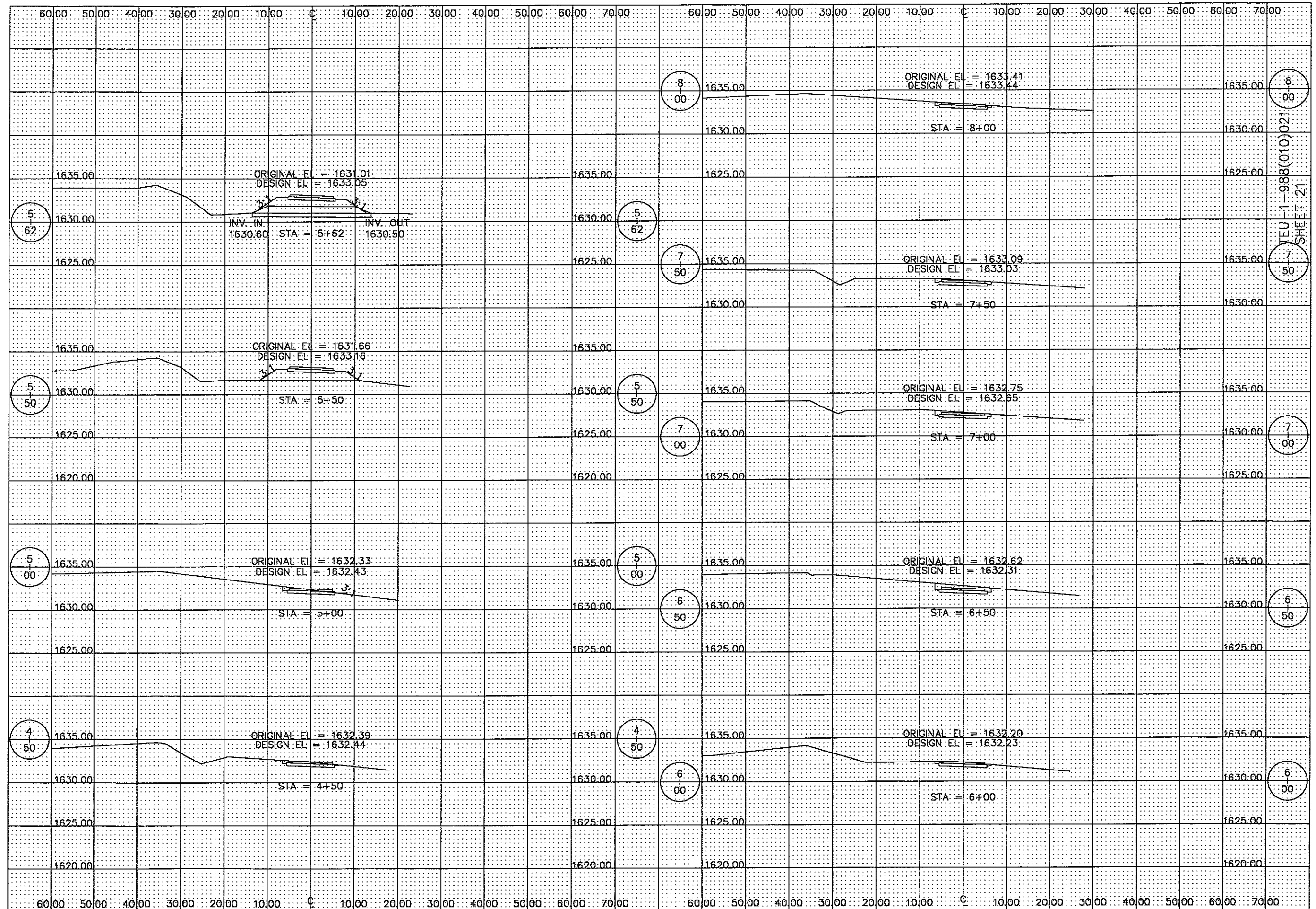
PAVEMENT MARKING - 24" PAINTED LINE
 STA. 29+03, 8' LT TO 25' LT - 72 LF

HERBICIDE WEED CONTROL
 STA. 25+00 TO 28+90 - 390 LF

FHWA REGION	STATE	PROJECT NO.	SHEET NO.
	ND	TEU-1-988(010)021	19
CITY OF MANDAN MANDAN, NORTH DAKOTA			
Kadmas Lee & Jackson Consulting Engineers and Surveyors		DATE 2/5/99	DRAWN BY NMH
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TEU-1-988(010)021
SHEET 21

7
00

6
50

6
00

8
00

5
62

7
50

5
50

7
00

5
00

6
50

4
50

6
00

5
62

5
50

5
00

4
50

ORIGINAL EL = 1631.01
DESIGN EL = 1633.05

INV. IN 1630.60 STA = 5+62 INV. OUT 1630.50

ORIGINAL EL = 1631.66
DESIGN EL = 1633.16

STA = 5+50

ORIGINAL EL = 1632.33
DESIGN EL = 1632.43

STA = 5+00

ORIGINAL EL = 1632.39
DESIGN EL = 1632.44

STA = 4+50

ORIGINAL EL = 1633.41
DESIGN EL = 1633.44

STA = 8+00

ORIGINAL EL = 1633.09
DESIGN EL = 1633.03

STA = 7+50

ORIGINAL EL = 1632.75
DESIGN EL = 1632.65

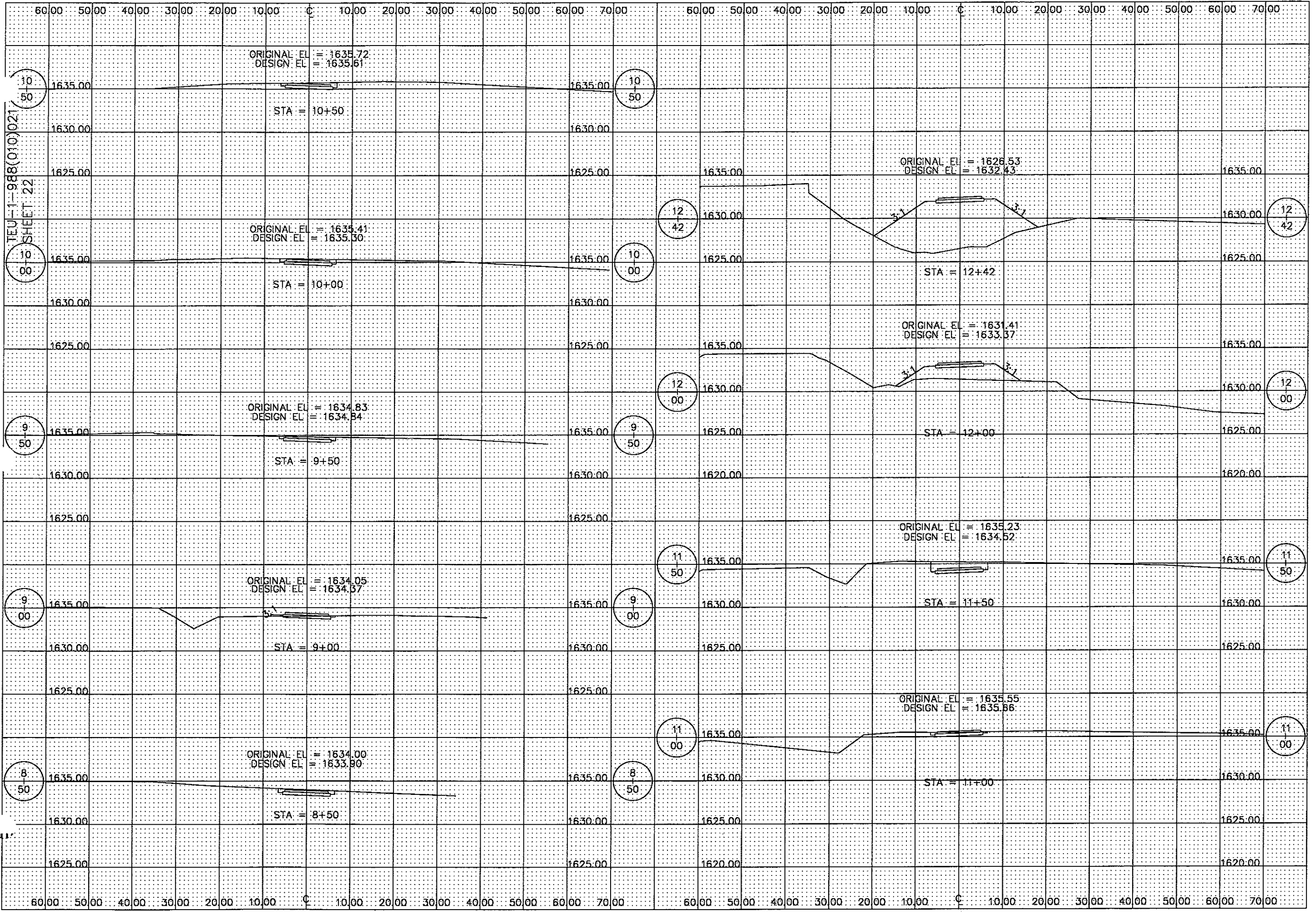
STA = 7+00

ORIGINAL EL = 1632.62
DESIGN EL = 1632.31

STA = 6+50

ORIGINAL EL = 1632.20
DESIGN EL = 1632.23

STA = 6+00



TEU-1-988(010)021
SHEET 22

ORIGINAL EL. = 1635.72
DESIGN EL. = 1635.61

STA = 10+50

ORIGINAL EL. = 1635.41
DESIGN EL. = 1635.30

STA = 10+00

ORIGINAL EL. = 1634.83
DESIGN EL. = 1634.84

STA = 9+50

ORIGINAL EL. = 1634.05
DESIGN EL. = 1634.37

STA = 9+00

ORIGINAL EL. = 1634.00
DESIGN EL. = 1633.90

STA = 8+50

ORIGINAL EL. = 1626.53
DESIGN EL. = 1632.43

STA = 12+42

ORIGINAL EL. = 1631.41
DESIGN EL. = 1633.37

STA = 12+00

ORIGINAL EL. = 1635.23
DESIGN EL. = 1634.52

STA = 11+50

ORIGINAL EL. = 1635.55
DESIGN EL. = 1635.66

STA = 11+00

10
50

12
42

10
00

12
00

9
50

11
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9
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11
00

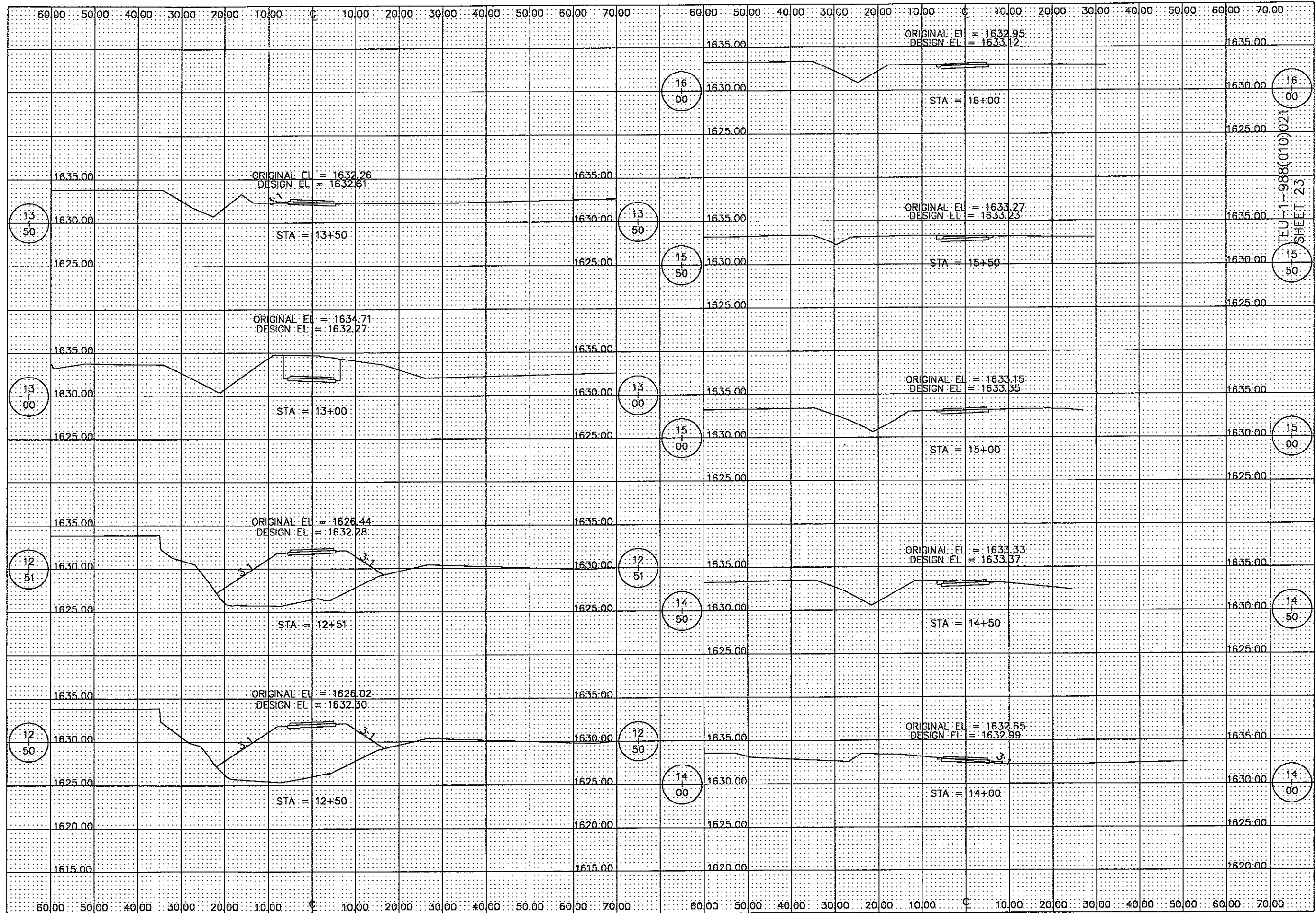
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50

12
42

12
00

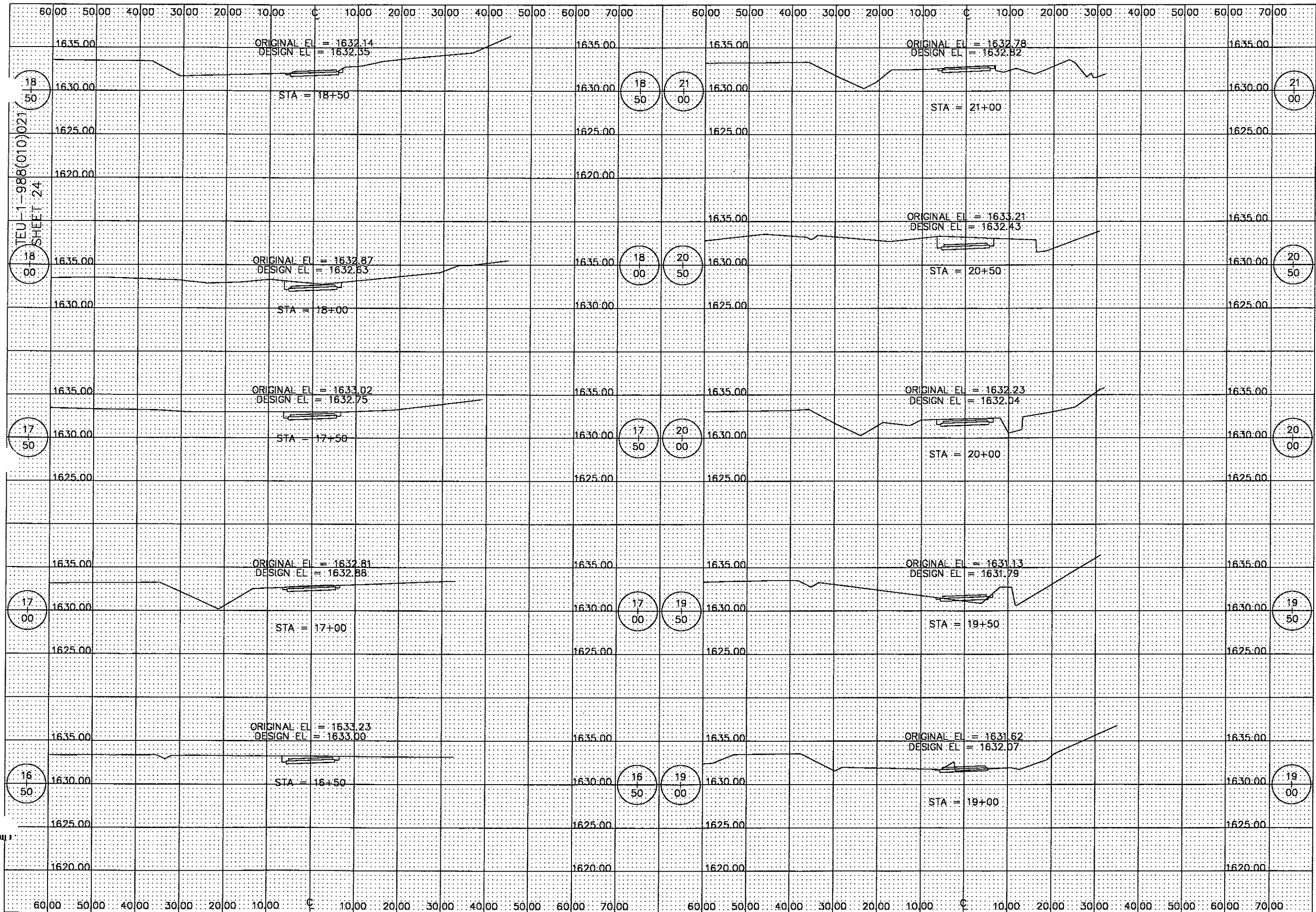
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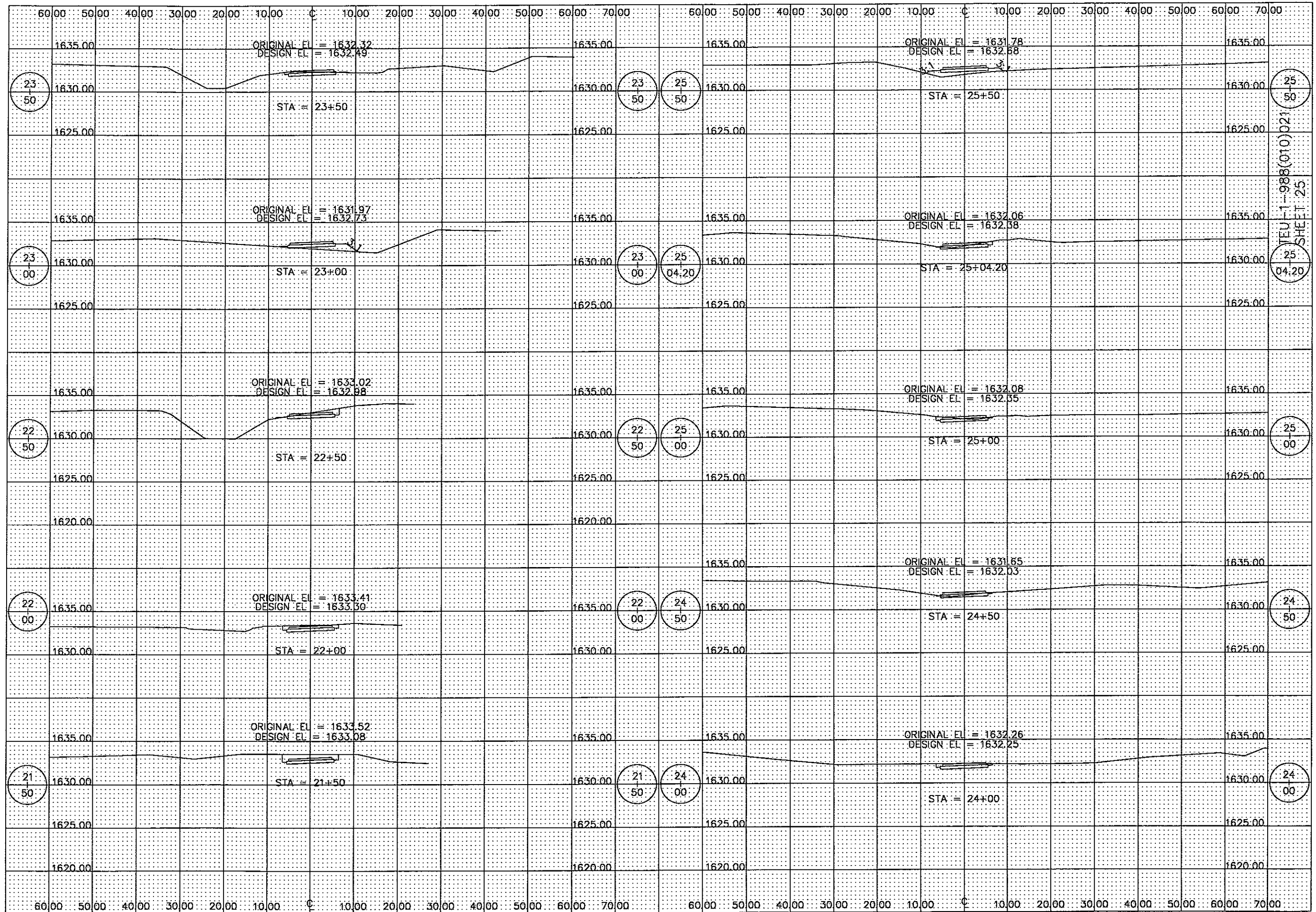
11
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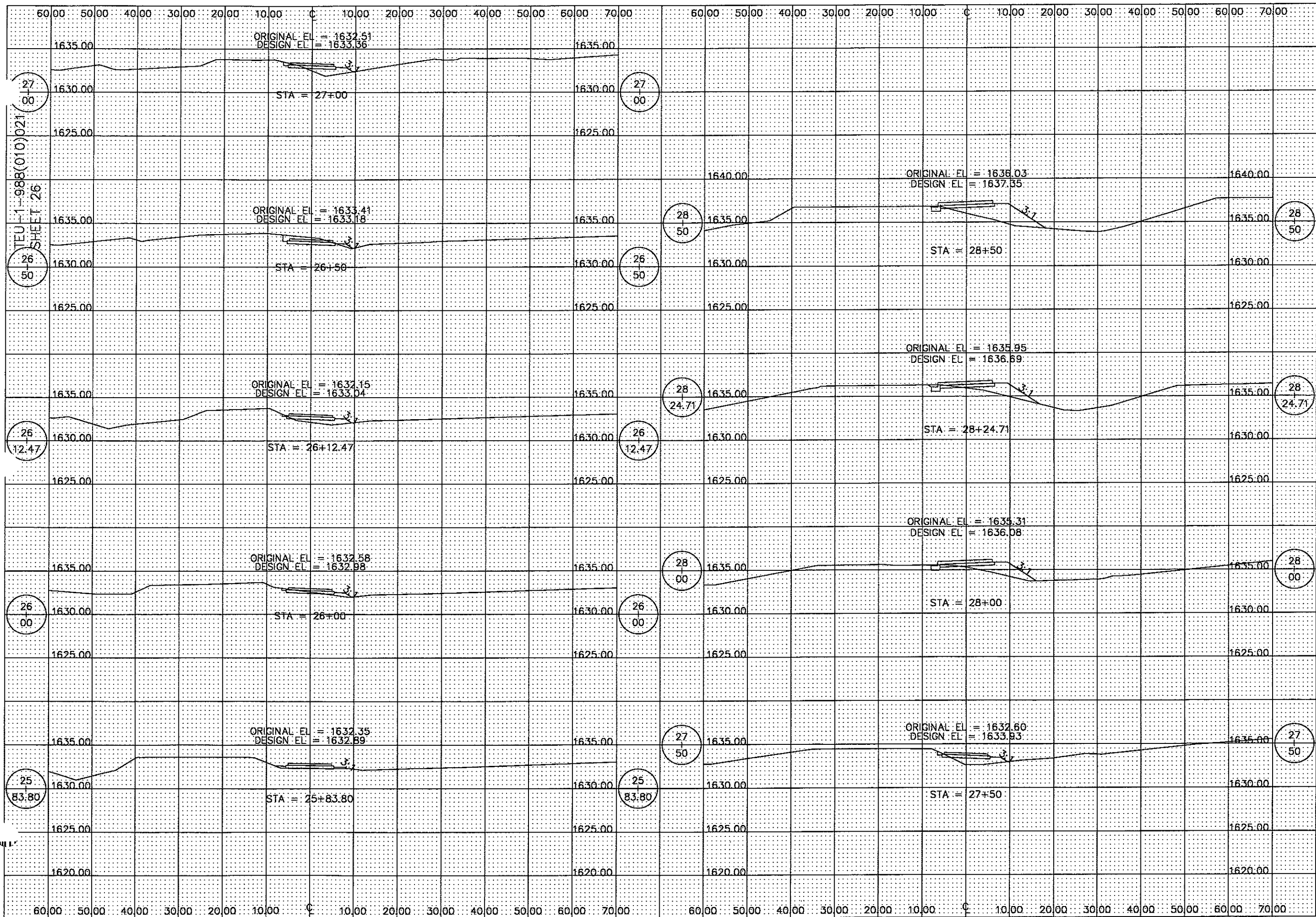
TEU-1-98(010)021
SHEET 23

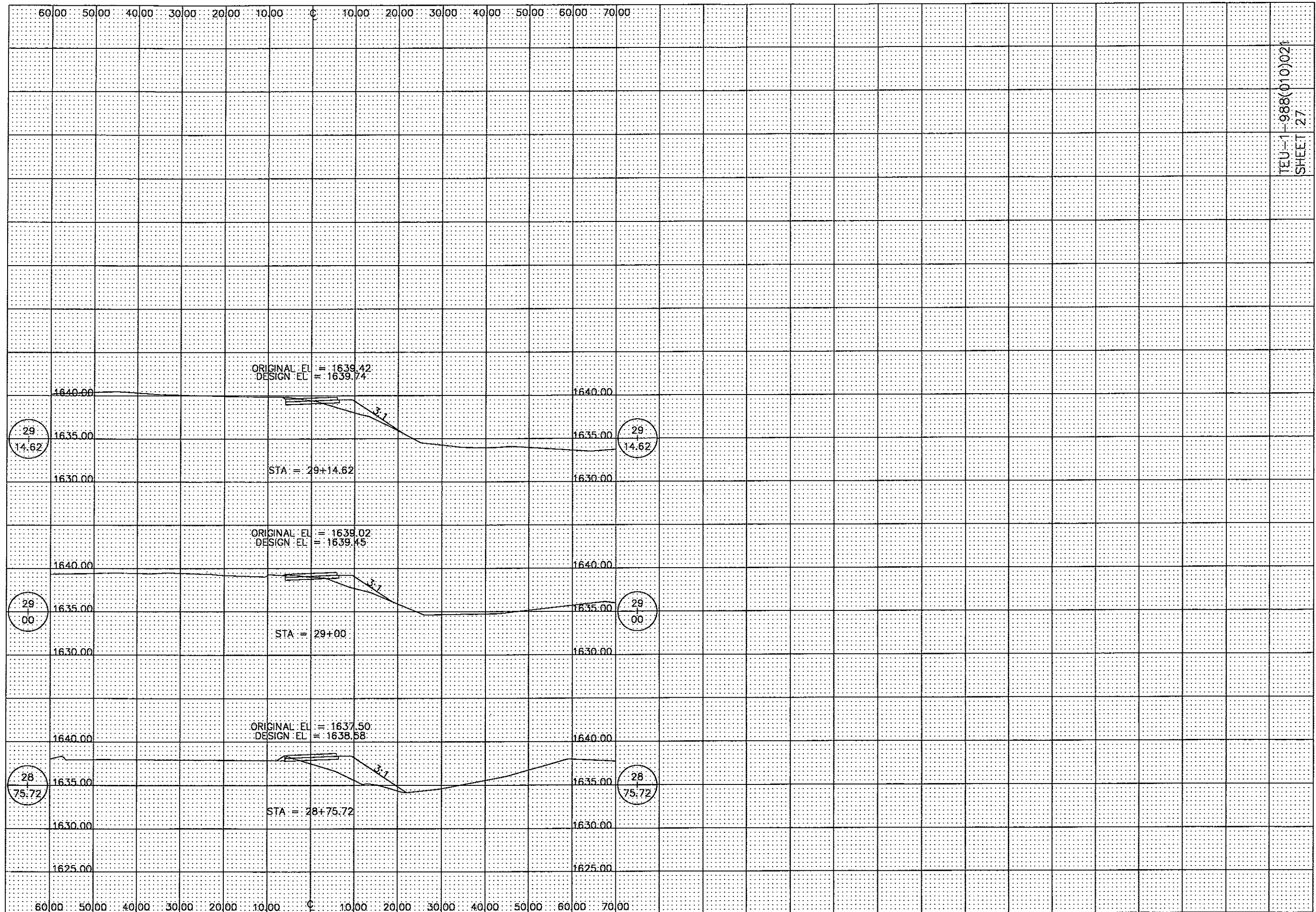
41





TEU-1-988(010)021
SHEET 25





TEU-1-988(010)021
 SHEET 27

417

FIRMA REGION	STATE	PROJECT NO.	SHEET NO.
	ND	TEU-1-988(010)021	29
CITY OF MANDAN MANDAN, NORTH DAKOTA			
Kadmos Lee & Jackson Consulting Engineers and Surveyors		DATE	2/5/99
		PROJECT NO.	1498021
		DESIGN BY	NMH
		CHECKED BY	
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J:\PARK_REC\1498021\EP\RCP02003.DWG			

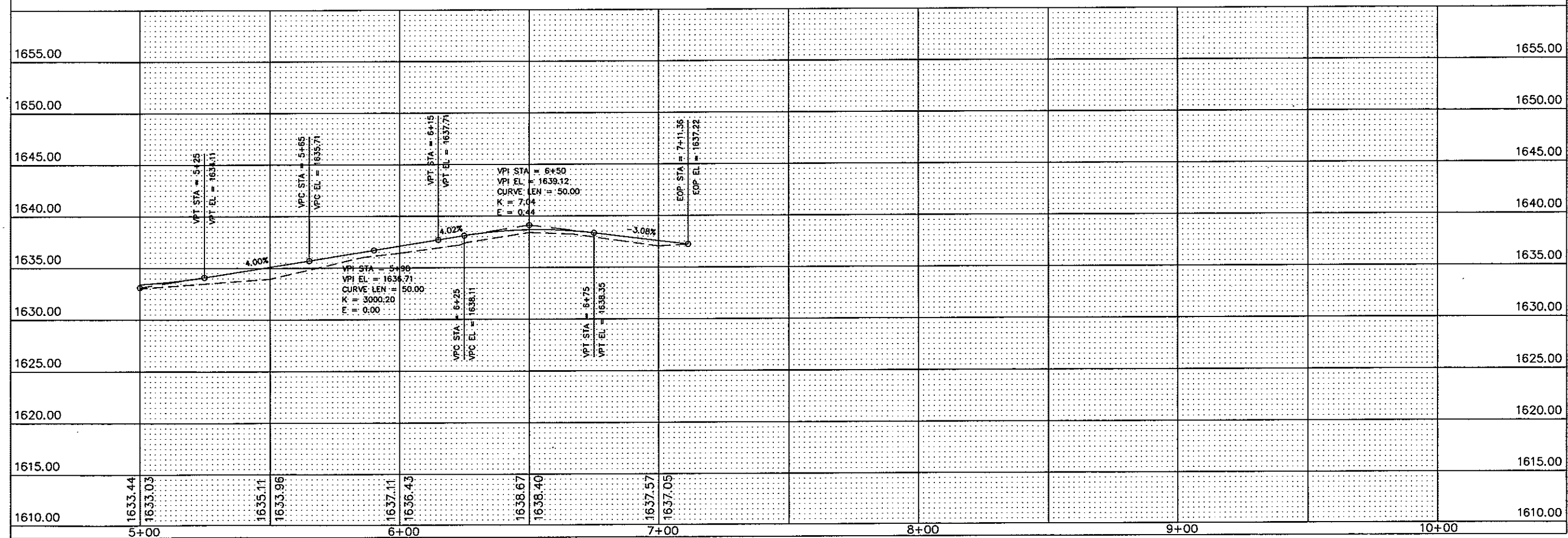
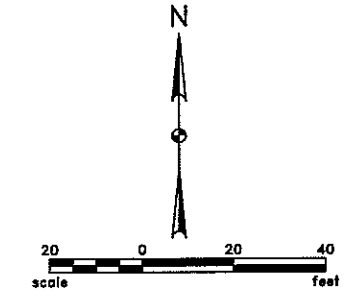
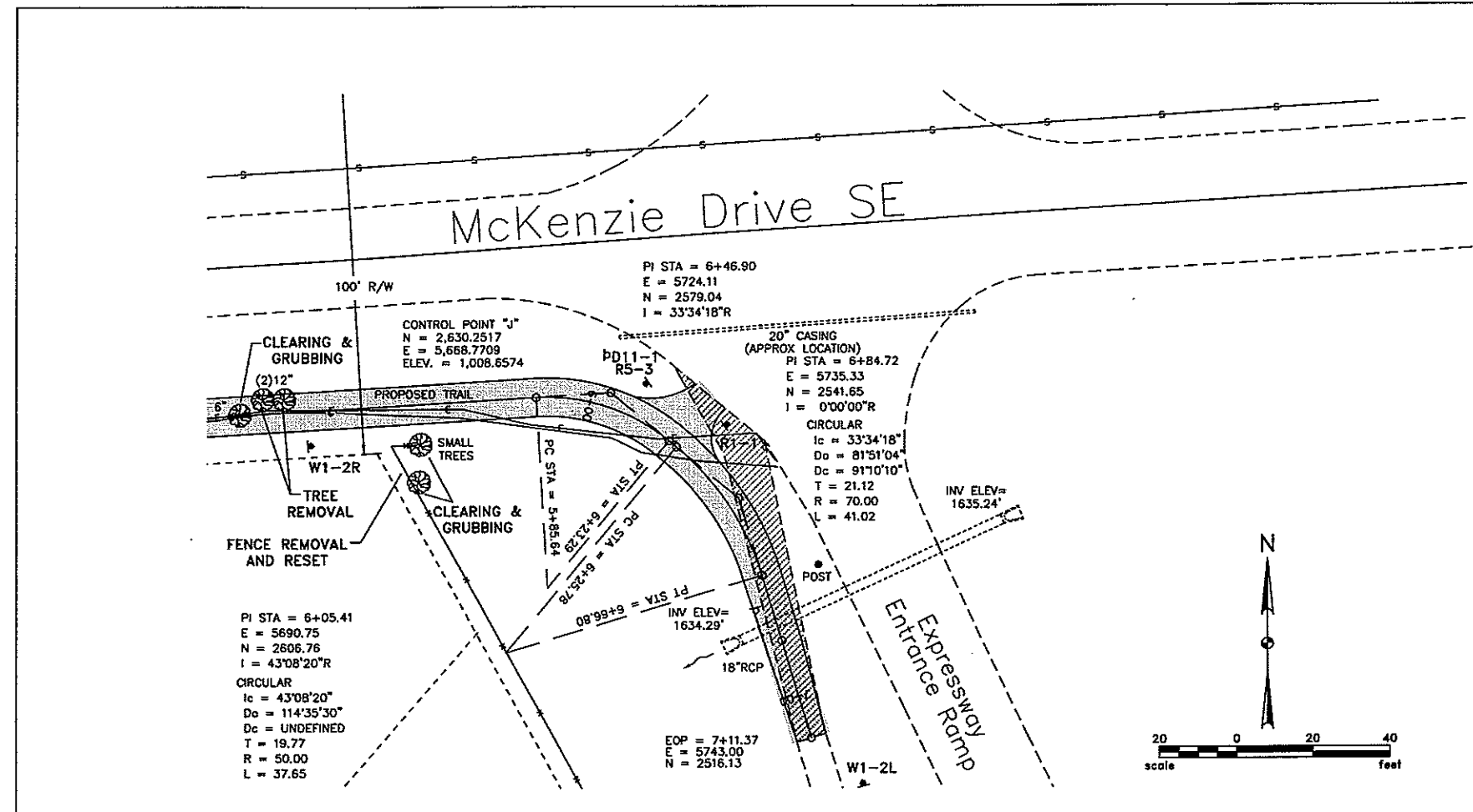
- 24" x 24" SIGNS
STA. 6+09, 9' LT. (R5-3) - 1 EA
- 24" x 18" SIGNS
STA. 6+09, 9' LT. (D11-1) - 1 EA
- 18" x 18" SIGNS
STA. 5+27, 9' RT. (W1-2R) - 1 EA
STA. 7+18, 9' LT. (W1-2L) - 1 EA
STA. 6+31, 9' LT. (R1-1) - 1EA

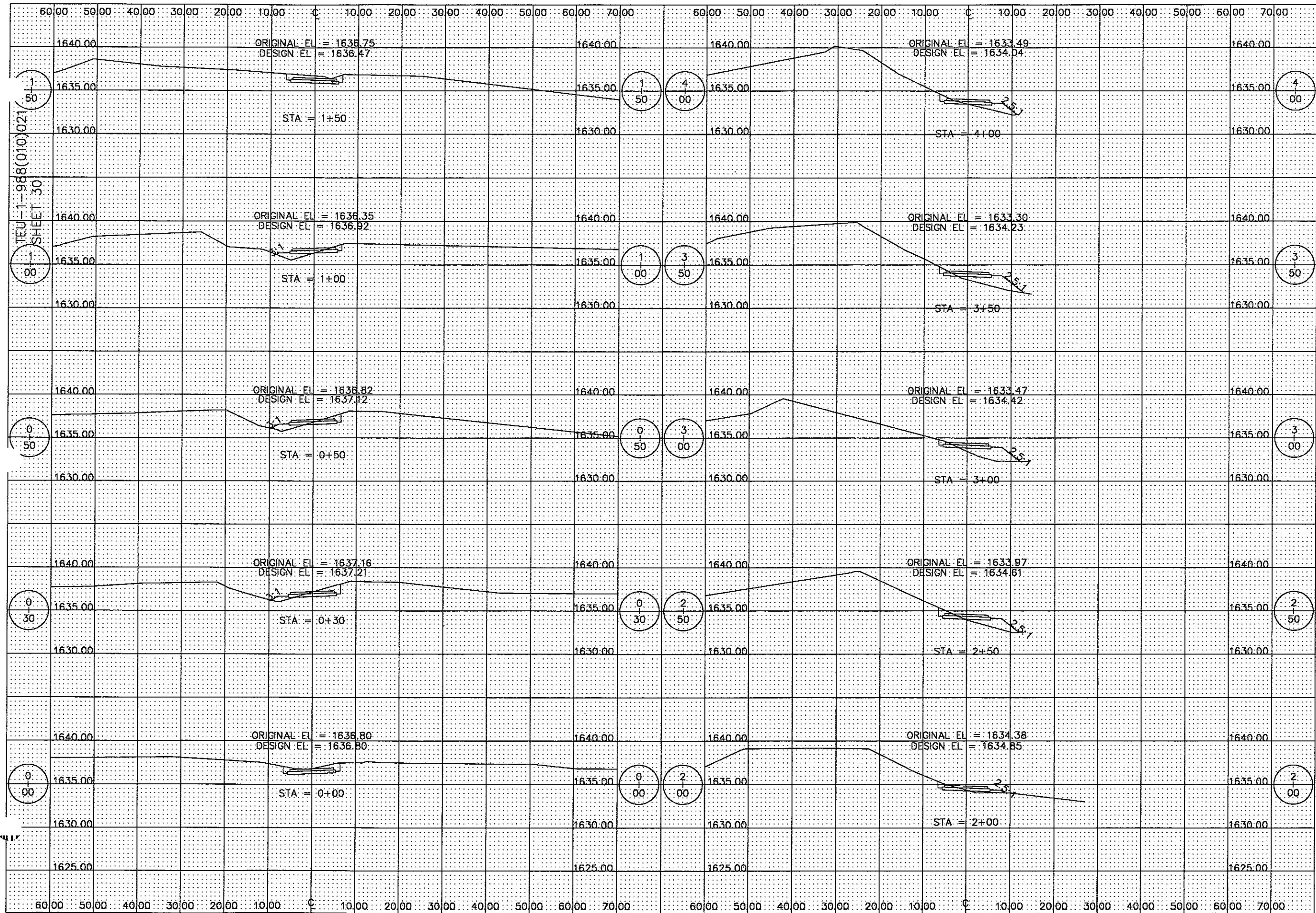
HERBICIDE WEED CONTROL
STA. 5+00 TO 7+13 - 213 LF

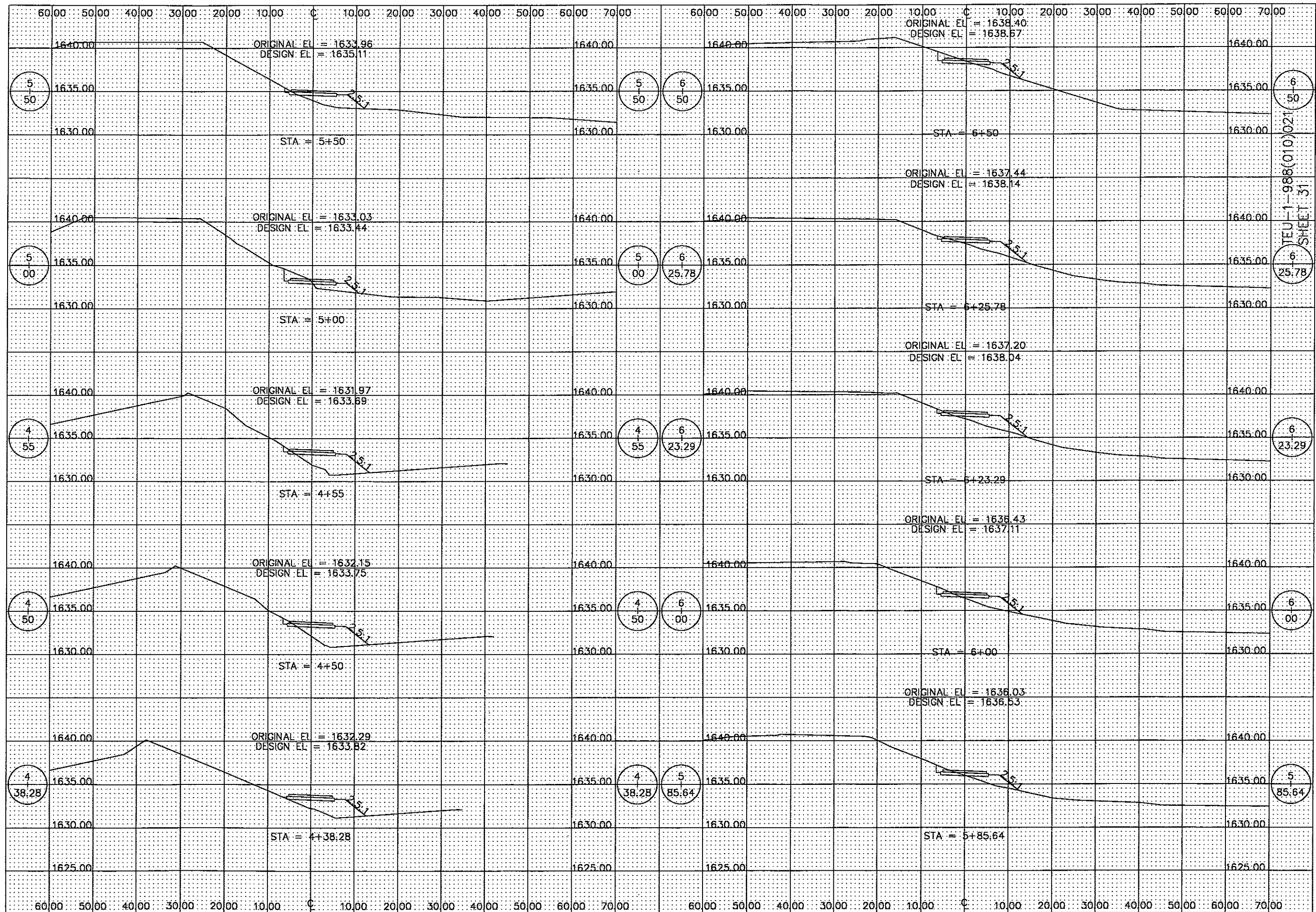
TREE REMOVAL - 10"
STA. 5+15 - 1 EA
STA. 5+21 - 1 EA

CLEARING AND GRUBBING
STA. 5+45 TO 5+70 - 25 LF

FENCE REMOVAL AND RESET
STA. 5+47 10' RT TO STA. 5+55 10' RT - 8 LF
STA. 5+47 10' RT TO 20' RT - 10 LF

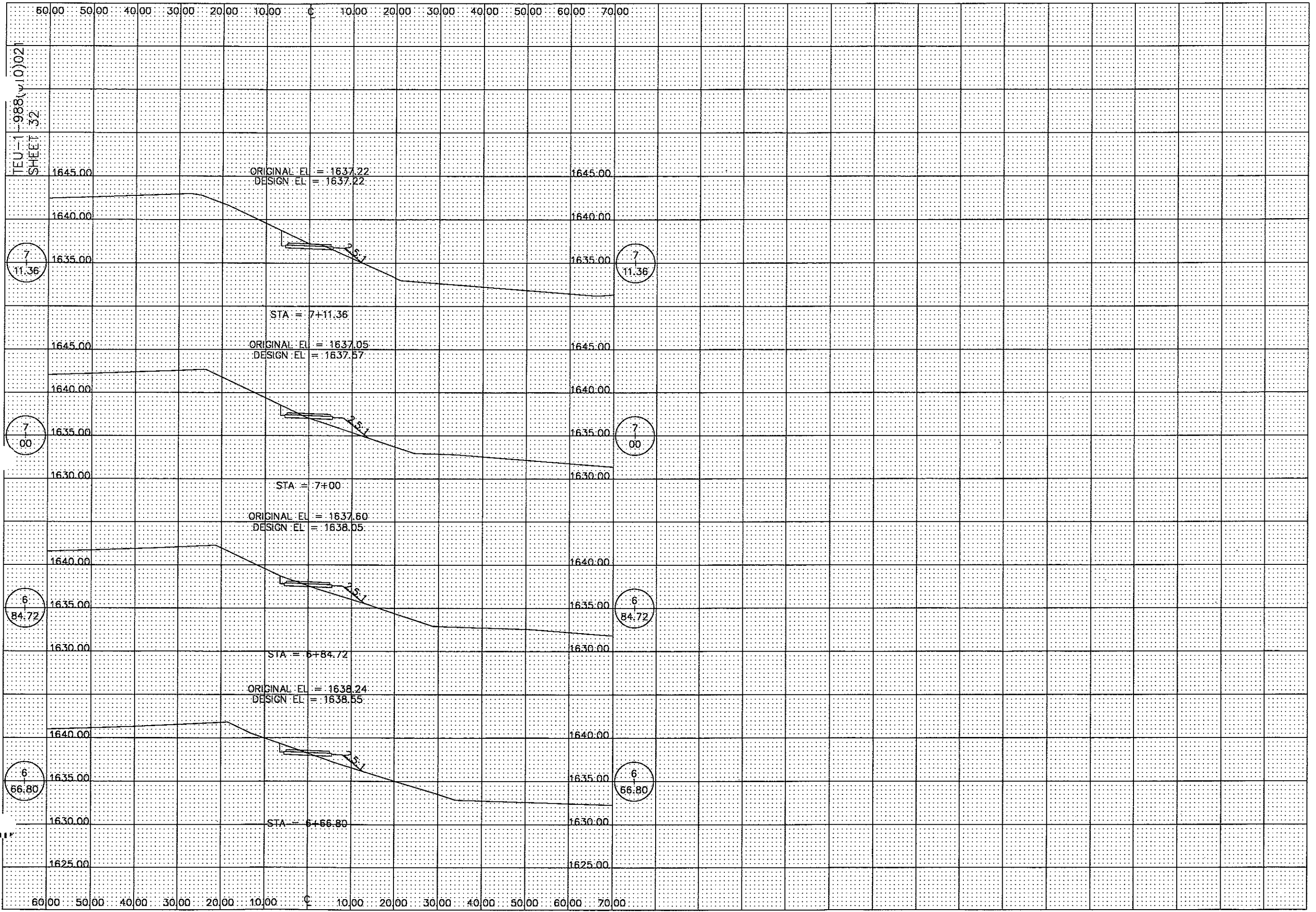


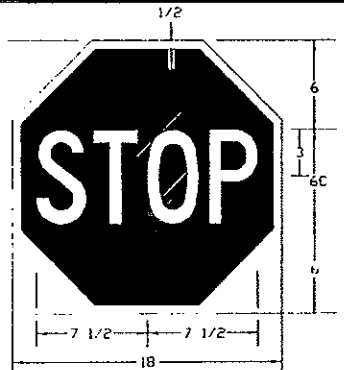




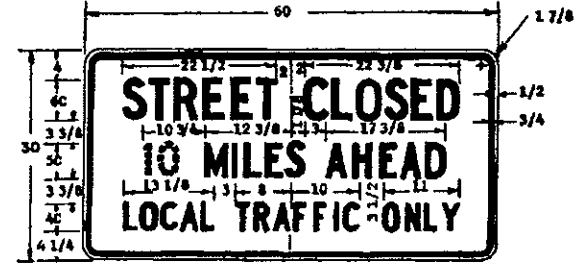
TEU-1-988(010)021
SHEET 31

411





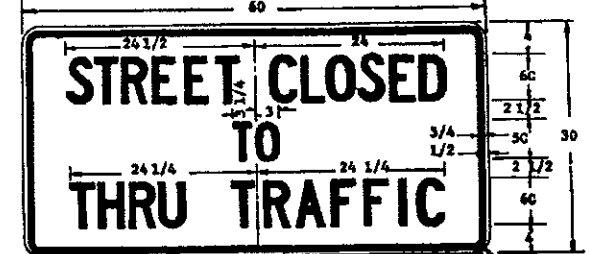
STOP-SLOW PADDLE
RED & WHITE
FLUORESCENT PADDLE



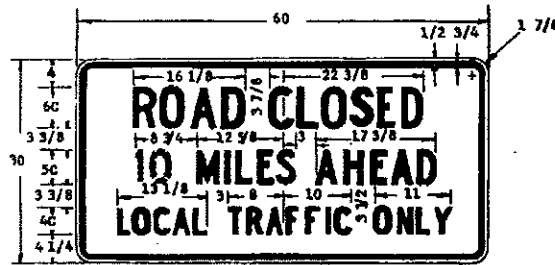
R11-3c-60
BLACK & WHITE



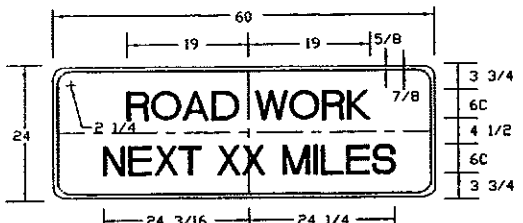
R11-2-48
BLACK & WHITE



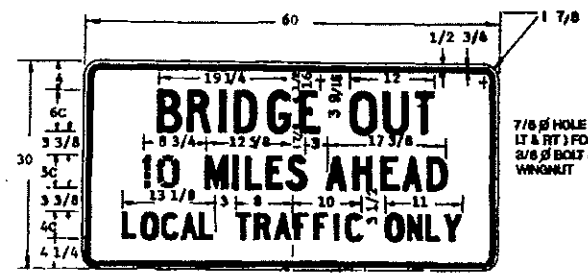
R11-4a-60
BLACK & WHITE



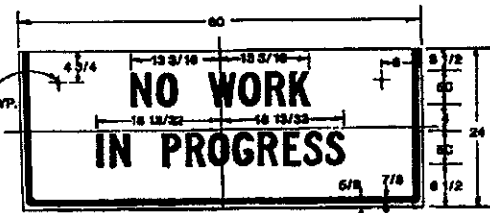
R11-3a-60
BLACK & WHITE



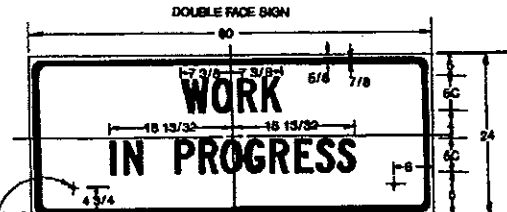
G20-1a-60
BLACK & ORANGE



R11-9-60
BLACK & WHITE

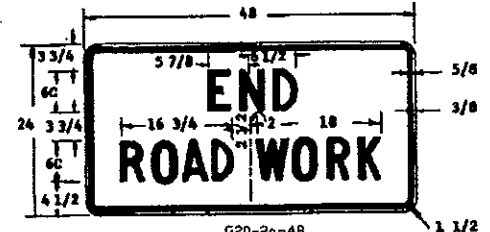


G20-1b-60
DOUBLE FACE SIGN
LEGEND: BLACK (NON-REFL)
BACKGROUND: ORANGE



G20-1b-60
DOUBLE FACE SIGN
LEGEND: BLACK (NON-REFL)
BACKGROUND: ORANGE

CONSTRUCTION SIGN DETAILS

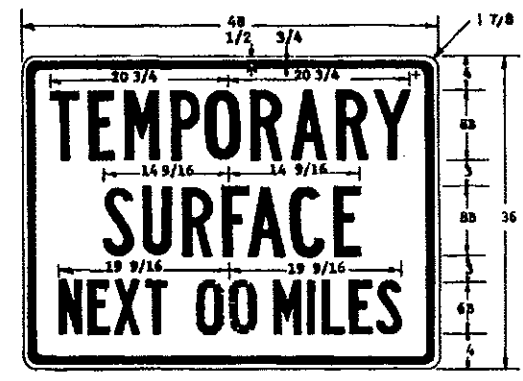


G20-2a-48
BLACK & ORANGE

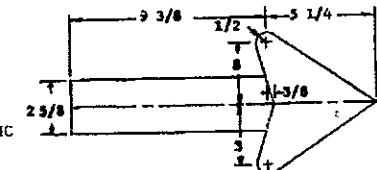


G20-4-36
BLACK & ORANGE

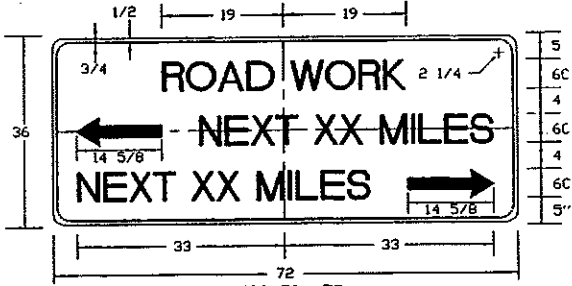
PILOT CAR SIGN SHALL BE MOUNTED ON REAR OF A VEHICLE USED FOR GUIDING CONTROLLED ONE-WAY TRAFFIC THROUGH A CONSTRUCTION AREA.



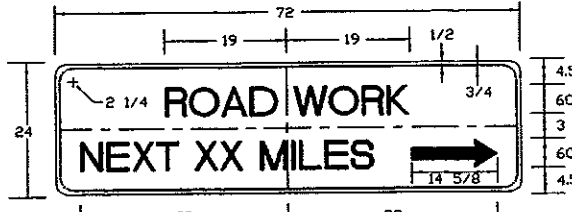
G20-8-48
BLACK & ORANGE



ARROW DETAIL FOR SIGN NOS.
G20-50a-72 & G20-52a-72

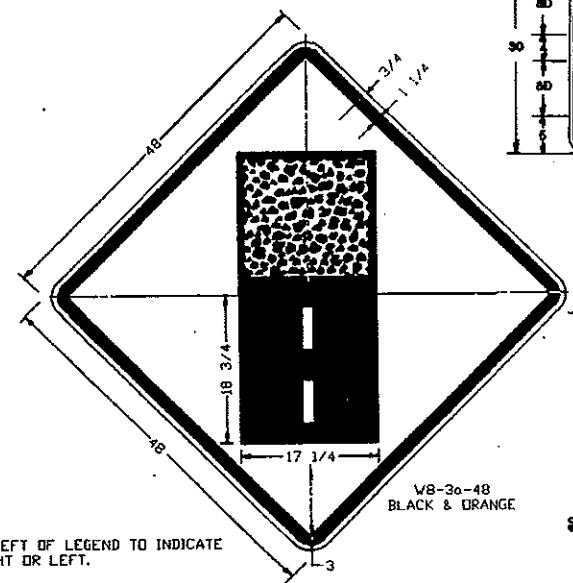


G20-50a-72
BLACK & ORANGE



G20-52a-72
BLACK & ORANGE

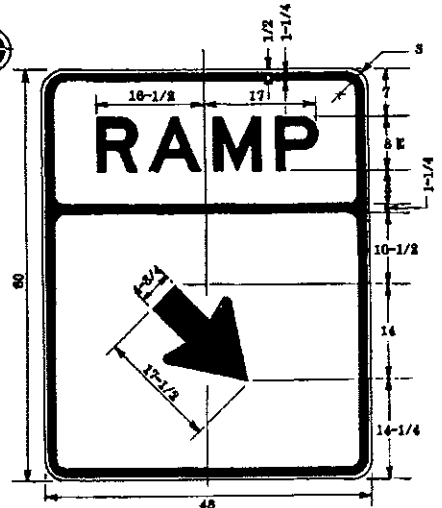
ARROW MAY BE RIGHT OR LEFT OF LEGEND TO INDICATE CONSTRUCTION TO THE RIGHT OR LEFT.



V8-3a-48
BLACK & ORANGE



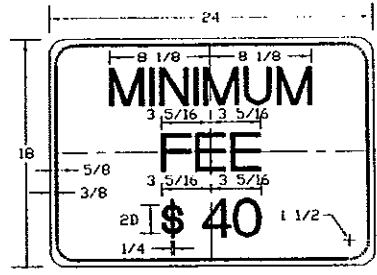
R11-2A-48
BLACK & WHITE



W13-4-48
BLACK & ORANGE



G20-54-48
BLACK & ORANGE



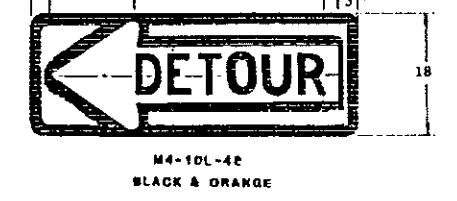
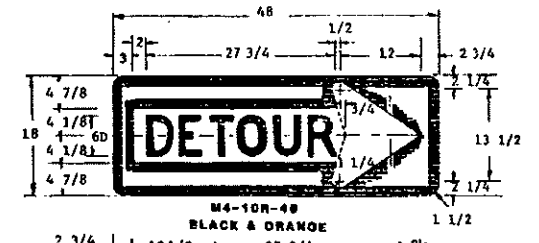
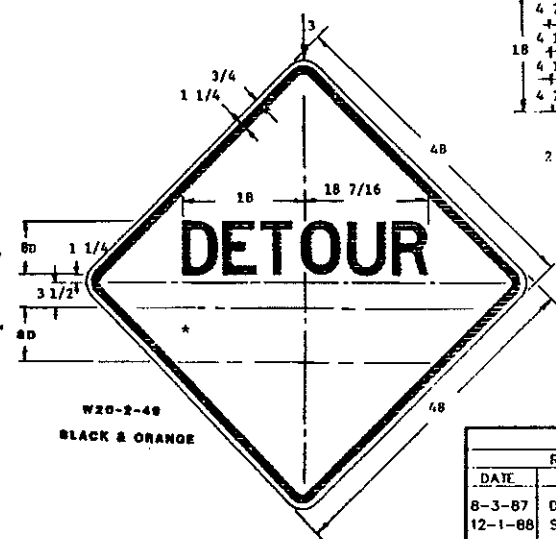
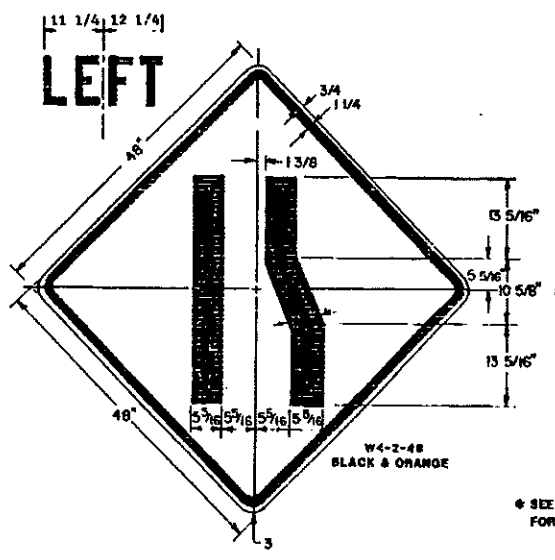
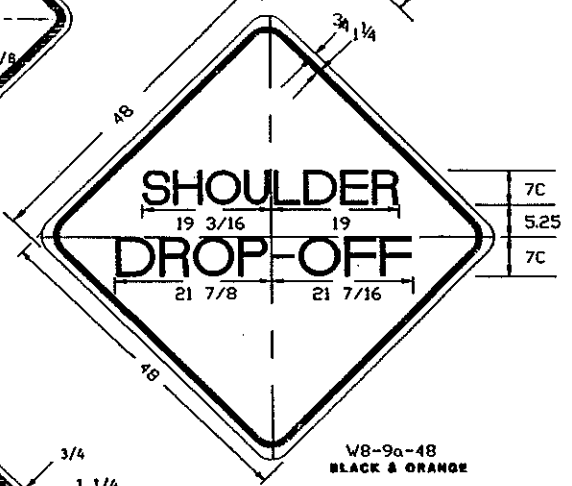
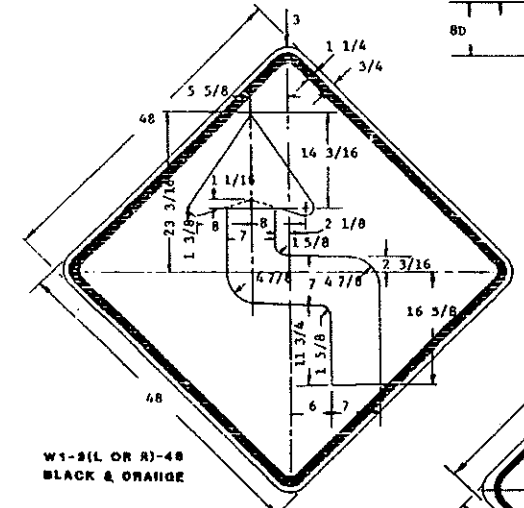
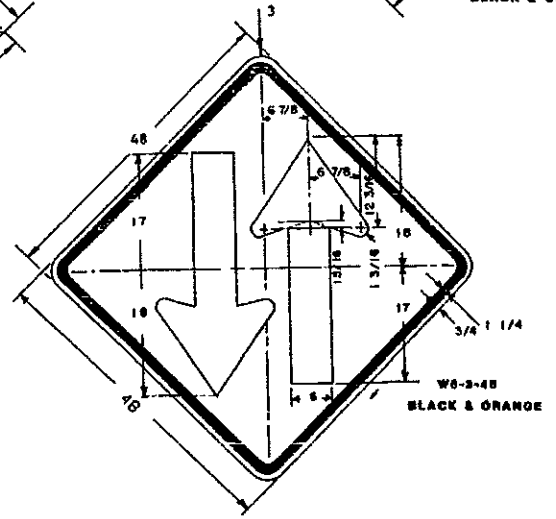
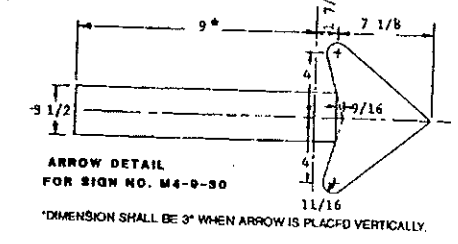
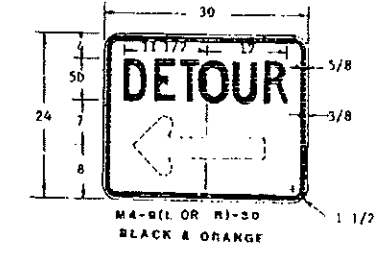
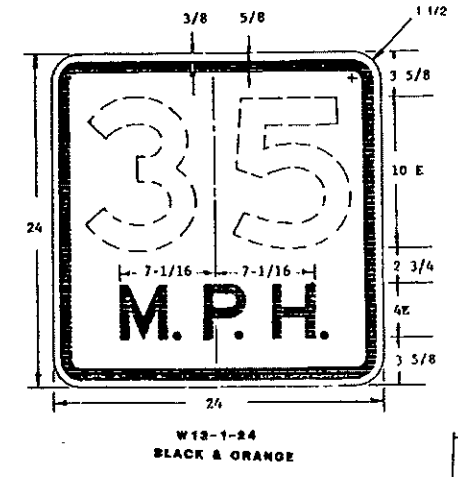
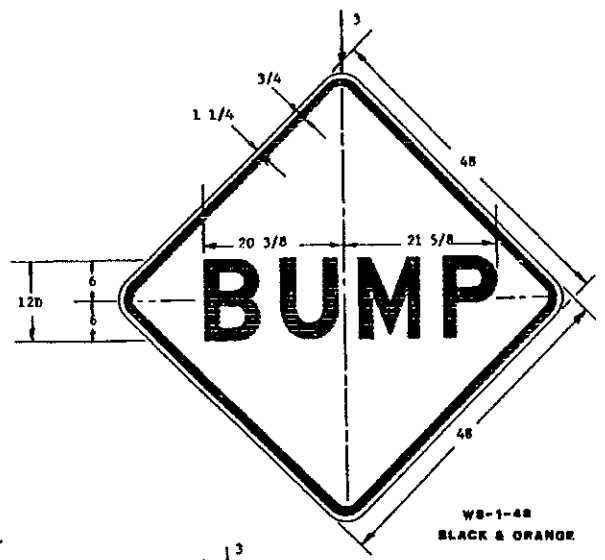
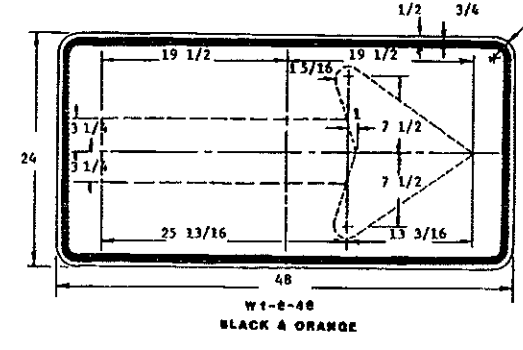
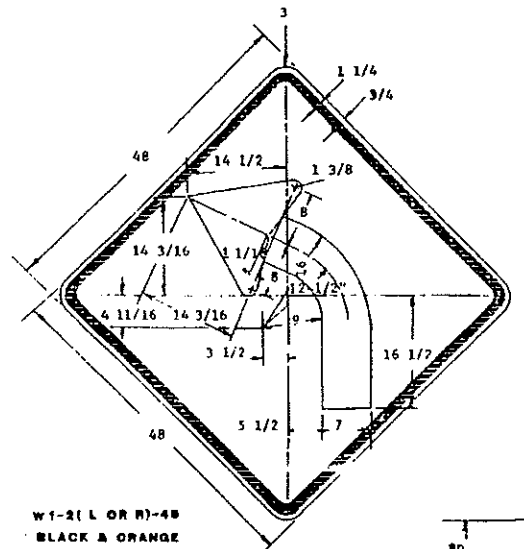
R2-1a-24
BLACK & WHITE

10-1-86 REVISIONS	
DATE	CHANGE
5-1-92	GENERAL REVISIONS
7-26-95	ADD SIGNS G20-1a, G20-50a, & R2-1a
3-4-96	REMOVE G20-2-60

APPROVED: *Frank C. Lee*
DESIGN ENGINEER

NURH GARCIA
DEPARTMENT OF TRANSPORTATION

CONSTRUCTION SIGN DETAILS



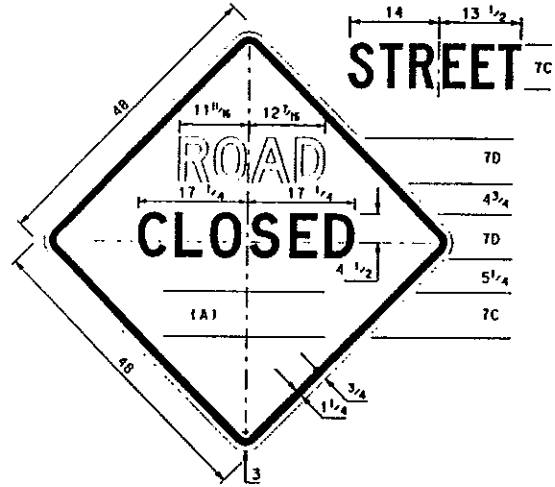
10-1-86	
DATE	REVISIONS
8-3-87	DETOUR NO.
12-1-88	SHOULDER DROP OFF
5-1-92	GENERAL REVISIONS
2-3-95	W8-9a-48
3-4-96	REMOVE W20-1-48

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
APPROVED *David K. Olson*
DESIGN ENGINEER

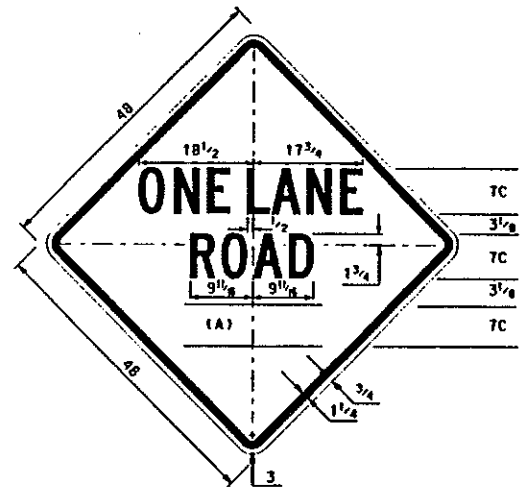
* SEE TABLE ON STANDARD D-704-12 FOR MESSAGES AND DIMENSIONS.

CONSTRUCTION SIGN DETAIL

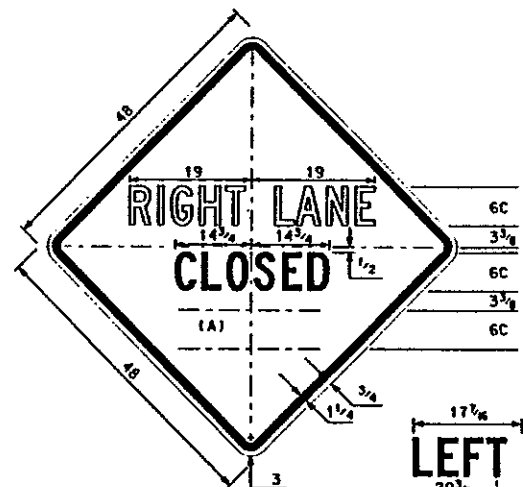
D-704-11



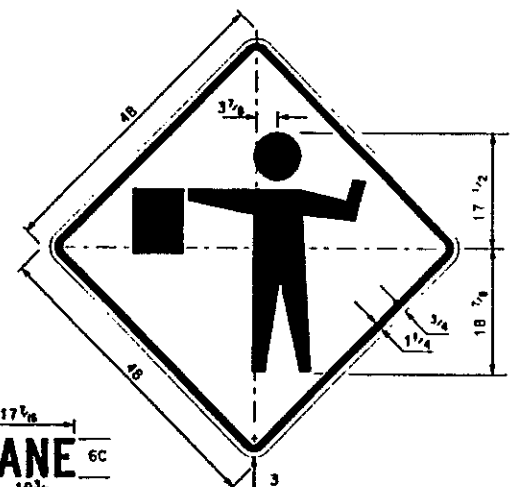
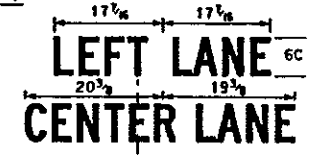
W20-3-48
Black & orange



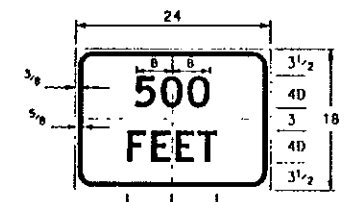
W20-4-48
Black & orange



W20-5-48
Black & orange



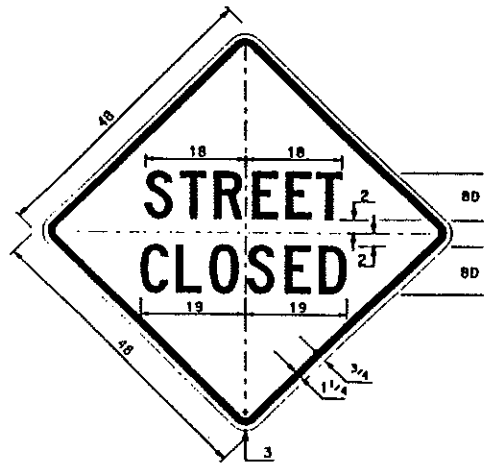
W20-7a-48
Black & orange



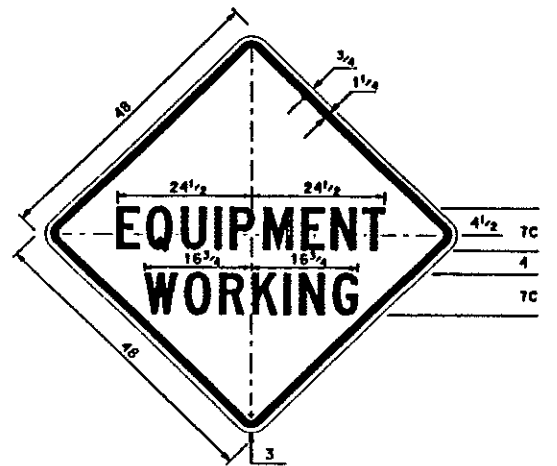
W20-7k-24
Black & orange

SIGN	DIMENSION B (INCHES)
500'	4 11/16
1000'	5 1/2
1500'	5 5/16

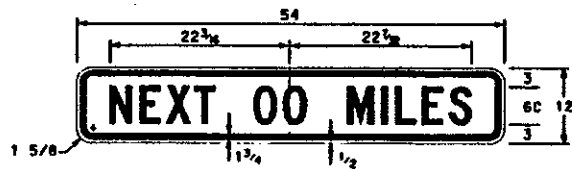
For use with
W20-7a-48 &
W21-1a-48



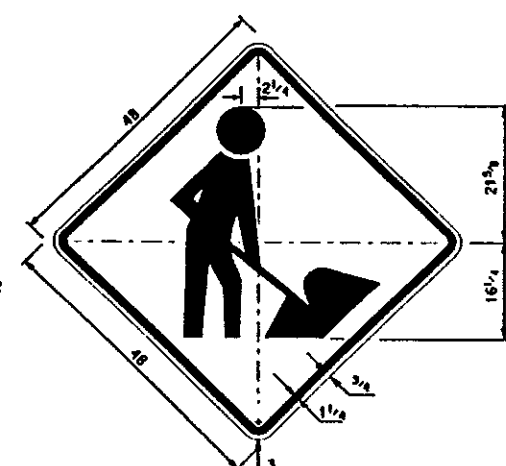
W20-8-48
Black & orange



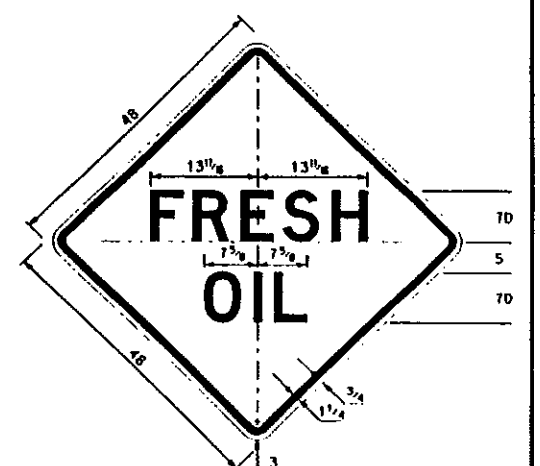
W20-51-48
Black & orange



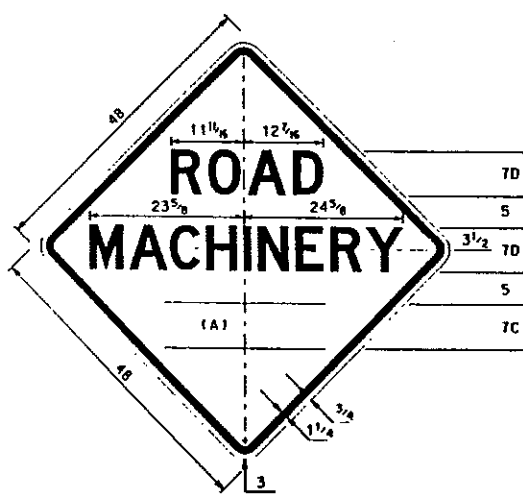
W20-52-48
Black & orange



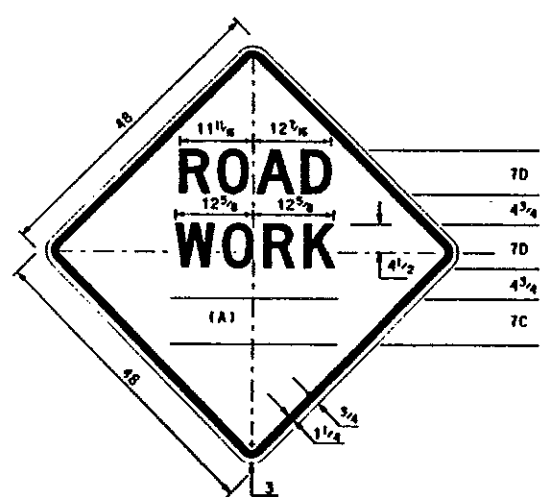
W21-1a-48
Black & orange



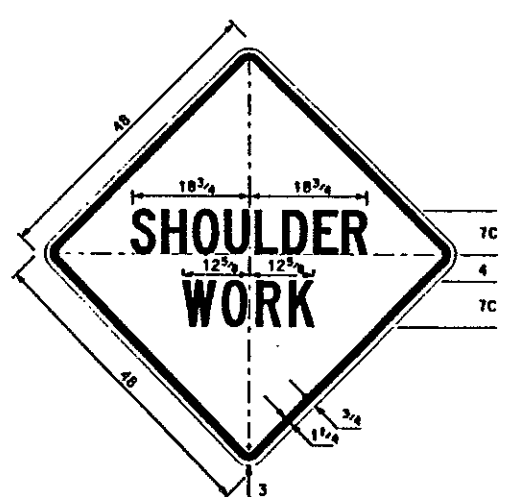
W21-2-48
Black & orange



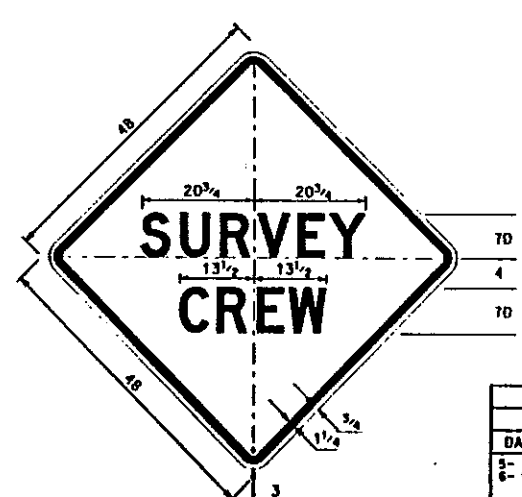
W21-3-48
Black & orange



W21-4-48
Black & orange



W21-5-48
Black & orange



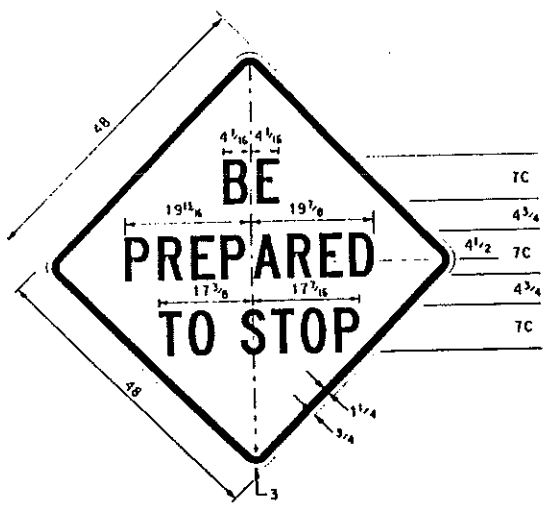
W21-6-48
Black & orange

NOTES:
(A) See table on standard D-704-12
for messages and dimensions.
All dimensions are in inches

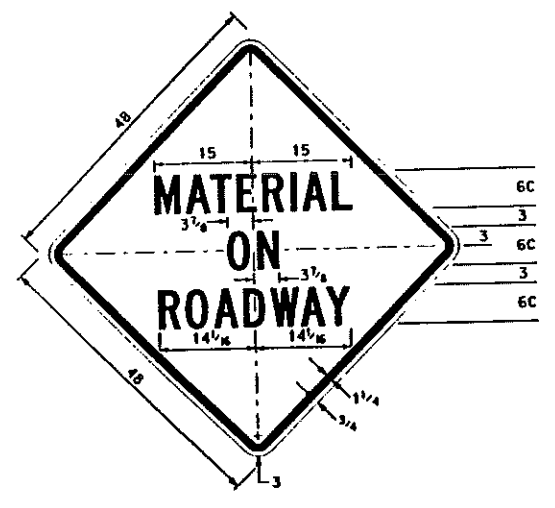
10-1-86	
REVISIONS	
DATE	CHANGE
5-1-92	General revisions
6-9-95	Chg TD to TC TDwg W20-3, W21-3 & W21-4

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
APPROVED: *K. H. B. J.*
DESIGN ENGINEER

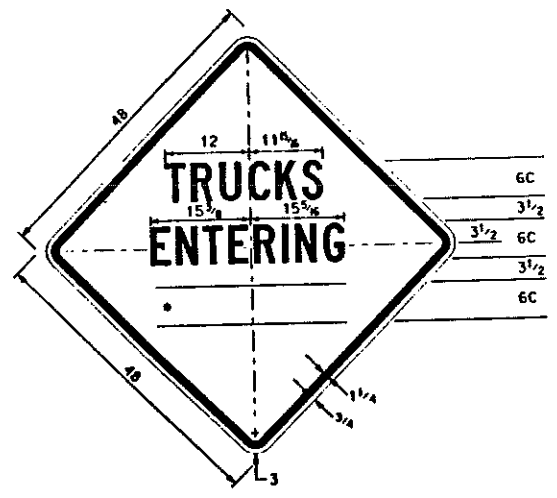
CONSTRUCTION SIGN DETAIL



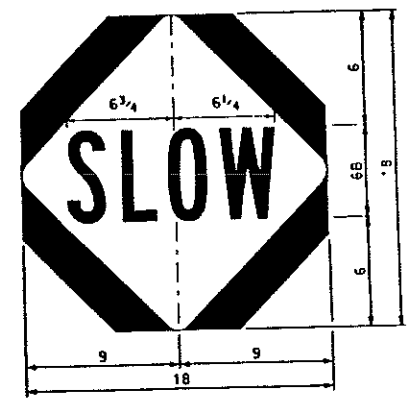
W20-7b-48
Black & orange



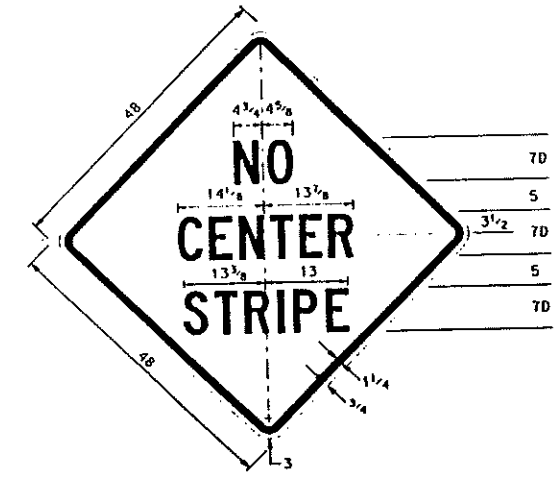
W21-51-48
Black & orange



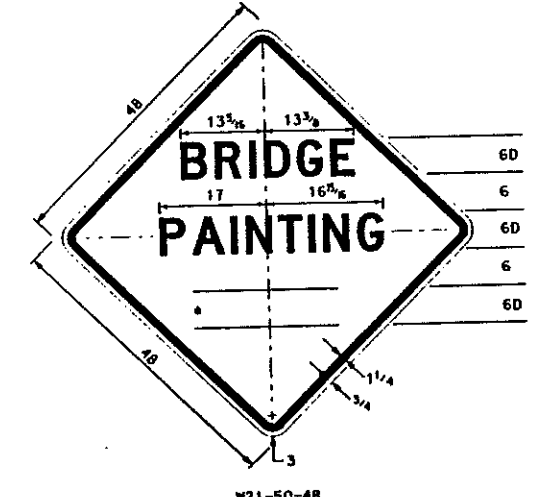
W8-54-48
Black & orange



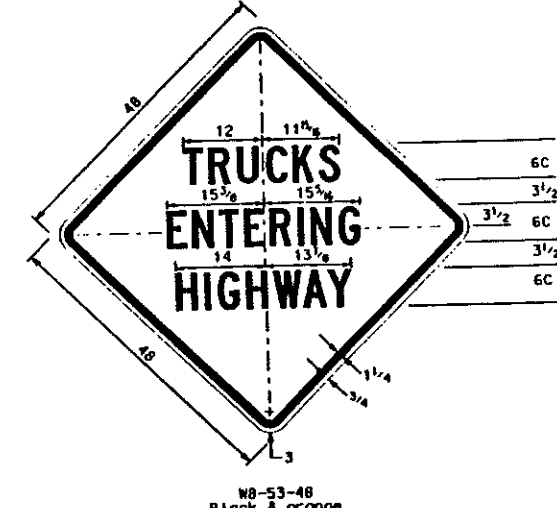
Slow-stop paddle
Black & orange
Flagperson paddle



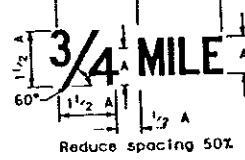
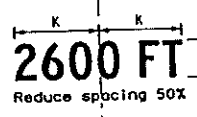
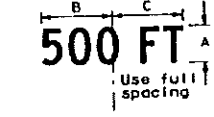
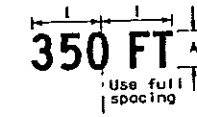
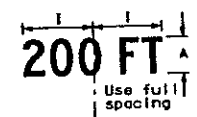
WB-12-48
Black & orange



W21-50-48
Black & orange



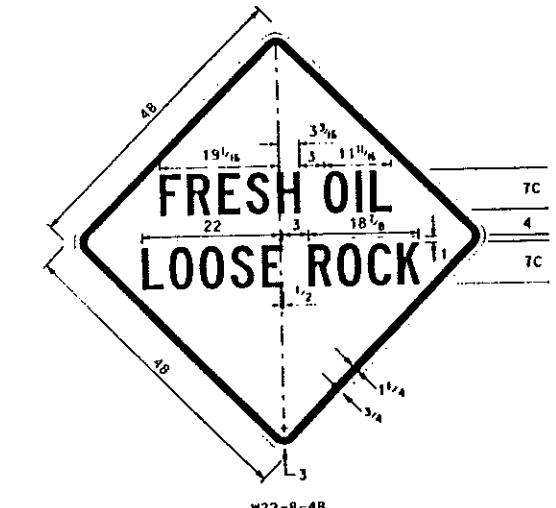
W8-53-48
Black & orange



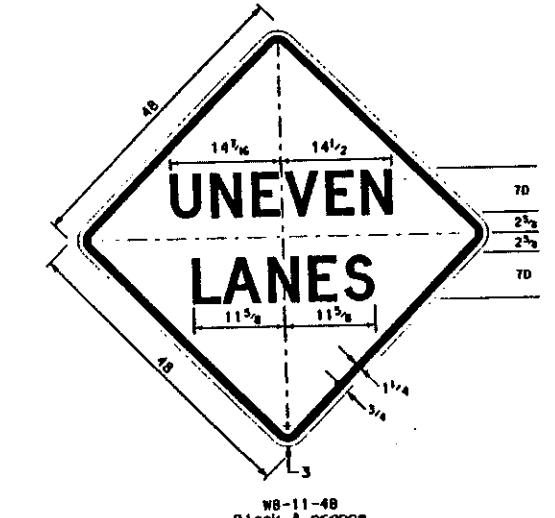
* DIMENSIONS (INCHES)

A	B	C	D	E	F	G	H	I	J	K
4C	6 1/8	7	7 1/2	8	8 5/16	6 1/16	7	8 3/16	9 1/8	9 3/4
5C	8 3/4	8 1/8	9 3/8	10	10 1/16	7 3/8	8 3/4	10 1/16	11 1/16	12 3/16
6C	10 3/8	10 1/2	11 1/4	12	12 1/2	9 1/8	10 1/2	12 1/2	13 3/4	14 5/8
7C	12	12 3/16	13 1/8	14	14 3/16	10 5/8	12 1/4	14 3/16	15	15 5/8
8C	13 3/4	14	15	16	16 5/8	12 1/8	14	16 3/4	18 1/4	19 1/2
4D	8 1/8	8 5/8	8 1/2	9	9	7 3/16	8 1/8	9 3/4	10 3/4	11 3/8
5D	10 3/16	10 1/4	11 3/8	11 1/4	11 1/4	9 1/2	10 1/8	12 1/8	13 1/4	14 1/4
6D	12 3/16	12 3/8	12 3/4	13 1/2	13 1/2	11 1/8	13 1/8	14 3/16	14 7/8	15 1/2
7D	14 1/4	15 1/8	14 7/8	15 3/4	15 3/4	13 1/16	15 1/2	15 1/2	15 1/2	16 1/8
8D	16 1/4	17 1/4	17	18	18	14 3/8	17 1/16	19 1/4	17 3/4	19 3/16

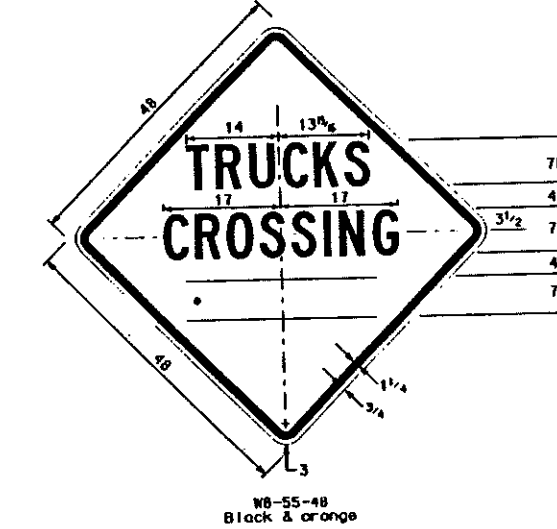
Standard signs that are shown in the construction sign and barricade location details shall be fabricated in the shape, color, and dimensions as shown in the standard signs layout booklet.



W22-8-48
Black & orange



W8-11-48
Black & orange



W8-55-48
Black & orange

10-1-86 REVISIONS

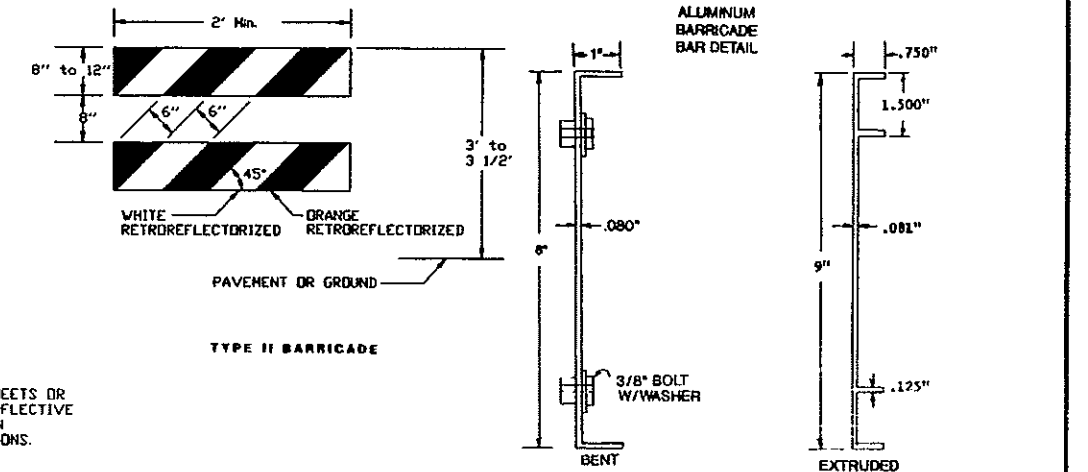
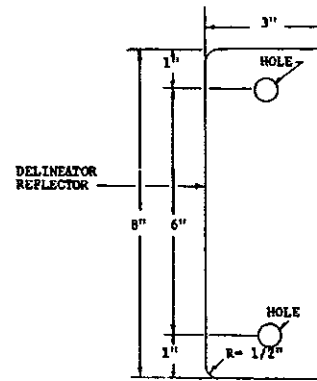
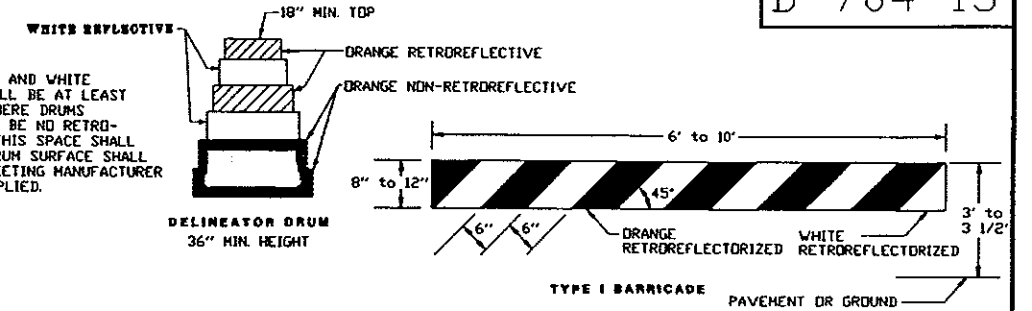
DATE	CHANGE
12-1-88	Uneven pavement
5-1-92	General revisions
1-24-95	W8-12-48
2-3-95	W8-11-48
6-15-95	General revisions
5-19-98	Added 3/4 mile

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
APPROVED: *K.H.B.*
DESIGN ENGINEER

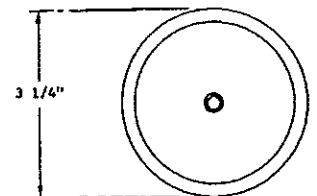
BARRICADE DETAILS

D-704-13

DELINEATOR DRUMS
 THE MARKINGS ON DRUMS SHALL BE ORANGE AND WHITE STRIPES 4 TO 6 INCHES WIDE. THERE SHALL BE AT LEAST TWO ORANGE AND TWO WHITE STRIPES. WHERE DRUMS HAVE RIBS OR INDENTATIONS, THERE SHALL BE NO RETRO-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 RETROREFLECTIVE SHEETING IS APPLIED.

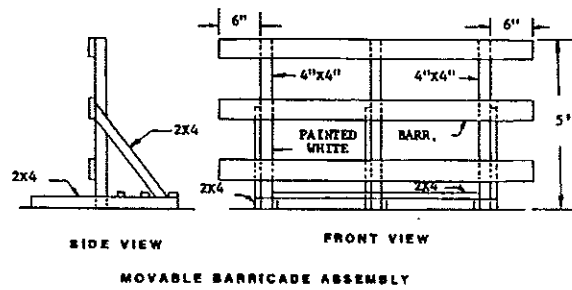
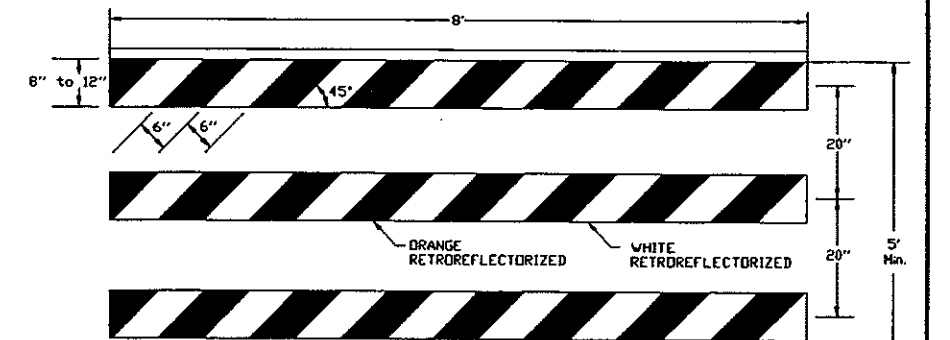


3" x 8" - 18 GAUGE GALVANIZED STEEL SHEETS OR .080" ALUMINUM PLATE WITH WHITE RETROREFLECTIVE SHEETING (TYPE 3A OR 3B) AS SPECIFIED IN SECTION 894 OF THE STANDARD SPECIFICATIONS.

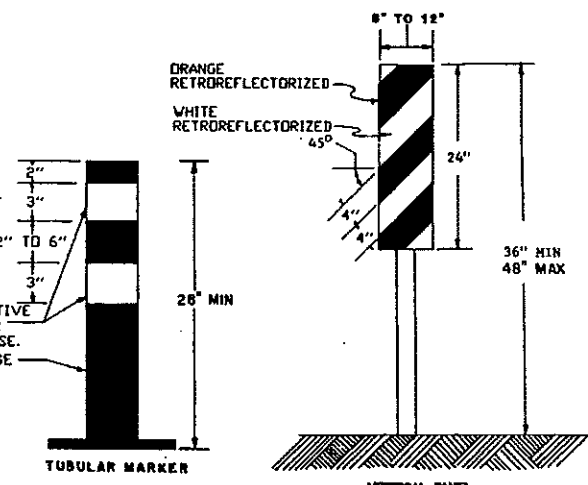
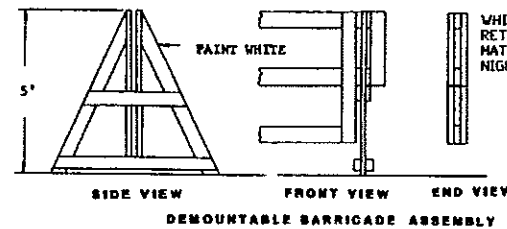
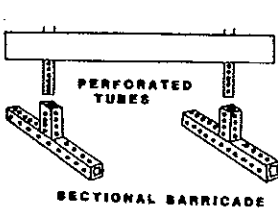
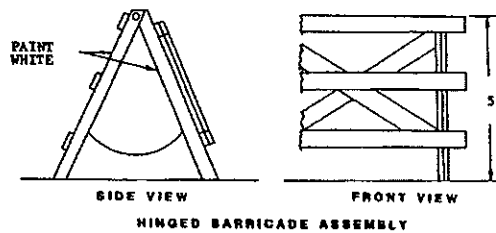


ACRYLIC PLASTIC REFLECTOR DELINEATOR REFLECTOR SHALL MEET THE REQUIREMENTS OF SECTION 894.

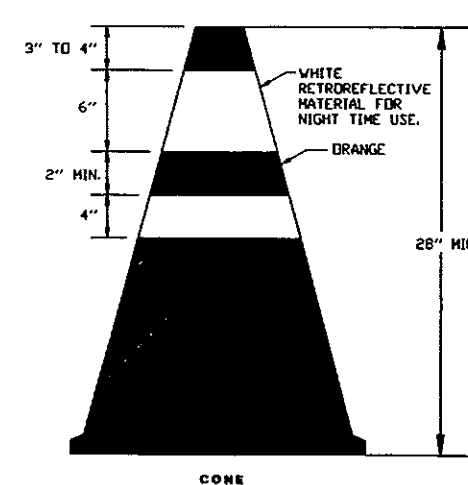
NOTE: VERTICAL PANELS USED ON THE EXPRESSWAYS OR OTHER HIGH SPEED ROADWAYS SHALL BE 12" BY 24".



NOTE: EACH MOVABLE BARRICADE SHALL BE WEIGHTED DOWN BY A SUFFICIENT NUMBER OF SAND BAGS 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.



(RETROREFLECTIVE SHEETING SHALL BE PLACED ON BOTH SIDES)



BARRICADES: NUMBER OF RETROREFLECTORIZED RAIL FACES

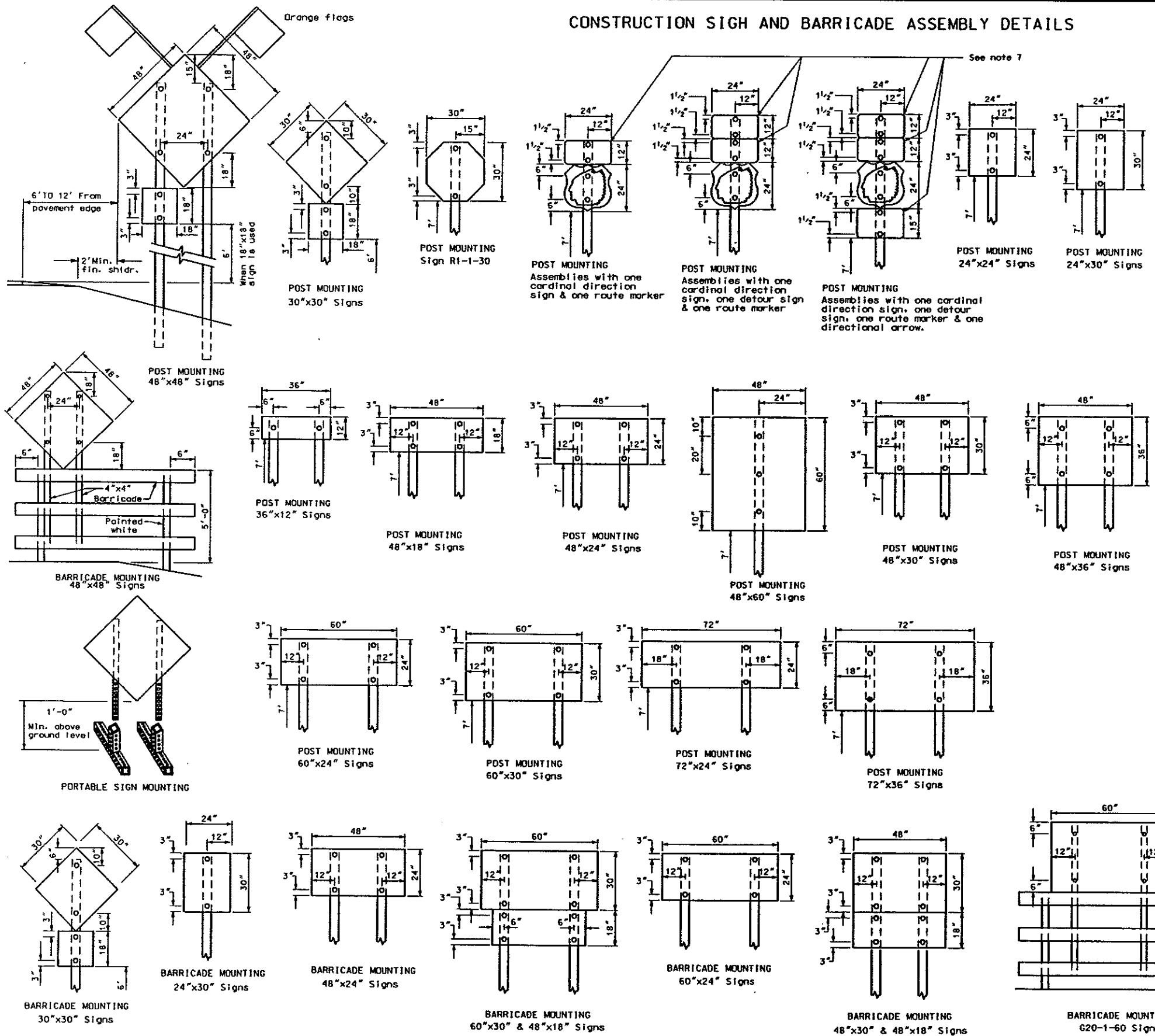
TYPE I	TYPE II	TYPE III
2 (One Each Direction)	4 (Two Each Direction)	8 (Facing in two Directions)

BARRICADE RAIL MATERIAL MAY BE 1" NOMINAL THICKNESS STANDARD LUMBER OR 3/4" PLYWOOD AND PREPARED AS RECOMMENDED BY THE SHEETING MANUFACTURER BEFORE RETROREFLECTIVE SHEETING IS APPLIED.

10-1-86 REVISIONS		NORTH DAKOTA DEPARTMENT OF TRANSPORTATION APPROVED: <i>David K. O. Lee</i> DESIGN ENGINEER
DATE	CHANGE	
8-3-87	TYPE SHEETING	
10-1-87	DELINEATOR DRUM NOTE	
6-9-88	BARRICADES TYPE III	
5-1-92	GENERAL REVISIONS	
6-10-93	GENERAL REVISIONS	
9-23-93	VERTICAL PANEL	
6-9-95	RETROREFLECTIVE SHEETING	

CONSTRUCTION SIGN AND BARRICADE ASSEMBLY DETAILS

D-704-14



NOTES:

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

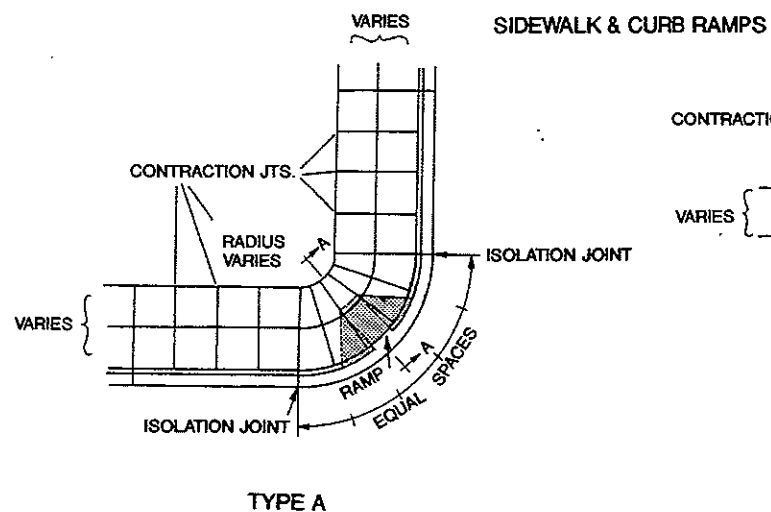
DELINEATOR ATTACHMENT AND POST MOUNTING DETAILS

10-1-86	
REVISIONS	
DATE	CHANGE
8-1-88	Sign assembly
5-1-92	Sign assembly
3-30-93	Sign supports note
3-4-96	Sign height
8-15-96	Note 8
7-10-97	Note Revision
7-31-98	Note & portable sign

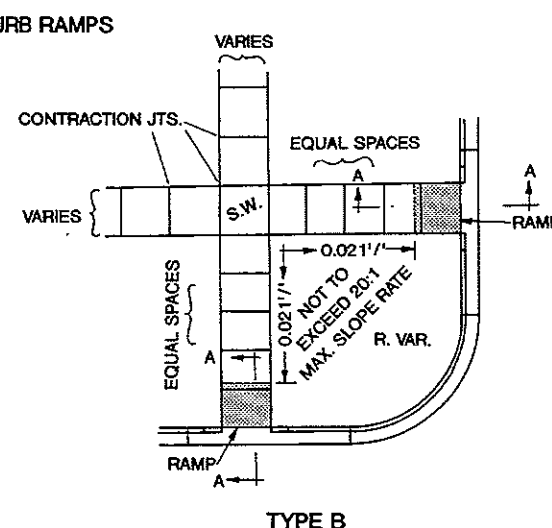
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
APPROVED: *K. H. B. B.*
DESIGN ENGINEER

NOTES

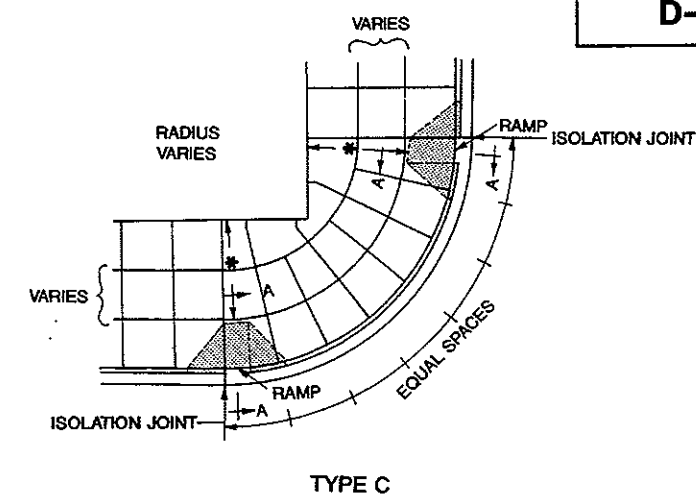
1. THE EXACT LOCATION & TYPE OF RAMP SHALL BE DETERMINED BY THE ENGINEER IN THE FIELD AFTER CONSULTATION WITH THE CITY ENGINEER & CHANGES MADE ACCORDINGLY.
2. THE RAMP SHALL HAVE A SLIP RESISTANT SURFACE
3. METHOD OF PAYMENT: THE CURB RAMP WILL NOT BE PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN THE QUANTITIES & PAID FOR AT THE UNIT PRICE FOR CONCRETE SIDEWALK AND CURB & GUTTER.
4. THE COST FOR ALL LABOR, EQUIPMENT, AND MATERIAL (Pre-molded Expansion Material & Hot Bituminous Joint Filler) NECESSARY TO CONSTRUCT CONTRACTION AND ISOLATION JOINTS SHALL BE INCLUDED IN THE PRICE BID FOR SIDEWALK.



TYPE A

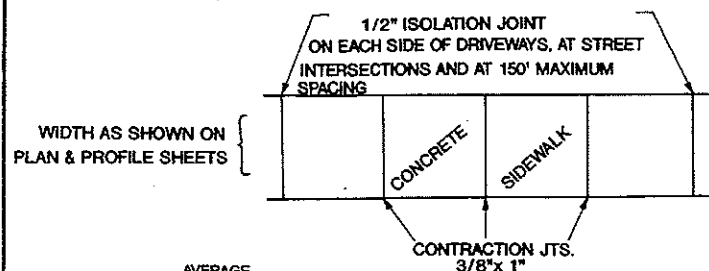


TYPE B



TYPE C

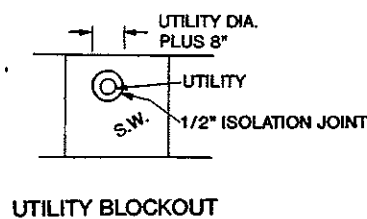
TYPE II CURB AS SHOWN ON THE PLANS OR AT THE DIRECTION OF THE ENGINEER, A CURB SHALL BE CONSTRUCTED WHERE THE EXISTING SIDEWALK, ABUTTING A BUILDING OR ADJACENT PROPERTY, IS TO BE LOWERED. THE CURB WILL BE PAID FOR AT THE UNIT PRICE BID FOR CURB (TYPE-1) PER LINEAL FOOT.



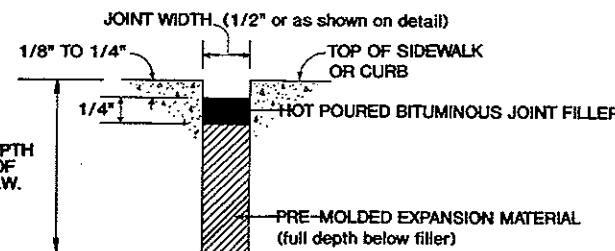
CONCRETE SIDEWALK DETAILS

WHEN THE SIDEWALK IS ADJACENT TO THE CURB & GUTTER THE SIDEWALK JOINTS SPACING SHALL BE VARIED SO THAT THE SIDEWALK JOINTS MATCH UP WITH THE CURB & GUTTER JOINTS

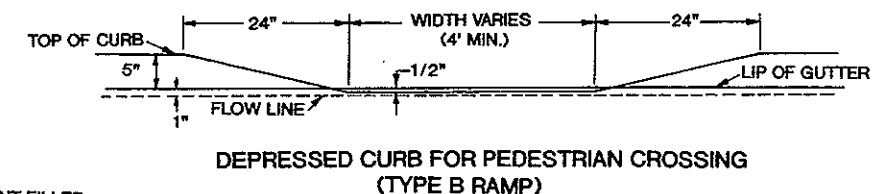
SIDEWALK WIDTH	AVERAGE CONTRACTION JOINT SPACING
4'-6"	5'
OVER 6'	6'



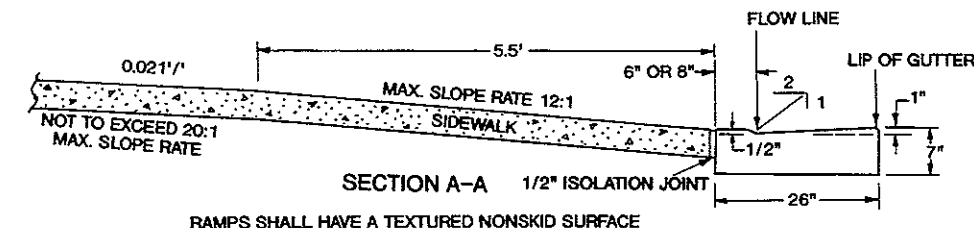
UTILITY BLOCKOUT



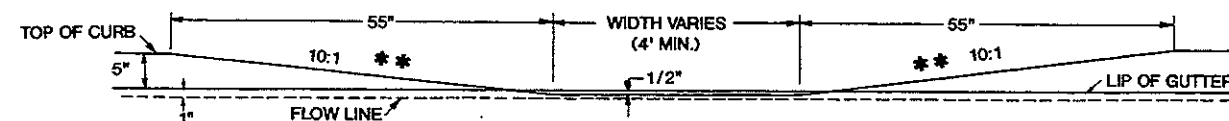
TYPICAL ISOLATION JOINT SEAL (longitudinal and transverse)



DEPRESSED CURB FOR PEDESTRIAN CROSSING (TYPE B RAMP)

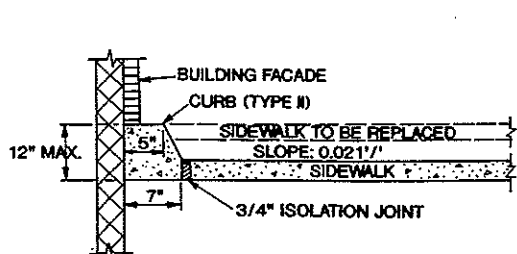


SECTIONS A-A 1/2\"/>

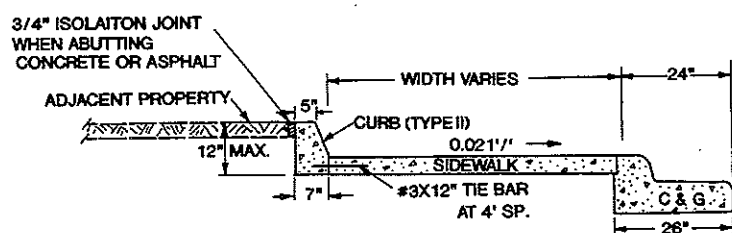


DEPRESSED CURB FOR PEDESTRIAN CROSSING (TYPE A & C RAMPS)

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

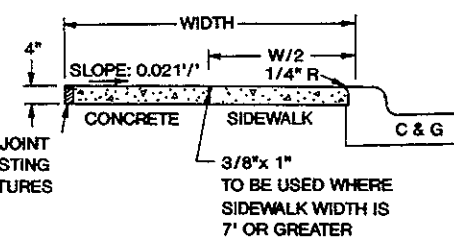


TYPE II CURB DETAIL



CURB DETAIL

3/4\"/>

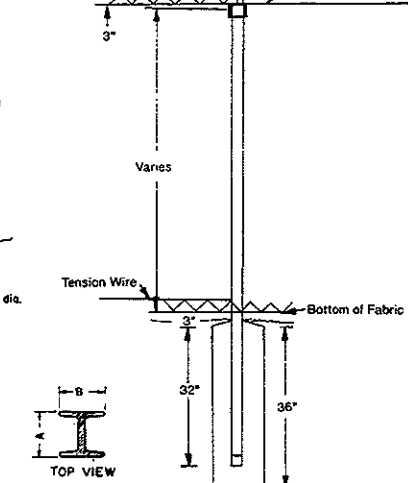
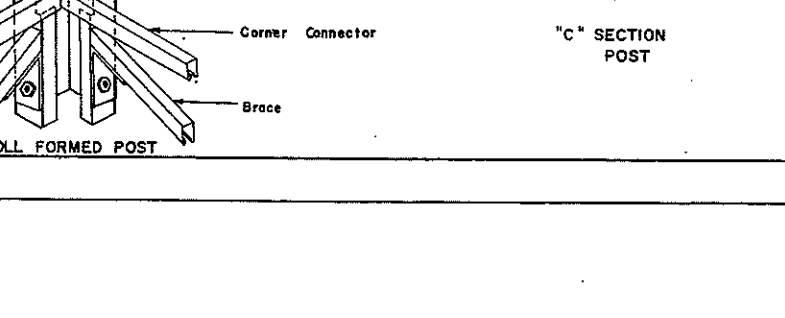
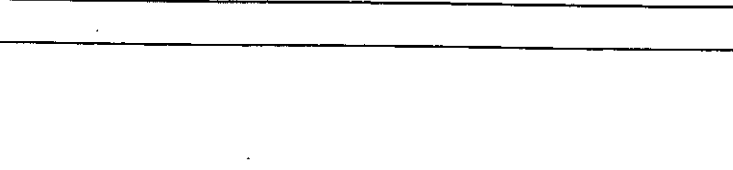
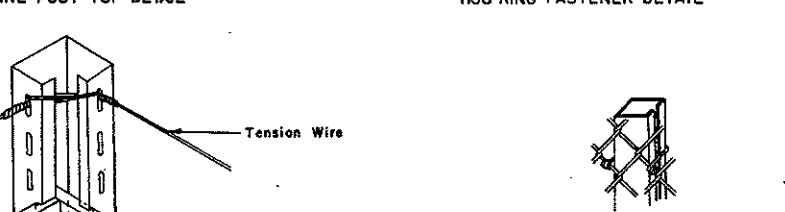
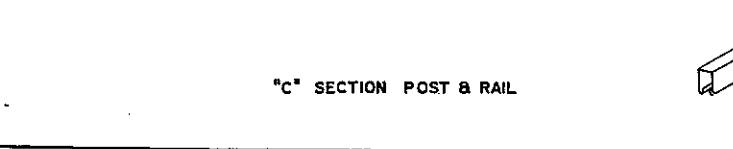
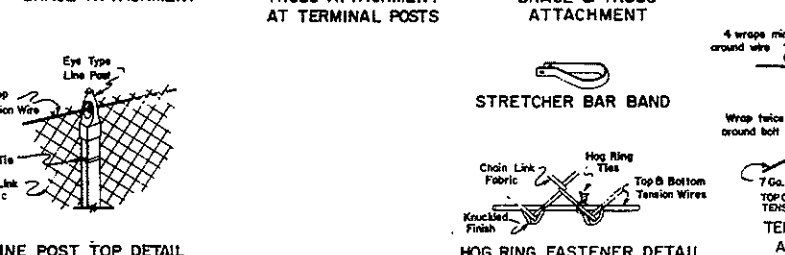
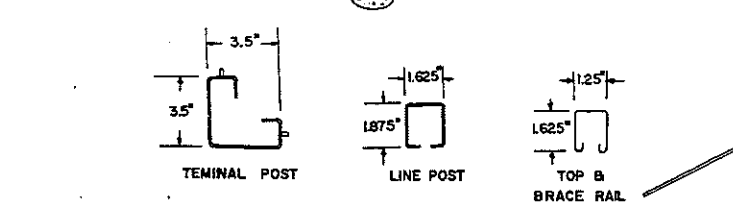
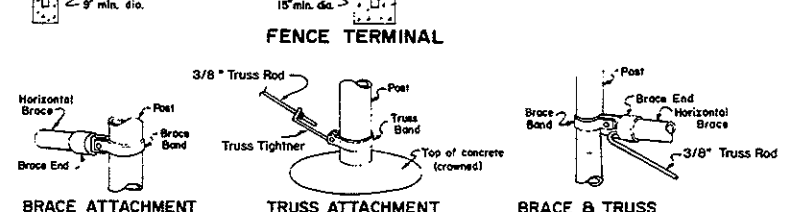
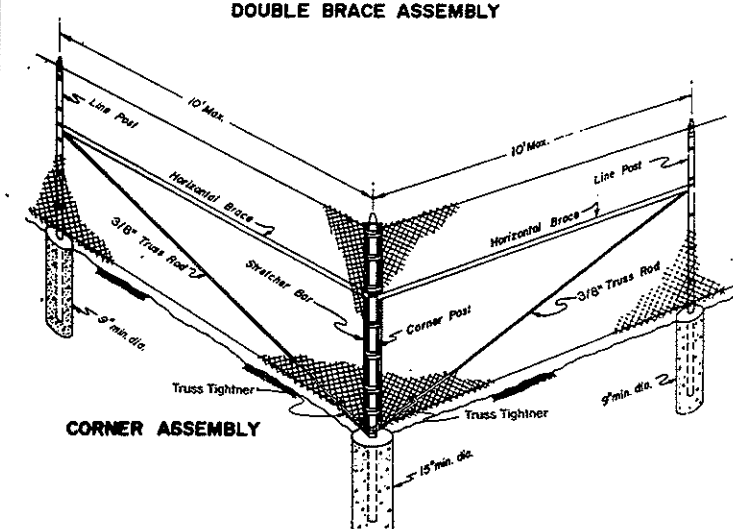
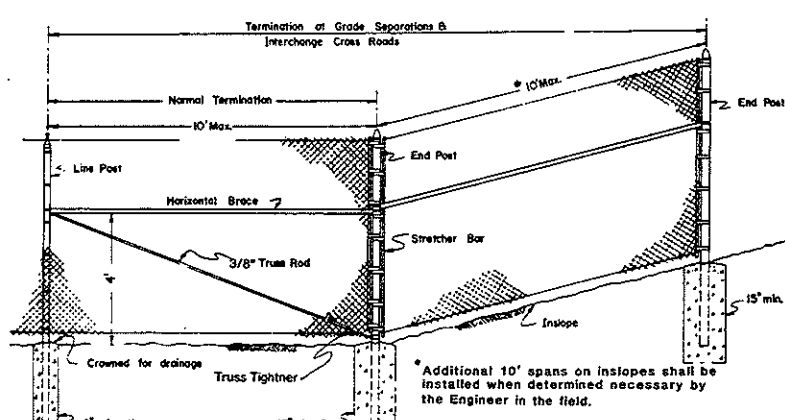
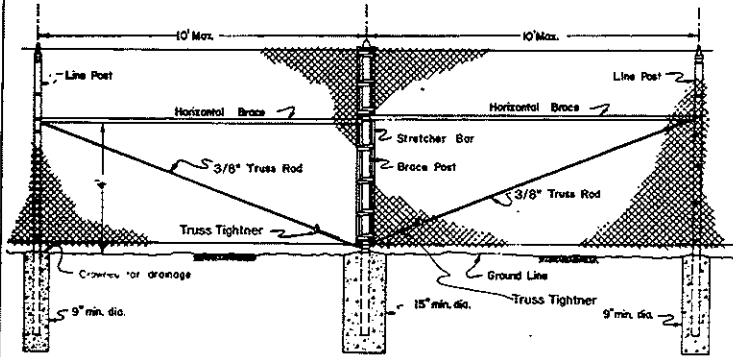
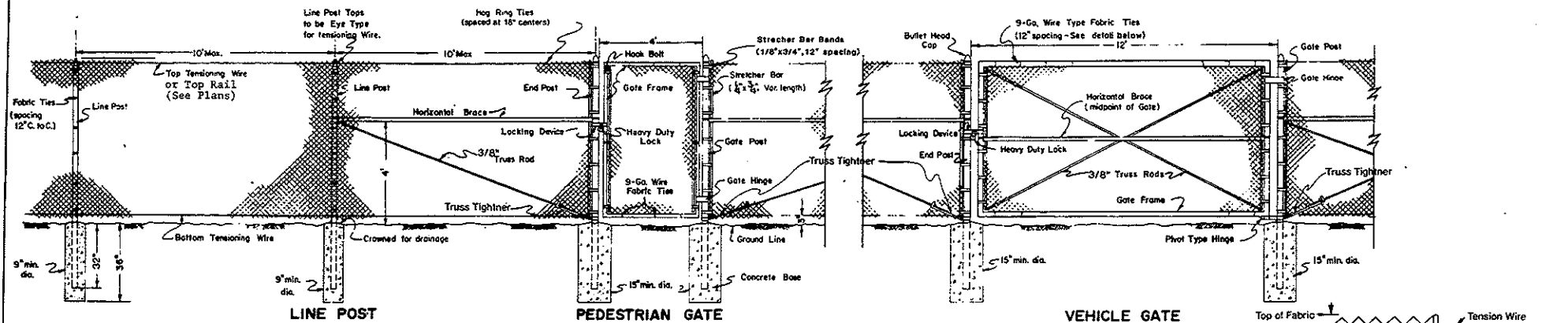


3/8\"/>

3-19-92	
DATE	REVISIONS
9-1-92	REMOVE DETECTABLE WARNING
9-23-92	REVISED EXPANSION JOINT
12-5-93	ISOLATION JOINT
2-16-94	GENERAL REVISIONS

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
 APPROVED *D. Wick*
 DESIGN ENGINEER

CHAIN LINK FENCE



DOUBLE BRACE ASSEMBLIES SHALL BE INSTALLED AT LOCATIONS SHOWN ON THE PLANS OR ESTABLISHED BY THE ENGINEER. THE DISTANCE 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.

HEIGHT OF FABRIC SHALL BE 6' UNLESS OTHERWISE SHOWN ON THE PLANS.

CONCRETE FOR THE 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 WRITTEN PERMISSION OF THE ENGINEER.

CHAIN LINK FABRIC SHALL BE 9-GAGE WIRE 2\"/>

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 P.S.I.

THE FABRIC SHALL BE TIED TO THE TENSION WIRE AS RECOMMENDED BY THE MANUFACTURER.

PRIVATE FENCES SHALL NOT BE CONNECTED TO THE HIGHWAY RIGHT-OF-WAY FENCE, BUT MAY BE ABUTTED NEXT TO THE RIGHT-OF-WAY FENCE.

HOT-DIP ZINC-5% ALUMINUM-MISCHMETAL ALLOY COATING CONFORMING TO THE PERTINENT REQUIREMENTS OF ASTM A 875 MAY BE APPLIED TO GRADE 1 STEEL POSTS, RAILS, OR GATE FRAMES AS AN ALTERNATIVE TO HOT-DIPPED GALVANIZED COATING. THE WEIGHT OF THE ALLOY COATING SHALL BE 2.1 OUNCES PER SQUARE FOOT, TESTED IN ACCORDANCE WITH ASTM A 90.

ROLL-FORMED SECTIONS SHALL BE FABRICATED FROM MATERIAL MEETING THE REQUIREMENTS OF ASTM A 570, GRADE 45, AND SHALL BE GALVANIZED IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM A 123, OR COATED WITH ZINC-5% ALUMINUM MISCHMETAL ALLOY IN ACCORDANCE WITH ASTM F 1234, TYPE C.

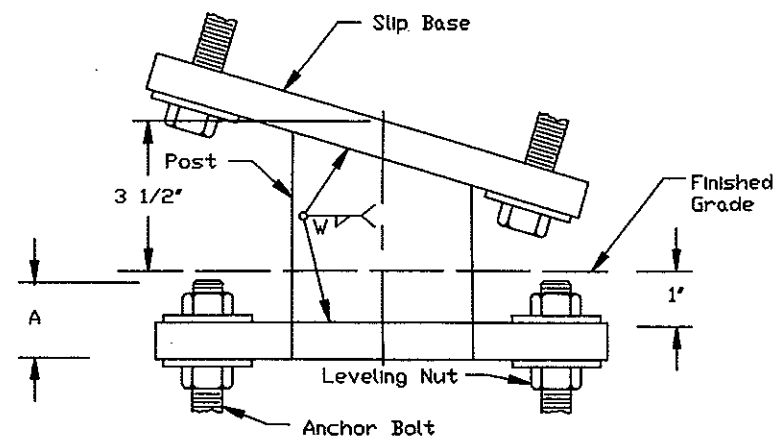
USE OF POST	SECTION	EQUIVALENT POST SIZES AND WEIGHTS								
		"C" SEC. STEEL		"H" COLUMN STEEL		ROUND STEEL				
		Size	Weight	Size	Weight	Size	Weight - Lbs./Ft.	Class 1	Class 2	
LINE POST	Fabric 6' or less	1.875 x 1.625	1.60	2.25" x 1.70"	3.43	1.900"	2.72	2.28		
	Fabric over 6'	1.875 x 1.625	2.34	2.25" x 1.70"	3.43	2.375"	3.65	3.12		
END, CORNER	Fabric 6' or less	3.5 x 3.5	5.10			2.375"	3.65	3.12		
	Fabric over 6'	3.5 x 3.5	5.10			2.875"	5.79	4.64		
GATE POST	All	3.5 x 3.5	5.10			3.500"		5.71		
EXTERIOR FRAME FOR GATE	Gate width 6' or less					4.000"	9.11			
	Gate width over 6'					1.315"	1.68	1.35		
HORIZONTAL BRACE		1.625 x 1.25	1.35			1.900"	2.72	2.28		
						1.660"	2.27	1.84		
BRACE POST	Fabric 6' or less	1.875 x 1.624	2.34			2.375"	3.65	3.12		
	Fabric 6' or less	1.875 x 1.624	2.34			2.875"	5.79	4.64		

10-1-86 REVISIONS		NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
DATE	CHANGE	
10-15-86	NOTE	APPROVED <i>David K. Lee</i> DESIGN ENGINEER
12-11-86	NOTE	
9-4-90	PRIVATE FENCE NOTE	
7-22-92	REMOVE TOP RAIL	
5-1-92	NOTE	
12-31-92	H-POSTS & NOTES	
7-16-93	Truss Rod & Tightener	
10-31-94	GENERAL	

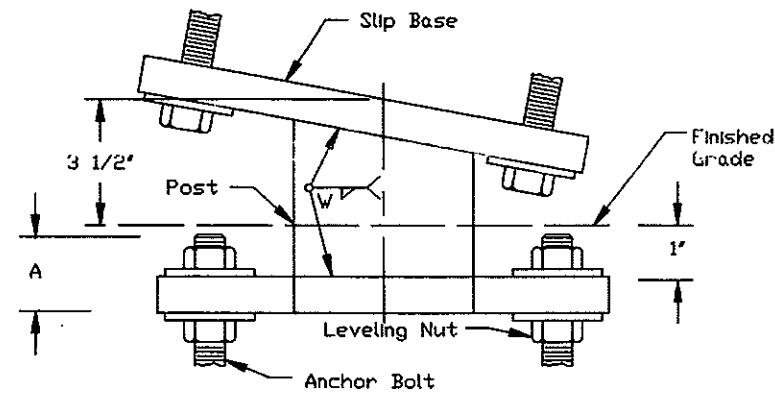
BREAK AWAY BASE AND FOUNDATION DETAILS

ANCHOR BOLT CONNECTION

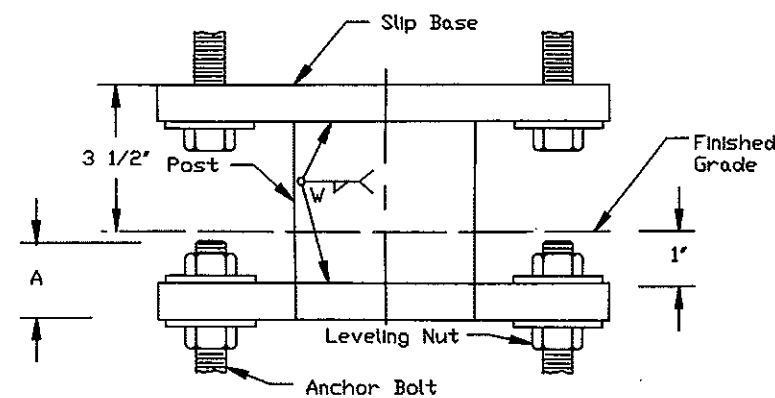
D-754-2



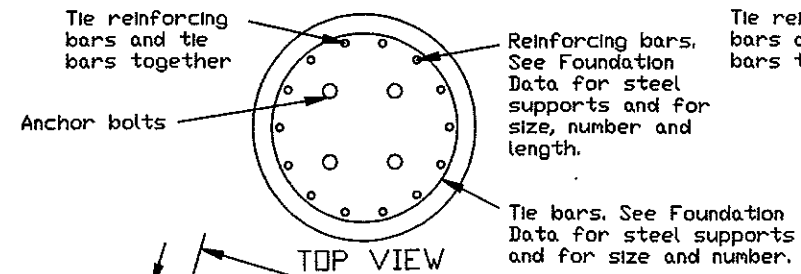
**ELEVATION
SINGLE POST SIGN
AND ANCHOR BOLT CONNECTION**



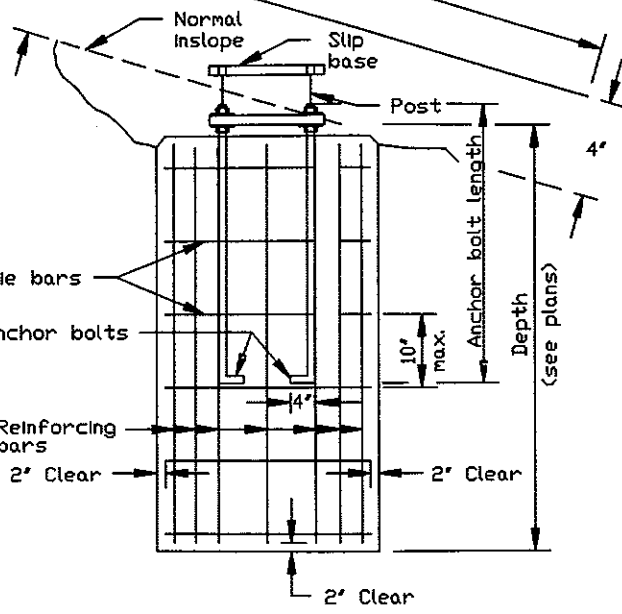
**ELEVATION
TWO POST SIGN AND
ANCHOR BOLT CONNECTION
For signs with less than 8' post spacing**



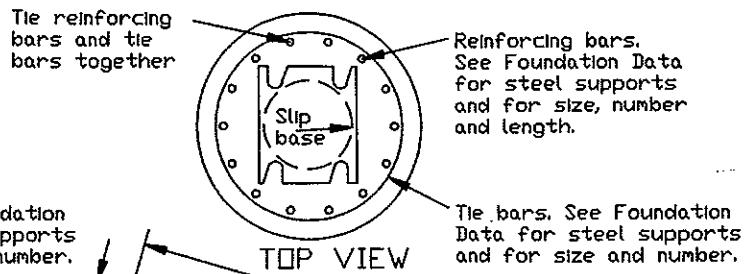
**ELEVATION
TWO OR MORE POST SIGN
AND ANCHOR BOLT CONNECTION
For signs with less than 8' post spacing**



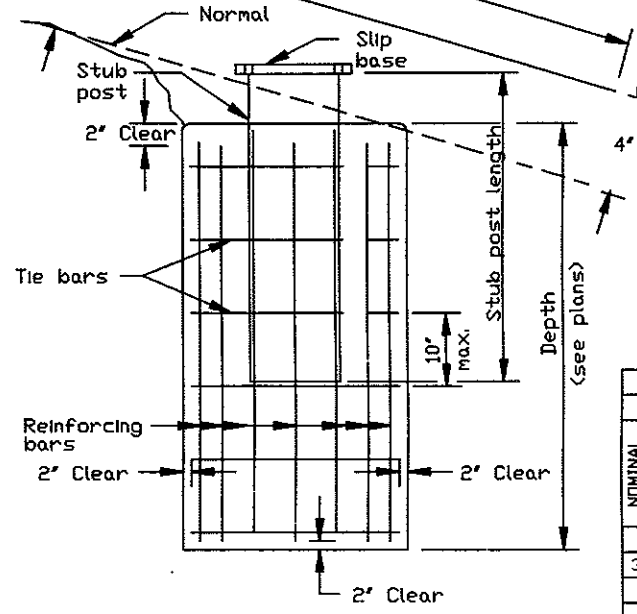
TOP VIEW



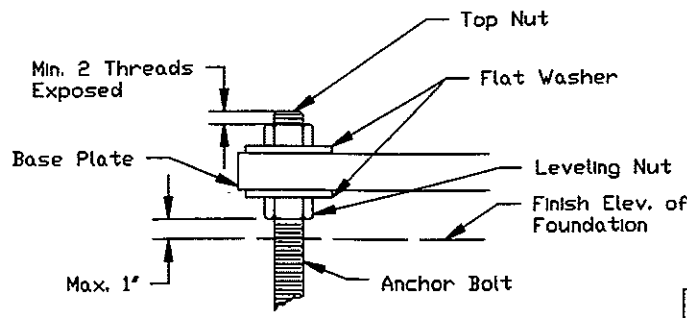
**FRONT VIEW
FOUNDATION DETAIL
For break away base
with anchor bolt connection**



TOP VIEW



**FRONT VIEW
FOUNDATION DETAIL
For break away base
with stub post connection**



ANCHOR BOLT DETAIL

NOTE:

FOUNDATION DATA OBTAINED FROM STANDARD DRAWING D-754-5.
4" VERTICAL CLEARANCE OF BREAK AWAY BASE. THE 4' x 60" MEASUREMENT SHALL BE MADE ABOVE AND BELOW POST LOCATION AND ALSO BACK AND AHEAD OF POST.

ROUND METAL POSTS						
DIMENSIONS				PROPERTIES		
NOMINAL DIAMETER IN.	OUTSIDE DIAMETER IN.	INSIDE DIAMETER IN.	WALL THICKNESS IN.	WEIGHT PER FOOT POUND	MOMENT OF INERTIA IN ⁴	CROSS SECT. AREA IN. SQ.
STEEL POSTS						
3 1/2	4.000	3.548	.226	9.11	4.788	2.680
4	4.500	4.026	.237	10.79	7.233	3.174
5	5.563	5.047	.258	14.62	15.16	4.300
6	6.625	6.065	.280	18.97	28.14	5.581
8	8.625	8.071	.277	24.70	63.35	7.265
10	10.750	10.192	.279	31.20	125.9	9.178
12	12.750	12.090	.330	43.77	248.5	12.88
12	12.750	12.000	.375	49.56	279.3	14.58
ALUMINUM POSTS						
3 1/2	4.000	3.548	.226	3.151	4.788	2.680
4	4.500	4.026	.237	3.733	7.232	3.174
5	5.563	5.047	.258	5.057	15.16	4.300
6	6.625	6.065	.280	6.564	28.14	5.581
8	8.625	8.071	.277	8.543	63.35	7.265
8	8.625	7.981	.322	9.878	72.49	8.399
10	10.750	10.192	.279	10.79	125.8	9.178
10	10.750	10.136	.307	11.84	137.4	10.072
10	10.750	10.020	.365	14.00	160.7	11.908
12	12.750	12.090	.330	15.14	248.5	12.88
12	12.750	12.000	.375	17.14	279.3	14.579
12	12.750	11.750	.500	22.63	361.5	19.242

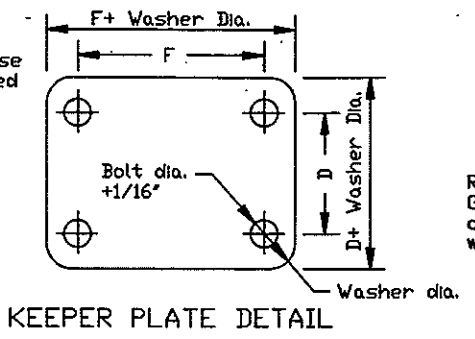
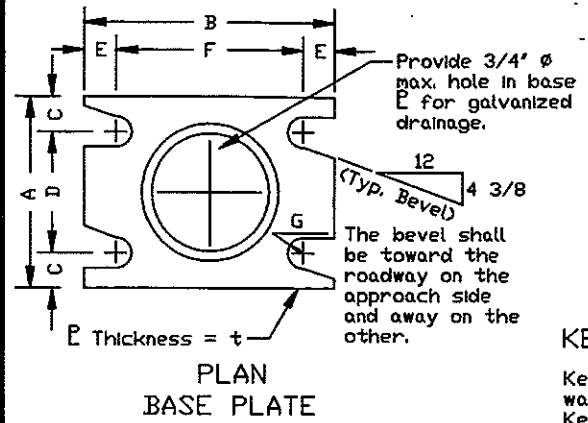
FOUNDATION DIAMETER	POST SIZE	ANCHOR BOLTS		A
		SIZE	NO.	
1'-4"	3 1/2" x 4"	3/4" x 2'-6"	4	4"
1'-9"	5"	1" x 2'-6"	4	2 1/2"
1'-9"	6"	1" x 2'-6"	4	2 3/4"
2'-0"	8"	1 1/4" x 2'-6"	4	3 1/4"
2'-4"	10"	1 1/2" x 2'-6"	4	3 1/2"
2'-6"	12"	1 1/2" x 2'-6"	4	3 1/2"

7-15-94
REVISIONS

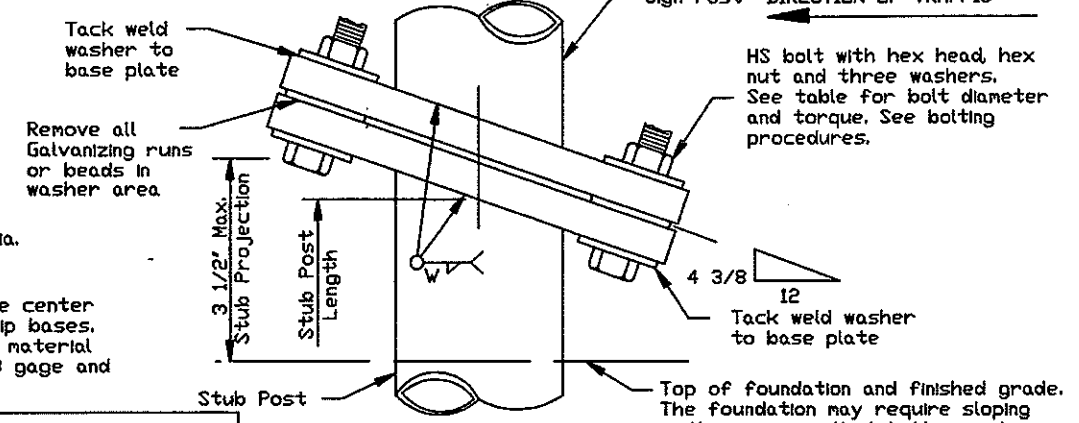
DATE	CHANGE

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

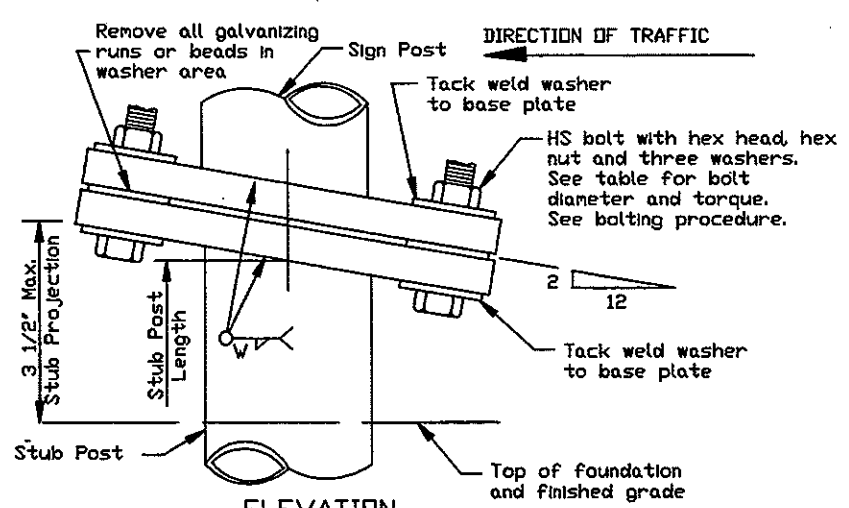
David K. Lee
APPROVED: DESIGN ENGINEER



BREAK-AWAY BASE
STUB POST

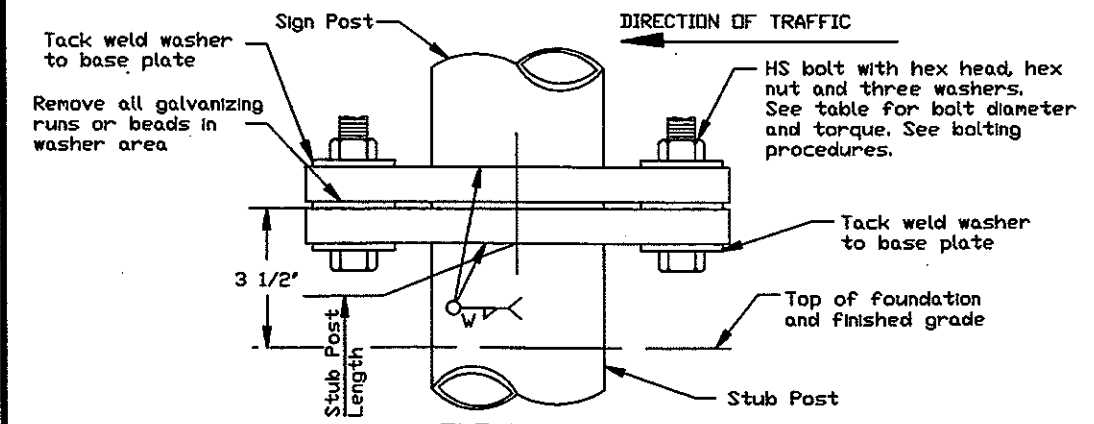


ELEVATION
SINGLE POST SIGN AND STUB POST
Type A

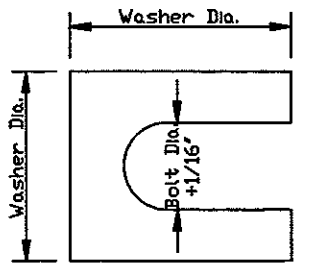


ELEVATION
TWO POST SIGN AND STUB POST
FOR SIGNS WITH LESS THAN 8' POST SPACING
Type B

DIMENSION NOM. PIPE SIZE	BASE DATA TABLE											
	BOLT SIZE	TORQUE SIZE	A	B	C	D	E	F	G	t	W	STUB POST LENGTH
STEEL												
3 1/2"Ø	1/2"Ø x 2-1/2"	12	5-1/2"	8-3/8"	13/16"	3-7/8"	13/16"	6-3/4"	9/32"	3/4"	3/8"	1'-6"
4"Ø	5/8"Ø x 2-3/4"	29	5-1/2"	8-3/4"	1"	3-1/2"	1"	6-3/4"	11/32"	3/4"	3/8"	1'-6"
5"Ø	3/4"Ø x 3-1/2"	46	6-1/2"	10"	1-1/8"	4-1/4"	1-1/8"	7-3/4"	13/32"	1"	7/16"	2'-0"
6"Ø	1"Ø x 4-1/4"	61	7-1/2"	11-3/4"	1-3/8"	4-3/4"	1-3/8"	9"	17/32"	1-1/4"	7/16"	2'-0"
8"Ø	1"Ø x 4-1/4"	61	9-1/2"	13-1/4"	1-3/8"	6-3/4"	1-3/8"	10-1/2"	17/32"	1-1/4"	7/16"	2'-6"
10"Ø	1"Ø x 4-1/4"	61	11-3/4"	15-1/4"	1-3/8"	8"	1-3/8"	12-1/2"	17/32"	1-1/4"	1/2"	3'-0"
12"Ø	1-1/4"Ø x 5"	135	13-3/4"	18"	1-5/8"	10-1/2"	1-5/8"	14-3/4"	21/32"	1-1/2"	1/2"	3'-0"
ALUMINUM												
3 1/2"Ø	1/2"Ø x 2-1/2"	12	5-1/2"	8-3/8"	13/16"	3-7/8"	13/16"	6-3/4"	9/32"	3/4"	3/8"	1'-6"
4"Ø	5/8"Ø x 2-3/4"	29	5-1/2"	8-3/4"	1"	3-1/2"	1"	6-3/4"	11/32"	1"	7/16"	1'-6"
5"Ø	3/4"Ø x 3-1/2"	46	6-1/2"	10"	1-1/8"	4-1/4"	1-1/8"	7-3/4"	13/32"	1"	1/2"	2'-0"
6"Ø	1"Ø x 4-1/4"	61	7-1/2"	11-3/4"	1-3/8"	4-3/4"	1-3/8"	9"	17/32"	1-1/4"	1/2"	2'-0"
8"Ø	1"Ø x 4-1/4"	61	9-1/2"	13-1/4"	1-3/8"	6-3/4"	1-3/8"	10-1/2"	17/32"	1-1/4"	1/2"	2'-6"
10"Ø	1"Ø x 4-3/4"	61	11-3/4"	15-1/4"	1-3/8"	8"	1-3/8"	12-1/2"	17/32"	1-1/2"	7/16"	3'-0"
12"Ø	1-1/4"Ø x 5-1/2"	135	13-3/4"	18"	1-5/8"	10-1/4"	1-5/8"	14-3/4"	21/32"	1-3/4"	11/16"	3'-0"



ELEVATION
TWO OR MORE POST SIGN AND STUB POST
FOR TWO POST SIGNS WITH 8' OR MORE POST SPACING
AND ALL THREE OR MORE POST SIGNS
Type C



Furnish 2 ea. .012"± thick and 2 ea. .032"± shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM-B36.

SHIM DETAIL

NOTES:

- KEEPER PLATE - A KEEPER PLATE MAY BE USED IN LIEU OF TACK WELDING WASHER TO THE BASE PLATE.
- ALUMINUM BASE PLATE WASHERS - WHEN THE BASE PLATE IS FABRICATED FROM ALUMINUM, THE WASHERS SHOWN AS TACK WELDED TO BASE SHALL BE ALUMINUM.
- FUSE JOINT CUTS - STEEL POSTS MAY BE CUT AFTER GALVANIZING AND CUT SURFACE TREATED WITH AN APPROVED ZINC SOLDER MEETING THE FEDERAL SPEC. 0.G-93 (STICK ONLY) OR THE CUT MAY BE GALVANIZED AFTER FABRICATION. ALUMINUM POSTS WILL NEED NO TREATMENT.

ASSEMBLY PROCEDURE

- ASSEMBLE POST TO STUB WITH BOLTS AND WITH ONE FLAT WASHER BETWEEN BASE PLATES AND KEEPER PLATE.
- SHIM AS REQUIRED TO PLUMB POST.
- TIGHTEN ALL BOLTS THE MAXIMUM POSSIBLE WITH 12" TO 15" WRENCH TO BED WASHERS AND SHIMS AND TO CLEAN BOLT THREADS, THEN LOOSEN.
- RETIGHTEN BOLTS IN A SYSTEMATIC ORDER TO PRESCRIBED TORQUE. (SEE TABLE)
- LOOSEN EACH BOLT AND APPLY THREAD LOCKING LIQUID RESIN. THE LIQUID LOCKING RESIN SHALL BE 'LOCTITE' MANUFACTURED BY LOCKTITE CORPORATION OR EQUAL. THE THREAD LOCKER SHALL SECURE THE ENTIRE ASSEMBLY FROM VIBRATION, PRESSURE AND CORROSION. THE THREAD LOCKER SHALL FILL THE GAPS BETWEEN THE THREAD AND THE MATING SURFACE TO FORM SOLID ONE PART ASSEMBLIES.
- RETIGHTEN EACH BOLT TO PRESCRIBED TORQUE IN THE SAME ORDER AS INITIAL RETIGHTENING.

7-15-84	
REVISIONS	
DATE	CHANGE
6-20-95	NOTES
8-14-95	STUB POST DIMENSION

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
Kathleen B. ...
APPROVED: DESIGN ENGINEER

ASSEMBLY DETAILS

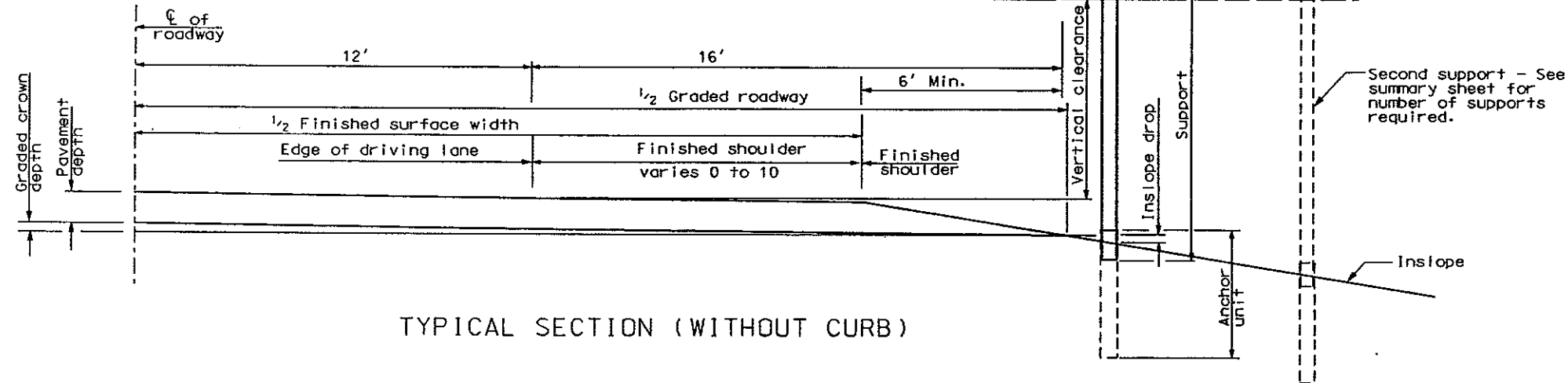
D-754-23

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 routes shall have a 3' minimum horizontal clearance from the edge of the bike route to the edge of the sign.

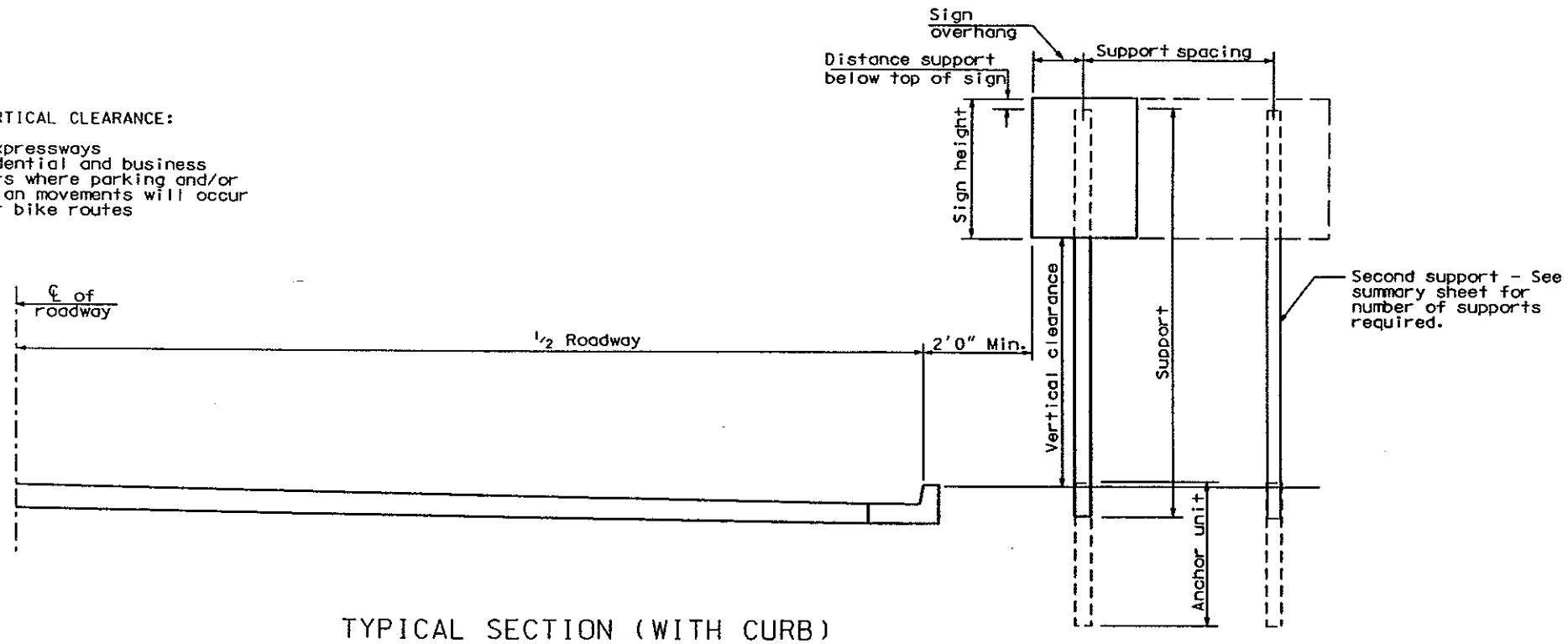
MINIMUM VERTICAL CLEARANCE:

- 5' Rural roadways
- 6' On rural or urban expressways
- 7' On freeways



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



NOTES:

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.

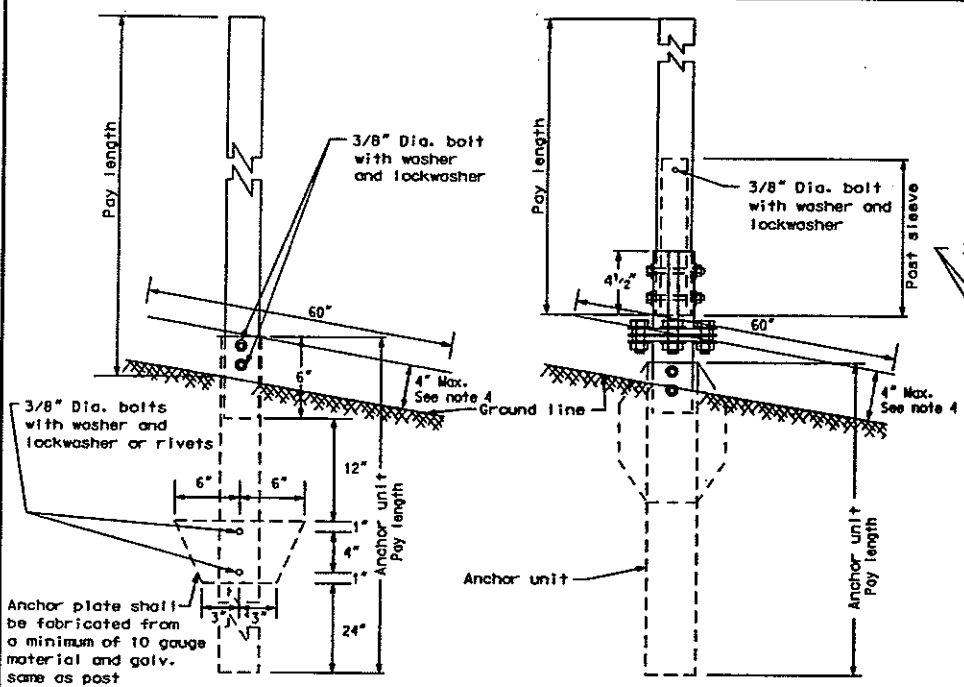
Horizontal Clearance: The support lengths have been computed using a horizontal clearance of 16 feet between the edge of the driving lane and the edge of the sign. For an ultimate shoulder width of 10 feet, the districts have the option of setting the signs out to 18 feet clearance. If the clearance 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
9-4-90	Min. overhang from shoulder
5-1-92	General revisions
9-3-92	Min. clearance
9-8-95	Pay length
2-2-98	General revisions
11-5-98	Vert. cl.

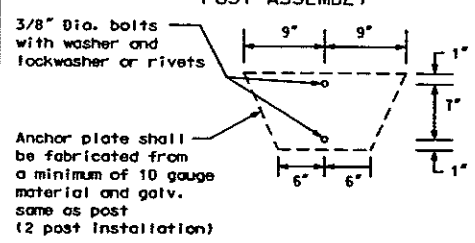
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
APPROVED: *R. H. B. Bit*
DESIGN ENGINEER

D-754-24

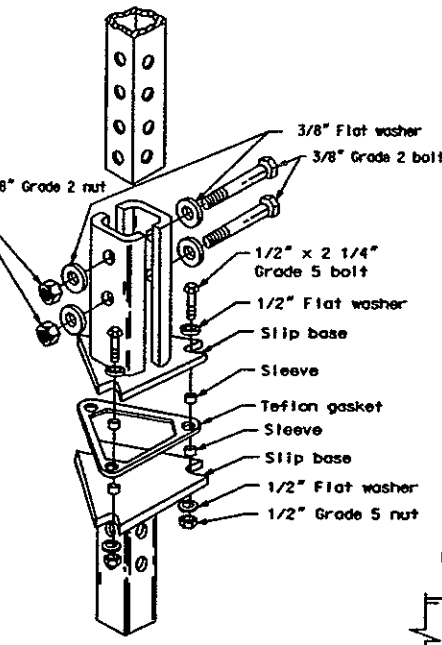
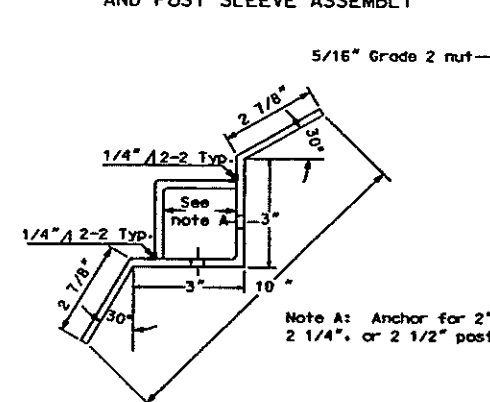
MOUNTING DETAILS PERFORATED TUBE



ANCHOR UNIT AND POST ASSEMBLY

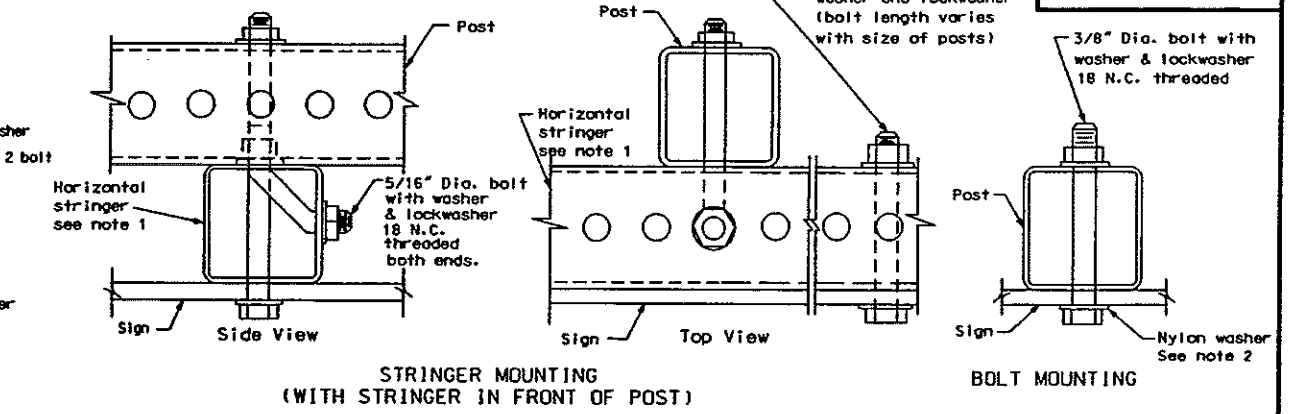


SLIP BASE ANCHOR UNIT AND POST SLEEVE ASSEMBLY



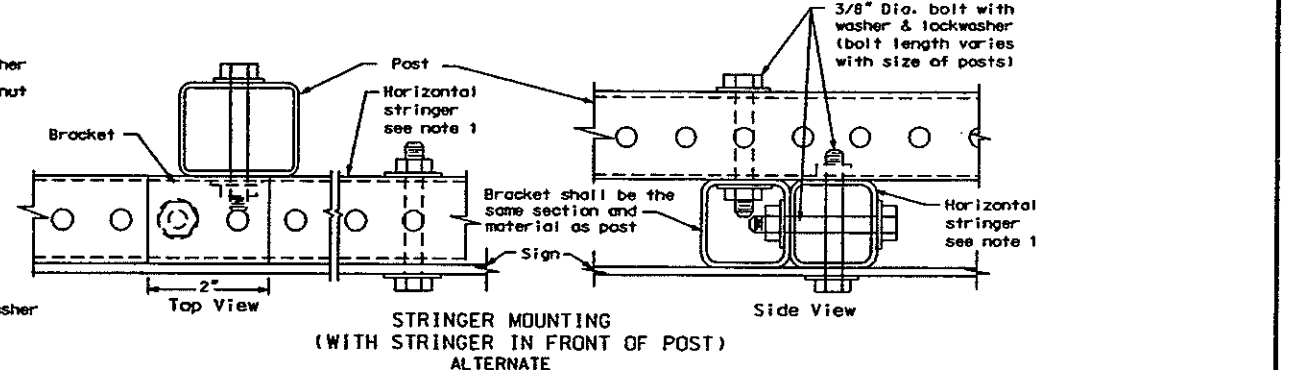
SLIP BASE ASSEMBLY DETAILS

Note: Slip base bolts shall be torqued as specified by the manufacturer.

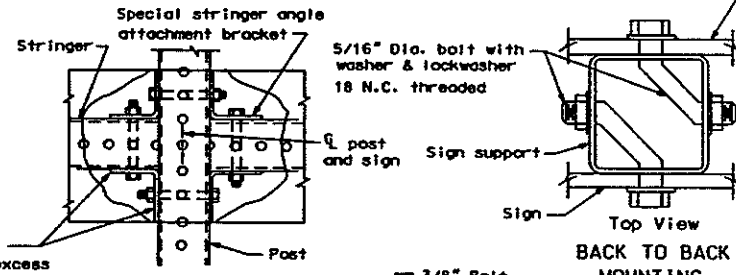


STRINGER MOUNTING (WITH STRINGER IN FRONT OF POST)

BOLT MOUNTING



STRINGER MOUNTING (WITH STRINGER IN FRONT OF POST) ALTERNATE

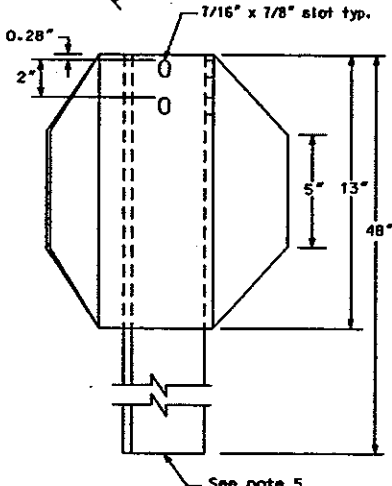


SINGLE POST ASSEMBLY ONE STRINGER OR BACK TO BACK MOUNTING

BACK TO BACK MOUNTING

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

B - The 2 1/2" 12 gauge posts do not need slip bases when placed in standard soils. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are defined as boggy, wet, or loose soil areas.



ANCHOR UNIT Use with breakaway slip base

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

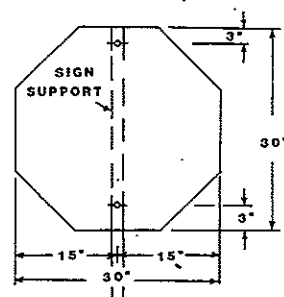
The 2 3/16" size 10 gauge is shown as 2.19" size on the plans. The 2 1/2" size 10 gauge is shown as 2.51" size on the plans.

- Note:
- Horizontal stringers - In lieu of perforated tubes, the contractor may substitute z bar stringers. The z bar stringers shall be 1 3/4" x 3/16" thick, 1.08 lbs./ft. aluminum or 3.16 lbs./ft. steel.
 - Metal washer and nylon washers used on sign face shall have a minimum outside diameter of 15/16" ± 1/16" and 10 gauge thickness.
 - No Parking Signs: All no parking signs with directional arrows shall be placed at a 30 to 45 degree angle with the line of traffic flow. No parking signs required at the above angles may have the support turned to the correct angle. If the no parking sign is placed with another sign that has to be placed at a 90 degree angle with the line of traffic flow, the detailed angle strap should be used to mount the no parking sign. Material used for the attachment strap shall be included in the price bid flat sheet for signs. Flat washers and lockwashers shall be used with all nylon washers.
 - 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
 - Anchor material shall be 7 gauge (179-188) H.R.P.D. Commercial quality ASTM A569.

10-1-96 REVISIONS	
DATE	CHANGE
8-15-94	Anchor detail
3-20-95	Rev. 4x4 post
9-8-95	Pay length
2-20-96	Perforated tube table
5-13-96	B note
11-3-97	Anchor unit
2-10-98	Anchor unit

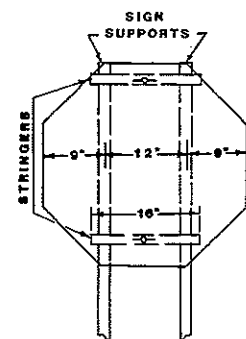
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
APPROVED: *K. E. Baird*
DESIGN ENGINEER

**SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS
REGULATORY, WARNING, AND GUIDE SIGNS**

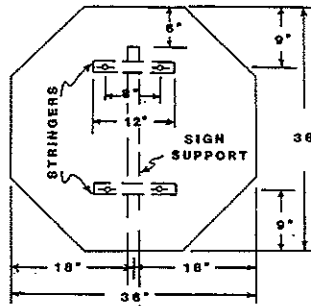


1 POST

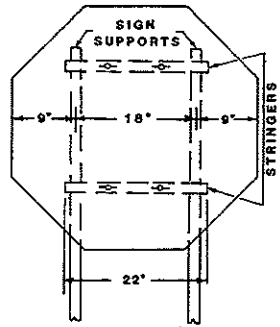
ASSEMBLY NO. 1



2 POSTS

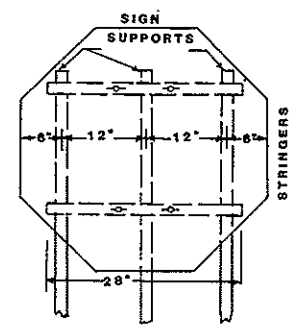


1 POST

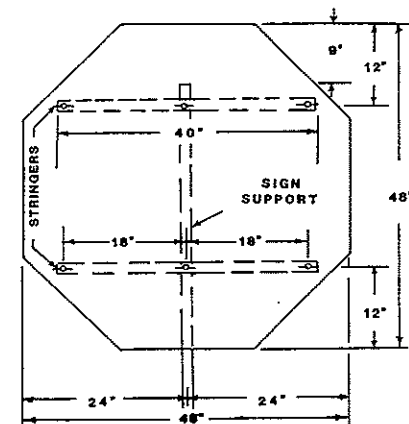


2 POSTS

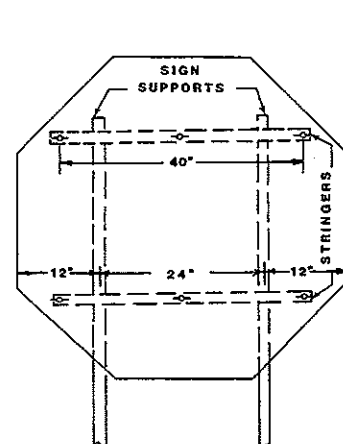
ASSEMBLY NO. 2



3 POSTS

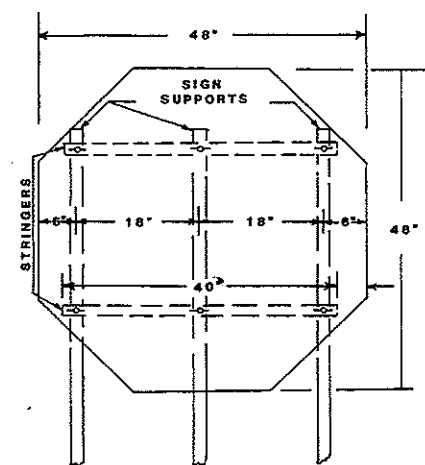


1 POST

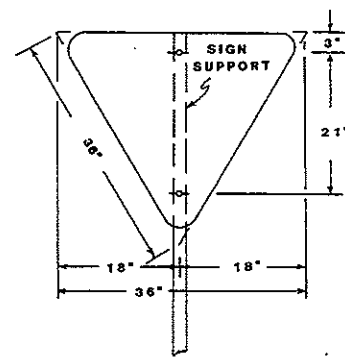


2 POSTS

ASSEMBLY NO. 3

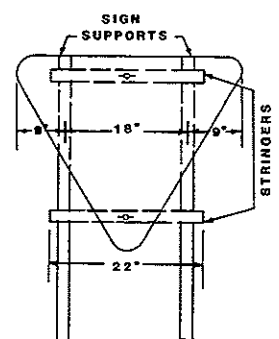


3 POSTS



1 POST

ASSEMBLY NO. 4



2 POSTS

NOTE:

Material:

Signing Backing: The sign backing material thickness shall be as follows.

Aluminum: Aluminum Alloy 6061-T6 and 5082-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.

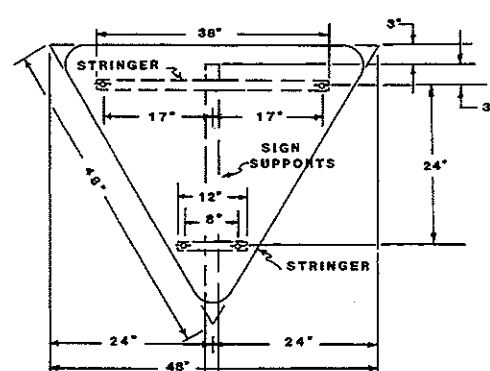
Square Tube, Perforated: All stringers shall be square tube, perforated 1 1/2" X 1 1/2" and of the length shown.

Holes:

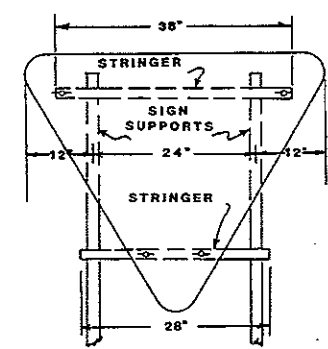
Flange Channel: All holes shall be punched round for 3/8" diameter bolts.
Square Tube, Perforated: All holes shall be punched round for 3/8" diameter bolts.

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.

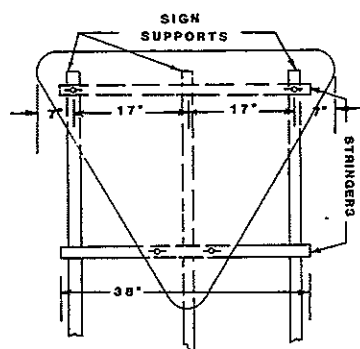


1 POST



2 POSTS

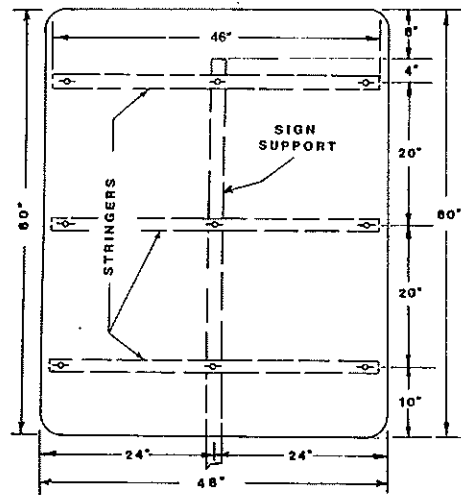
ASSEMBLY NO. 5



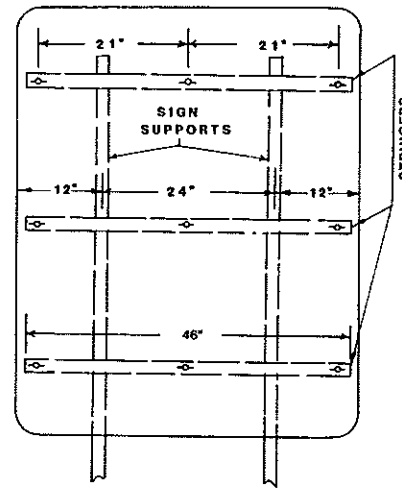
3 POSTS

10-1-86		NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
REVISIONS		
DATE	CHANGE	APPROVED: <i>David R. Bean</i> DESIGN ENGINEER
5-1-92	GENERAL REVISIONS	

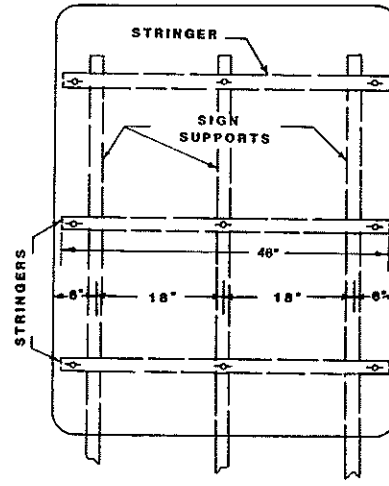
**SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS
REGULATORY, WARNING, AND GUIDE SIGNS**



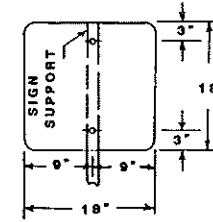
1 POST



2 POSTS



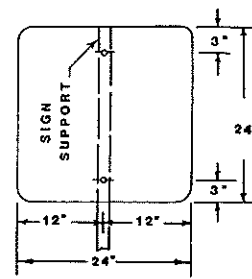
3 POSTS



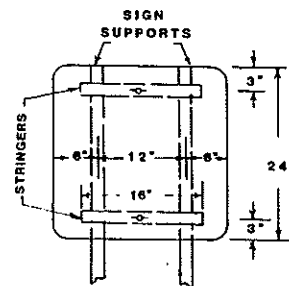
1 POST

ASSEMBLY NO. 13

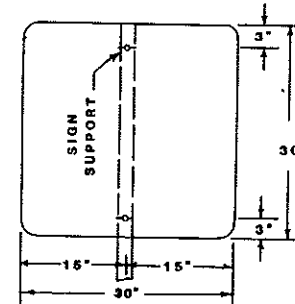
ASSEMBLY NO. 12



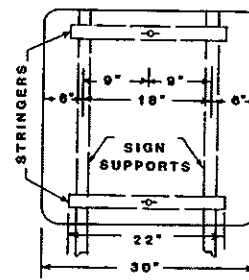
1 POST



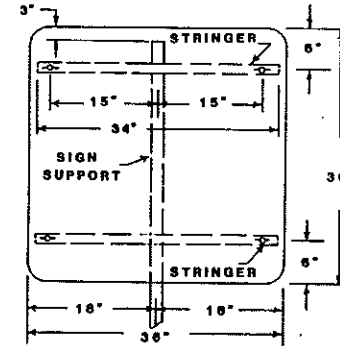
2 POSTS



1 POST



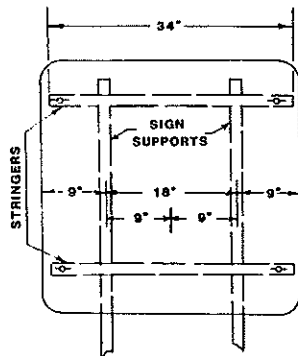
2 POSTS



1 POST

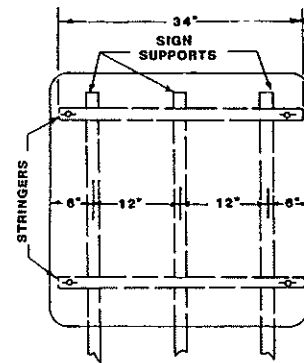
ASSEMBLY NO. 14

ASSEMBLY NO. 15

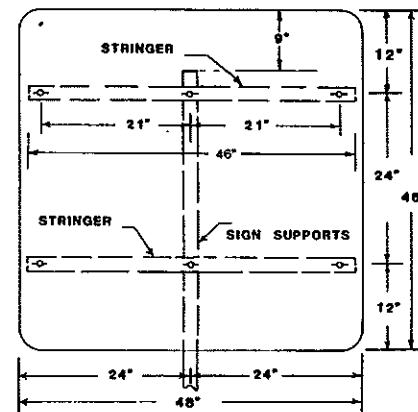


2 POSTS

ASSEMBLY NO. 16

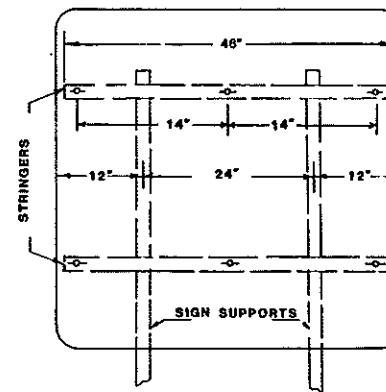


3 POSTS



1 POST

ASSEMBLY NO. 17



2 POSTS

NOTE:

Material

Sign Backing: The sign backing material thickness shall be as follows.

Aluminum: Aluminum Alloy 6061-T6 and 5052-H38 shall 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 1/2" 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.

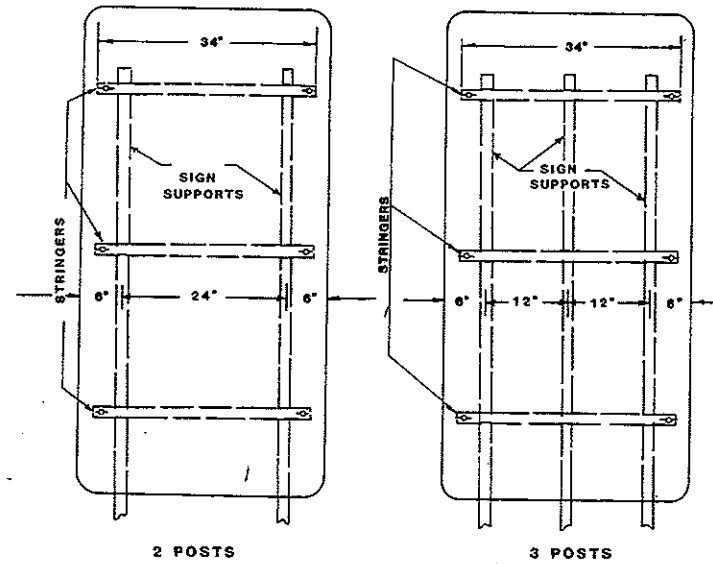
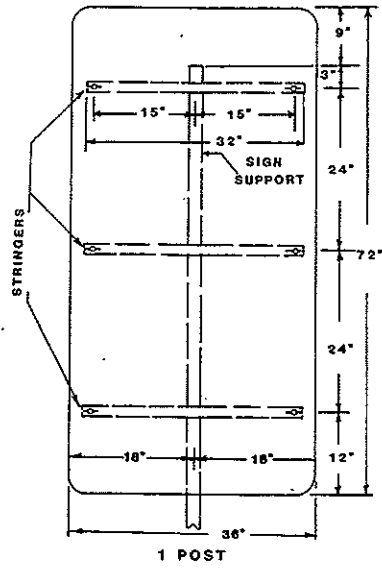
See Std. D-754-24 for square tube, perforated mounting details.

See Std. D-754-25 for flange channel mounting details.

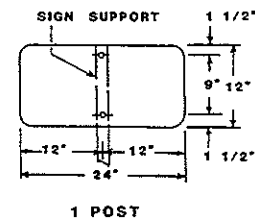
10-1-86	
REVISIONS	
DATE	CHANGE
5-1-92	GENERAL REVISIONS
7-14-95	46" Stringer

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
APPROVED: *David K.O. Bear*
DESIGN ENGINEER

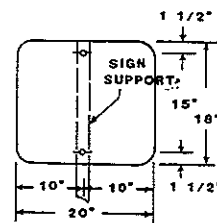
**SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS
REGULATORY, WARNING, AND GUIDE SIGNS**



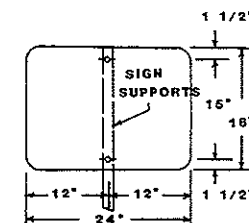
ASSEMBLY NO. 24



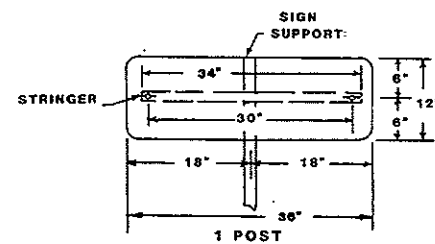
ASSEMBLY NO. 26



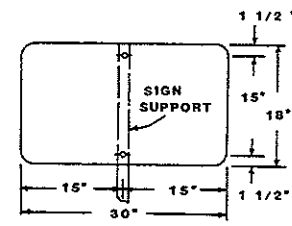
ASSEMBLY NO. 28



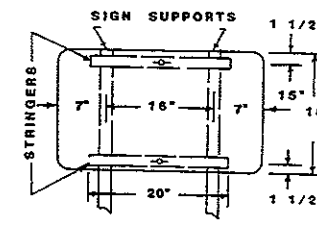
ASSEMBLY NO. 29



ASSEMBLY NO. 27



ASSEMBLY NO. 30



**3 POSTS
ASSEMBLY NO. 25**

NOTE:
Material:
Sign Backing: The sign backing material thickness shall be as follows.

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.

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.

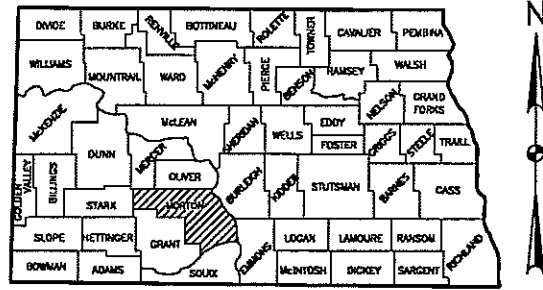
10-1-86		NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
REVISIONS		
DATE	CHANGE	APPROVED: <i>David K. Olson</i> DESIGN ENGINEER
5-1-92	GENERAL REVISIONS	
7-14-95	46" Stringer	

JOB# 22

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CITY OF MANDAN
NINETEENTH STREET TRAIL

PROJECT NO. TES-1-806(035)068
HOT BITUMINOUS PAVING, GRADING
AND INCIDENTALS



STATE OF NORTH DAKOTA

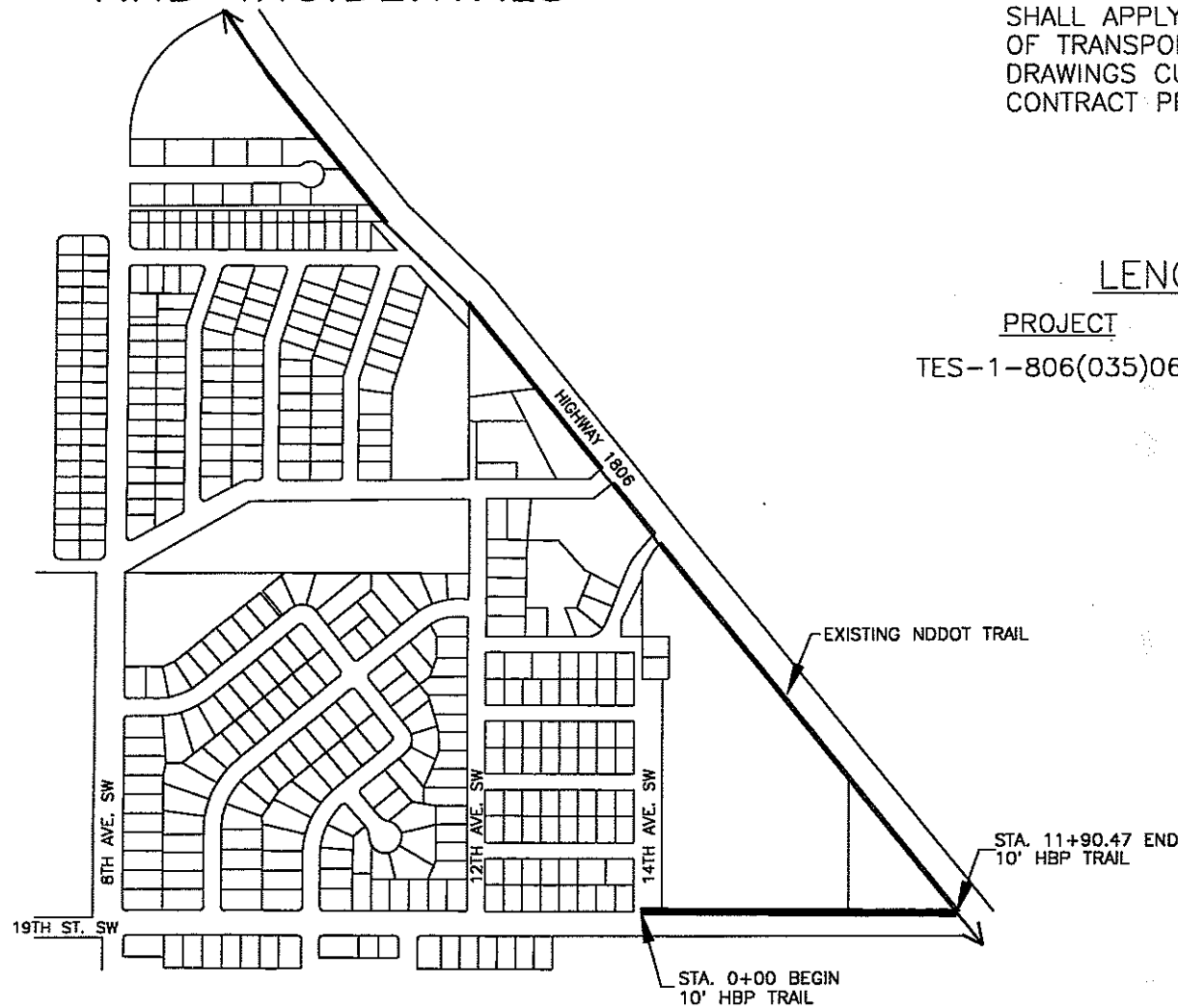
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D-754-28	SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS
D-754-31	SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS

ANY QUESTIONS REGARDING THESE PLANS CAN BE DIRECTED TO:
TERRY RAGAN, P.E.
KADRNAS, LEE & JACKSON
PO BOX 1157
BISMARCK, ND 58502-1157
(701)-255-0076 PHONE
(701)-255-0943 FAX



LENGTH OF PROJECT

PROJECT	MILES-GROSS	MILES-NET
TES-1-806(035)068	0.225	0.225

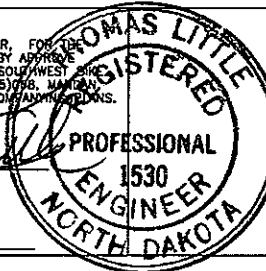
TES-1-806(035)068

APPROVAL OF CITY ENGINEER

I, THOMAS R. LITTLE, P.E., CITY ENGINEER, FOR THE CITY OF MANDAN, NORTH DAKOTA, HEREBY APPROVE THESE PLANS FOR NINETEENTH STREET SOUTHWEST TRAIL, PROJECT NUMBER TES-1-806(035)068, MANDAN, NORTH DAKOTA AS SHOWN ON THE ACCOMPANYING PLANS.

Thomas R. Little
THOMAS R. LITTLE, P.E.
CITY ENGINEER
MANDAN, NORTH DAKOTA

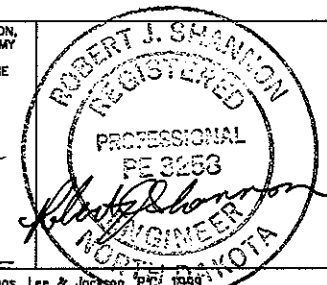
DATE: 2/10/99



I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF NORTH DAKOTA.

Robert J. Shannon
ROBERT J. SHANNON, P.E.
PROJECT MANAGER
BISMARCK, NORTH DAKOTA

DATE: 2/8/99



**Kadmas
Lee &
Jackson**
Consulting Engineers
and Surveyors
BISMARCK, NORTH DAKOTA

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LEGEND

No Scale

EXISTING	PROPOSED		EXISTING	PROPOSED	
		FIRE HYDRANT			UNDERGROUND ELECTRIC
		GATE VALVE			UNDERGROUND TELEPHONE
		CURB STOP			GAS LINE
		BEND			CURB & GUTTER (CONCRETE)
		TEE			EDGE OF GRAVEL SURFACE
		CROSS			EDGE OF ASPHALT SURFACE
		REDUCER			FENCE
		SLEEVE			SIDEWALK OR DRIVEWAY (CONCRETE)
		SANITARY MANHOLE			SIGN POST
		CURB INLET			GUY WIRE & ANCHOR
		CATCH BASIN			PROPERTY PIN - FOUND/SET
		STORM MANHOLE			TREE - CONIFEROUS/DECIDUOUS
		POWER POLE			HEDGE OR BUSHES
		STREET LIGHT			MAILBOX
		ELECTRICAL JUNCTION BOX			CONTROL POINT
		TELEPHONE PEDESTAL			CULVERT
		WATER MAIN			DRAINAGE DIRECTION
		SANITARY SEWER MAIN			OVERHEAD POWERLINE
		STORM SEWER MAIN			

CONSTRUCTION NOTES

FHWA REGION	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
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100 GENERAL

- 100. P01 UNDERGROUND UTILITIES:** THE CONTRACTOR SHALL NOTIFY THE LOCAL UTILITY COMPANIES PRIOR TO THE BEGINNING OF CONSTRUCTION SO THEY MAY DETERMINE THE LOCATION OF ALL UTILITIES IN THE PROJECT AREA. THE ONE CALL NUMBER IS 1-800-795-0555. SUBCUTTING 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 CONSTRUCTION WILL BE MADE AVAILABLE TO THE CONTRACTOR UPON REQUEST TO THE ENGINEER.
- 100. P02 TREES, SHRUBS, AND NATIVE GRASSES:** THE CONTRACTOR SHALL EXERCISE 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 UNLESS APPROVED BY THE ENGINEER. THE CONTRACTOR SHALL NOT BE PERMITTED ANY UNNECESSARY EQUIPMENT OPERATIONS UNDER, AROUND OR WITHIN TREE DRIP LINES.
- 100. P03 EQUIPMENT OPERATING RESTRICTIONS:** THE CONTRACTOR SHALL NOT OPERATE HIS EQUIPMENT OUTSIDE THE CORRIDOR SHOWN ON THE PLAN SHEETS. THE CORRIDOR SHALL BE DEFINED AS THE WIDTH OF CUT OR FILL SECTION AS SHOWN ON THE CROSS SECTION SHEETS PLUS THREE FEET ON EACH SIDE. ON FILL SECTIONS UTILIZING GEOGRID, EQUIPMENT SHALL BE RESTRICTED TO OPERATING ONLY ON THE FILL EMBANKMENT WITH ABSOLUTELY NO DRIVING OFF THE FILL EXCEPT FOR MOWING PURPOSES. TRAIL ACCESS POINTS WILL BE AT THOSE POINTS WHERE THE TRAIL CROSSES EXISTING ROADS OR APPROACHES. NO OTHER ACCESS POINTS WILL BE PERMITTED UNLESS WRITTEN PERMISSION IS RECEIVED FROM THE ENGINEER. SHOULD THE CONTRACTOR BE FOUND TO HAVE ACCESSED OR LEFT THE TRAIL CORRIDOR WITHOUT USING AN ACCESS POINT, ONE WARNING WILL BE ISSUED TO THE VIOLATOR, FOREMAN, AND SUPERINTENDENT. SHOULD THE VIOLATION OCCUR AGAIN, THE VIOLATOR AND THE FOREMAN WILL BE BANNED FROM THE CONSTRUCTION SITE FOR THE REMAINDER OF THE PROJECT. THE THIRD VIOLATION WILL RESULT IN THE REMOVAL OF THE VIOLATOR AND THE SUPERINTENDENT FROM THE PROJECT. NO EXCEPTIONS WILL BE ALLOWED.
- 100. P04 HANDLING OF RESOURCE DISCOVERIES:** SHOULD ANY HISTORICAL RESOURCES, I.E., BONE, FIRE HEARHS, HUMAN REMAINS ETC., BE DISCOVERED DURING CONSTRUCTION, ALL WORK WILL BE HALTED UNTIL THE SITE HAS BEEN INSPECTED BY A PERMITTED ARCHAEOLOGIST. DEPENDING ON THE NATURE OF THE DISCOVERY, THE CONTRACTOR MAY MOVE THE TRAIL CONSTRUCTION OPERATION TO A DIFFERENT SECTION OF THE TRAIL. AFTER THE DISCOVERY, AN ARCHEOLOGIST WILL BE RETAINED BY THE CONTRACTOR TO MONITOR THE REMAINING PORTION OF THE PROJECT. COMPENSATION WILL ONLY BE NEGOTIATED IF THERE ARE NO OTHER SECTIONS OF THE TRAIL REMAINING TO BE CONSTRUCTED AND THE TRAIL CONSTRUCTION IS SHUT DOWN FOR MORE THAN 2 CONSECUTIVE DAYS.
- 100. P05 BIKE TRAIL:** BIKE TRAILS ARE USED BY CYCLISTS, IN LINE SKATERS, WHEEL CHAIRS, JOGGERS, WALKERS, AND ALL OTHER FORMS OF NON-MOTORIZED MODES OF TRANSPORTATION. THESE TRAILS REQUIRE A SURFACE FREE OF DEFECTS AND MUCH SMOOTHER THAN TYPICAL ASPHALT STREETS.
- 100. P06 PREFORMANCE BOND:** ALL SUBCONTRACTORS SHALL PROVIDE TO THE PRIME CONTRACTOR A PERFORMANCE BOND FOR THE WORK THEY WILL PERFORM ON THIS PROJECT. A COPY OF THAT BOND WILL BE PRESENTED TO THE ENGINEER. NO PAYMENT WILL BE MADE FOR ANY WORK DONE BY A SUBCONTRACTOR WHO IS NOT BONDED TO THE PRIME CONTRACTOR. THE PERFORMANCE BOND FOR EACH SUBCONTRACTOR SHALL BE CONSIDERED INCIDENTAL TO THE ITEMS THAT THE SUBCONTRACTOR IS RESPONSIBLE FOR.
- 100. P07 PRODUCT CERTIFICATIONS:** NO PAYMENT WILL BE MADE FOR ANY ITEM REQUIRING CERTIFICATIONS UNTIL THOSE CERTIFICATIONS HAVE BEEN RECEIVED BY THE ENGINEER. COMMON ITEMS REQUIRING CERTIFICATIONS ARE PIPE (BOTH CONCRETE AND CORRIGATED METAL), SEED, SIGNS, FENCE, AND VARIOUS OTHER ITEMS.

- 100. P08 TESTING:** THE CONTRACTOR SHALL PROVIDE AN APPROVED INDEPENDENT TESTING LABORATORY, WHO SHALL BE RESPONSIBLE FOR THE TESTING OF THE SUBGRADE, ASPHALT PAVING, AND CONCRETE. ALL TEST LOCATIONS WILL BE SELECTED BY THE ENGINEER. ALL TEST RESULTS SHALL BE PROVIDED TO THE ENGINEER FOR APPROVAL. ALL TESTING COSTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

- 100. P09 COMPLETION DATE:** THE TRAIL SHALL BE COMPLETED ON OR PRIOR TO AUGUST 20, 1999.

200. EARTHWORK

- 203. P01 COMMON EXCAVATION, TYPE A:** PAYMENT FOR COMMON EXCAVATION SHALL BE IN WITH SECTION 203.03.B OF THE STANDARD SPECIFICATIONS (CONTRACT QUANTITY). RECOMPACTING OF THE SUBGRADE WILL NOT BE REQUIRED.
- 203. 0109 TOPSOIL:** TOPSOIL WILL BE REMOVED TO A DEPTH OF 3 INCHES MAXIMUM AND TO A WIDTH AS SHOWN ON THE CROSS SECTIONS. NO TOPSOIL REMOVAL WILL BE DONE BEYOND STATION 8+55. ALL REMOVED TOPSOIL SHALL BE REPLACED AND RAKED TO GRADE PRIOR TO SEEDING. ADDITIONAL RAKING MAY BE REQUIRED AFTER SEEDING TO ELIMINATE SCALPING BY THE MOWERS. THE BID PRICE FOR TOPSOIL SHALL INCLUDE ALL COSTS ASSOCIATED WITH REMOVAL AND REPLACEMENT OF THE TOPSOIL.
- 203. 0119 TOPSOIL-IMPORTED:** THE CONTRACTOR SHALL IMPORT TOPSOIL FROM AN APPROVED TOPSOIL WILL BE PLACED ALONG BOTH SIDES OF THE TRAIL. IT IS RECOMMENDED THAT THE CONTRACTOR BRING IN THE TOPSOIL PRIOR TO THE PAVING OPERATION, AS NO VEHICLES WILL BE ALLOWED TO ACCESS THE TRAIL FOR TOPSOIL PLACEMENT AFTER THE PLACEMENT OF THE PAVEMENT. TOPSOIL-IMPORTED WILL BE MEASRED BY THE CUBIC YARD USING THE LEGAL LOAD LIMIT VOLUME OF THE TRUCK. THE COST PER CUBIC YARD OF TOPSOIL-IMPORTED SHALL INCLUDE THE COST OF THE TOPSOIL, HAULING, PLACEMENT, RAKING, LABOR, EQUIPMENT, AND ALL OTHER COSTS ASSOCIATED WITH THE COMPLETION OF THIS ITEM.
- 203. 0140 BORROW:** BORROW SHALL BE OBTAINED FROM AN OFF SITE SOURCE. THE BORROW SITE SHALL BE APPROVED IN ACCORDANCE WITH SECTION 107.04.B OF THE STANDARD SPECIFICATIONS. THE BORROW MATERIAL SHALL BE APPROVED BY THE ENGINEER PRIOR TO BEING BROUGHT ON SITE. BORROW SHALL BE PLACED IN ACCORDANCE WITH SECTION 203.02.G OF THE STANDARD SPECIFICATIONS. BORROW SHALL BE MEASURED BY THE CUBIC YARD USING THE LEGAL LOAD LIMIT VOLUME OF THE TRUCK. COMPACTION SHALL BE AT $\pm 2\%$ OF OPTIMUM MOISTURE AND 92% OF MAXIMUM DENSITY, BASED ON AASHTO T-99. TESTS SHALL BE TAKEN AT 2 PER 500 FEET FOR EACH 8 INCH LIFT, WITH TEST LOCATIONS SELECTED AT RANDOM BY THE ENGINEER. FOR POSSIBLE BORROW AREA, CONTACT LEE MITZEL AT MITZEL BUILDERS. THE BID PRICE PER CUBIC YARD OF BORROW SHALL INCLUDE ALL COSTS ASSOCIATED WITH OBTAINING, HAULING, PLACING, LABOR, EQUIPMENT, AND ALL OTHER ITEMS REQUIRED TO COMPLETE THIS ITEM.

300. BASES

- 302. 0301 RECYCLED BASE COURSE:** RECYCLED BASE COURSE WILL BE ONE OF THE FOLLOWING:
- 4 INCHES OF SALVAGED BITUMINOUS BASE COURSE;
 - 4 INCHES OF SALVAGED CONCRETE BASE COURSE (FREE OF REBAR OR OTHER METAL);
 - 4 INCHES BLENDED MATERIAL USING EITHER BITUMINOUS OR CONCRETE WITH CLASS 5 AGGREGATE, BLENDED AT 50 - 50;
 - 4 INCHES OF CLASS 5 AGGREGATE;

IF THE CONTRACTOR CHOOSES TO USE A BLENDED BASE COURSE, ALL BLENDING WILL BE COMPLETED PRIOR TO BRINGING THE MATERIAL ONTO THE PROJECT SITE.

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THE SALVAGED BITUMINOUS AND SALVAGED CONCRETE BASE MATERIAL SHALL MEET THE FOLLOWING GRADATION:

SQUARE MESH SIEVE SIZE	PERCENT BY WEIGHT PASSING
1-3/4"	100
3/4"	70-100
NO.4	38-75
NO. 30	12-37
NO. 200	0-12
CLAY AND SOFT PARTICLES	8% MAXIMUM

PAYMENT WILL BE BASED ON A WIDTH OF 1 FOOT WIDER THAN THE PAVEMENT WIDTH AND A DEPTH OF 4 INCHES AS SHOWN ON THE TYPICAL SECTIONS. ANY BASE MATERIAL BEYOND THIS WIDTH WILL BE DEDUCTED FROM THE TOTAL QUANTITY USING 1.85 TONS/C.Y. AS THE BASIS FOR CONVERSION TO TONS. COMPACTION OF THE BASE SHALL BE IN ACCORDANCE WITH SECTION 203.02H OF THE NDDOT STANDARD SPECIFICATIONS.

400. BITUMINOUS PAVEMENT

408. 0170 HOT BITUMINOUS PAVEMENT, CL. 27: THE CONTRACTOR SHALL HAVE AN INDEPENDENT TESTING LABORATORY PERFORM ALL MARSHALL MIX DESIGNS WITH THE AGGREGATE AND ASPHALT TO BE USED FOR THE PROJECT. THE COST SHALL BE INCLUDED IN THE PER TON BID PRICE FOR "HOT BITUMINOUS PAVEMENT, CL. 27". THE MIX DESIGN SHALL MEET THE FOLLOWING REQUIREMENTS:

STABILITY (MINIMUM) LBS.	1,000
FLOW (HUNDREDTH OF AN INCH)	10-20
PERCENT AIR VOIDS (%)	1-5

THE CONTRACTOR SHALL FURNISH SAMPLES AND INFORM THE ENGINEER TWO WEEKS PRIOR TO PRODUCTION OF ANY STOCKPILES AS TO THE SOURCE OF AGGREGATE USED IN THE MIX DESIGN. THE MIX DESIGN SHALL BE SENT TO THE ENGINEER FOR APPROVAL 2 WEEKS PRIOR TO PAVING. ANY CHANGES IN AGGREGATE SOURCES, ASPHALT SOURCES OR OPERATIONS SHALL REQUIRE NEW OR ADDITIONAL MARSHALL MIX DESIGNS AT THE CONTRACTORS' EXPENSE.

OTHER THAN THE MIX DESIGN PROVISIONS OUTLINED HEREIN, ALL OTHER PROVISIONS OF SECTION 408.04B SHALL REMAIN IN FORCE.

408. 0170 ORDINARY COMPACTION OF HOT BITUMINOUS PAVEMENT: COMPACTION SHALL BE IN ACCORDANCE WITH SECTION 408.04I.2 OF THE STANDARD SPECIFICATIONS, 1997, MODIFIED AS FOLLOWS; THE CONTRACTOR SHALL USE ONE SELF PROPELLED ROLLER SUCH AS A SINGLE DRUM (BOMAG BW 172) OR DOUBLE DRUM (BOMAG BW120) STEEL ROLLER OF ADEQUATE SIZE TO OBTAIN COMPACTION WITHOUT DAMAGE TO THE TRAIL SURFACE OR THE SUBGRADE.

408. P01 HOT BITUMINOUS PAVEMENT: THE FINISHED TRAIL SHALL HAVE A SMOOTH SURFACE; FREE OF SURFACE IRREGULARITIES THAT WOULD CAUSE A HARSH OR UNDESIRABLE RIDE, OR WOULD COMPROMISE THE SAFETY OF TRAIL USERS. SURFACE IRREGULARITIES MAY INCLUDE, BUT IS NOT LIMITED TO INDENTATIONS, BROKEN EDGES, GROOVES, BLOW-UPS, POP-OUTS, IMPRINTS FROM HEAVY EQUIPMENT TRACKS OR TIRES, ETC. ANY ISOLATED TRIP HAZARDS OF 1/4 INCH OR GREATER HEIGHT OR DEPTH SHALL BE ELIMINATED BY METHODS TO BE APPROVED BY THE ENGINEER. THE FINISHED TRAIL SHALL NOT BE CAPABLE OF HOLDING STANDING WATER ON ANY PORTION. ANY TRAIL SURFACE DETERMINED TO BE IN NONCONFORMANCE WITH THE ABOVE SPECIFICATIONS SHALL BE OVERLAID WITH A ONE INCH MINIMUM DEPTH LIFT OF FINES AT THE CONTRACTOR'S EXPENSE. PRIOR TO ANY OVERLAY, THE TRAIL WILL BE THOROUGHLY SWEEPED, ALL IRREGULARITIES CLEANED, AND THE TRAIL TACKED, ALL AT THE CONTRACTORS' EXPENSE.

SURFACE TENSION CRACKING WILL BE KEPT TO A MINIMUM BY MONITORING THE ROLLING, SURFACE TEMPERATURE, AND IF NEED BE, ADJUSTING THE OIL CONTENT. ADJUSTING THE OIL CONTENT IN THE MIX WILL ONLY BE DONE WITH PERMISSION FROM THE ON-SITE ENGINEER.

409 0445 PG 58-28 ASPHALT CEMENT: THE HOT BITUMINOUS PAVEMENT, CLASS 27 SHALL HAVE A MAXIMUM ASPHALT CONTENT OF 7.0%.

700. TRAFFIC CONTROL

704. 0100 FLAGGING: FLAGGING HAS BEEN PROVIDED FOR USE DURING THE HAULING OF BORROW, RECYCLED BASE MATERIAL, HOT BITUMINOUS PAVEMENT, AND IMPORTED TOPSOIL SO AS TO NOTIFY THE TRAVELING PUBLIC OF TRUCKS ENTERING AND LEAVING THE ROAD AT VARIOUS LOCATIONS. FLAGGING WILL BE PAID FOR AT AN HOURLY RATE PER FLAGGER AND SHALL INCLUDE ALL TRAINING AND OTHER INCIDENTALS ASSOCIATED WITH THIS ITEM.

708. 2331 SEEDING, TYPE B SPECIAL: THE TRAIL SHALL BE SEEDED WITH THE FOLLOWING MIXTURE: WESTERN WHEAT GRASS (RODAN VARIETY) AT 25 LBS. PURE LIVE SEED PER ACRE, THICKSPIKE WHEAT GRASS (CRITANA VARIETY) AT 16 LBS. PURE LIVE SEED PER ACRE, AND SLENDER WHEAT GRASS (REVNUE VARIETY) AT 10 LBS. PURE LIVE SEED PER ACRE. SEED SHALL BE PLACED WITH A DRILL. THE COST OF THE SEED, DRILL, RAKING OF TOPSOIL NEXT TO THE TRAIL, FIRING OF THE AREA, AND ALL OTHER INCIDENTALS SHALL BE INCLUDED IN THE PER ACRE BID PRICE FOR SEEDING, TYPE B SPECIAL. RAKES, DRILL, AND OTHER EQUIPMENT SHALL NOT BE DRAGGED OVER OR ACROSS THE FINISHED ASPHALT TRAIL.

708. 5700 WOOD EXCELSIOR FIBERMAT: WOOD EXCELSIOR FIBERMAT SHALL BE PLACED ALONG THE TRAIL IN BOTH FILL AND CUT SECTIONS. PRIOR TO PLACEMENT, THE AREAS SHALL BE SEEDED WITH A GRASS MIXTURE AS STATED IN 708.2331, SEEDING, TYPE B SPECIAL. THE MAT WILL COMPLY WITH THE SPECIFICATIONS AS STATED IN SECTION 856.01 OF THE NDDOT STANDARD SPECIFICATIONS. WOOD EXCELSIOR FIBERMAT WILL BE PAID FOR BY THE SQUARE YARD IN PLACE WITH NO LAPS OR SEAMS AND SHALL INCLUDE ALL COSTS ASSOCIATED WITH INSTALLING THIS ITEM IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.

754. 0601 REMOVE AND RESET SIGNS: TRAFFIC SIGNS WILL BE REMOVED AND RESET AS INDICATED ON THE PLANS. EACH SIGN THAT IS RESET WILL BE REQUIRED TO HAVE A NEW BASE. THE NEW BASE, AND ALL EQUIPMENT, LABOR, AND INCIDENTALS SHALL BE INCLUDED IN THE PER EACH BID PRICE FOR REMOVE AND RESET SIGNS.

754. P01 SIGNS: THE SIGNS SHALL BE **ENGINEER GRADE**. THE PER EACH BID PRICE FOR SIGNS SHALL INCLUDE THE POST AND ALL OTHER MATERIALS, EQUIPMENT, AND LABOR TO INSTALL THE SIGNS IN THE LOCATIONS SHOWN ON THE PLANS. THE POSTS SHALL BE 2-1/4" X 2-1/4" SQUARE TUBE PERFORATED WITH 2-1/4" BASE/SPADE. THE SIGNS SHALL BE ATTACHED TO THE POSTS WITH RIVETS.

PERMANENT TRAFFIC SIGNING WILL BE INSTALLED BY THE CONTRACTOR AS INDICATED IN THE FOLLOWING SIGN LIST:

STATION	LOCATION	SIGN NO.	DESCRIPTION	QUANTITY
-0+06	±150' LT. *	W11-1	ADVANCED BICYCLE CROSSING	1
0+28	9' LT.	R1-1	STOP	1
0+75	9' RT.	D11-1	BIKE ROUTE	1
0+75	9' RT.	R5-3	NO MOTOR VEHICLES	1
5+25	9' RT. **	SPECIAL	TRAIL NOT WHEELCHAIR ACCESSIBLE BEYOND THIS POINT	1
5+25	9' RT.	W7-5	STEEP SLOPE	1
6+25	9' LT.	W5-4	TRAIL NARROWS	1
11+64	10' RT.	M7-5	LEFT - RIGHT ARROW	1
11+64	10' RT.	D11-1	BIKE ROUTE	1

CONSTRUCTION NOTES

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STATION	LOCATION	SIGN NO.	DESCRIPTION	QUANTITY
11+68	10' LT.	R5-3	NO MOTOR VEHICLES	1
11+75	10' LT**	SPECIAL	TRAIL NOT WHEELCHAIR ACCESSIBLE BEYOND THIS POINT	1
11+79	10' RT.	R1-1	STOP	1
11+83	10' LT.	D11-1	BIKE ROUTE	1
11+91	30' LT.	M7-6R	AHEAD - RIGHT ARROW	1
11+91	30' LT.	D11-1	BIKE ROUTE	1

* ATTACH SIGN TO LIGHT POLE.
 ** SIGN TO BE SPECIAL ORDERED

900. ADDITIONAL ITEMS

900. P01 SURVEY CONTROL: THE CONTRACTOR SHALL USE SPECIAL CARE TO AVOID DISTURBING ANY EXISTING PROPERTY CORNERS AND SURVEY MARKERS. IF A CORNER NEEDS TO BE DISTURBED, THE CONTRACTOR SHALL NOTIFY THE ENGINEER WHO WILL THEN HAVE THE CORNER TEMPORARILY OFFSET BY A SURVEY CREW. FAILURE OF THE CONTRACTOR TO NOTIFY THE ENGINEER WILL RESULT IN THE CONTRACTOR HIRING A REGISTERED LAND SURVEYOR TO RESET THE SURVEY MARKER/CORNER AT THE CONTRACTORS EXPENSE.

920. 1216 GEOGRID: THE CONTRACTOR SHALL PLACE GEOGRID IN THOSE AREAS AS INDICATED ON THE PLANS AND ACCORDING TO THE TRAIL SECTION DETAIL AND CROSS SECTIONS. TEN DAYS PRIOR TO THE PLACEMENT OF THE GEOGRID, THE TRAIL SHALL BE MOWED AND RECEIVE AN APPLICATION OF ROUNDUP. AFTER THE 10 DAY PERIOD, THE GEOGRID SHALL BE PLACED AND ANCHORED THEN THE CONTRACTOR SHALL START PLACING THE FILL OVER THE GEOGRID. AT NO TIME SHALL ANY EQUIPMENT BE DRIVEN ON THE GEOGRID BEFORE BACKFILLING OR ON THE SURROUNDING GROUND. BACKFILL MATERIAL SHALL BE END DUMPED OR PUSHED ONTO THE GEOGRID TO THE DEPTH SHOWN ON THE DETAIL.

THE GEOGRID SHALL BE OVERLAPPED AT THE SEAMS A MINIMUM OF ONE FOOT OR AS RECOMMENDED BY THE SUPPLIER. ANY DAMAGED GEOGRID SHALL BE REMOVED AND A NEW PIECE INSTALLED OVER THE AREA DAMAGED. THE NEW GEOGRID SHALL LAP THE DAMAGED AREA IN ALL DIRECTIONS BY THREE FEET. GEOGRID SHALL BE PLACED AND OVERLAPPED IN THE DIRECTION THAT THE FILL IS TO BE PLACED. THE GEOGRID SHALL BE SECURED AT THE "UPSTREAM" ROLL ENDS ONLY BY DRIVING STAKES, STAPLES, HOOKS OR NAILS WITH WASHERS THROUGH THE GRID APERTURES AND INTO THE GROUND. GEOGRID SHALL MEET THE FOLLOWING REQUIREMENTS WITH THE CONTRACTOR SUBMITTING TO THE ENGINEER A SAMPLE OF THE GEOGRID, CERTIFIED SPECIFICATION SHEETS WITH TEST RESULTS AS SPECIFIED IN THE CHART BELOW AND RECOMMENDED INSTALLATION INSTRUCTIONS.

STRUCTURAL GEOGRID PROPERTIES

PROPERTY	TEST METHOD	UNITS	VALUE
APERTURE SIZE	I.D. CALIPERED	INCHES	3/4 - 1-1/2
OPEN AREA	CORP OF ENGINEERS CW-2215	%	70 MIN.
RIB THICKNESS	ASTM D 1777-64	INCH	0.05 NOM.
JUNCTION THICKNESS	ASTM D 1777-64	INCH	0.16 NOM.
SECANT APERTURE STABILITY MODULES @ 20 cm-kg	GRID APERTURE TEST-UNIVERSITY OF ALASKA, FAIRBANKS	cm-kg/deg	6.50 MIN.

PROPERTY	TEST METHOD	UNITS	VALUE
FLEXURAL RIGIDITY MACHINE DIRECTION	ASTM D 1388-64	mg-cm	750,000 MIN.
TENSILE MODULES	GRI GG1-87	lb/ft	18,500 MIN-MACHINE DIRECTION 30,000 MIN.-CROSS MACHINE DIRECTION
JUNCTION STRENGTH	GRI GG2-87	lb/ft	1080 MIN.
JUNCTION EFFICIENCY	GRI GG2-87	%	90 MIN.

THE GEOGRID SHALL BE MEASURED IN PLACE BY THE SQUARE YARD OF AREA COVERED WITH NO ALLOWANCES FOR LAPS OR SEAMS. PAYMENT SHALL BE AT THE CONTRACT PRICE PER SQUARE YARD AND SHALL INCLUDE ALL MATERIALS, LABOR, EQUIPMENT, TOOLS AND OTHER INCIDENTAL ITEMS NECESSARY TO PLACE THE GEOGRID AS SHOWN ON THE PLANS.

970. 0005 LANDSCAPE PREPARATION: PRIOR TO APPLYING ROUNDUP, THE CONTRACTOR SHALL REMOVE ANY ROCKS, DEADFALL, AND GARBAGE FROM THE TRAIL CORRIDOR. THE CONTRACTOR SHALL APPLY ROUNDUP TO THE TRAIL CONSTRUCTION CORRIDOR 10 DAYS PRIOR TO MOWING/MULCHING OF THE CORRIDOR. ROUNDUP WILL NOT BE APPLIED NEXT TO RESIDENTIAL AREAS OR IN WOODED AREAS. GRASSES WILL BE MULCHED TO WITHIN 1 INCH OF THE EXISTING GROUND, USING A MULCHING MOWER CAPABLE OF PRODUCING STANDS OF 1 INCH OR LESS IN LENGTH.

970. 0110 HERBICIDE WEED CONTROL: THE CONTRACTOR SHALL PLACE A GRANULAR HERBICIDE IN THE AREAS WHERE THE HOT BITUMINOUS PAVEMENT TRAIL WILL BE PLACED. THE HERBICIDE SHALL BE PLACED TO THE WIDTH SHOWN ON THE TYPICAL SECTIONS, (CENTERED ON THE TRAIL CENTERLINE). THE CONTRACTOR SHALL USE NOROSAC 106 AT AN APPLICATION RATE OF 100 - 120 LBS. PER ACRE OR 2.3 -2.8 LBS. PER 1,000 SF., OR DYCLOMEC 46 AT AN APPLICATION RATE OF 250-300 LBS. PER ACRE OR 5.75-7.0 LBS. PER 1,000 SF., OR AN APPROVED EQUAL. THE HERBICIDE SHALL BE PLACED AND INCORPORATED INTO THE SUBGRADE PRIOR TO THE PALCEMENT OF THE RECYCLED BASE COURSE. COST OF MATERIALS, EQUIPMENT, LABOR AND INCIDENTALS TO COMPLETE THIS ITEM SHALL BE INCLUDED IN THE BID PRICE PER LINEAL FOOT OF HERBICIDE WEED CONTROL MEASURED ALONG THE TRAIL CENTERLINE.

ESTIMATE OF QUANTITIES

FHWA REGION	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
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MANDAN 19TH STREET BIKE TRAIL ESTIMATE OF QUANTITIES

SPEC	CODE	ITEM	UNIT	QUANTITY
103	0100	CONTRACT BOND	LS	0.4
202	0112	REMOVAL OF CONCRETE	SY	10
202	0119	SAW CONCRETE	LF	16
202	0130	REMOVAL OF CURB & GUTTER	LF	51
203	0101	COMMON EXCAVATION, TYPE A	CY	75
203	0109	TOPSOIL	CY	235
203	0119	TOPSOIL-IMPORTED	CY	130
203	0140	BORROW	CY	1425
216	0100	WATER	MGAL	14
302	0301	RECYCLED BASE COURSE	TON	415
408	0176	HOT BITUMINOUS PAVEMENT, CL 27	TON	310
409	0445	PG 58-28 ASPHALT CEMENT	TON	22
702	0100	MOBILIZATION	LS	0.4
704	0100	FLAGGING	MHR	50
704	1000	TRAFFIC CONTROL SIGNS	UNIT	316
704	1052	TYPE III BARRICADES	EA	4
704	1060	DELINEATOR DRUMS	EA	6
704	1065	TRAFFIC CONES	EA	8
708	1310	EROSION CHECKS	LF	50
708	2331	SEEDING, TYPE B SPECIAL	ACRE	1.5
708	5700	WOOD EXCELSIOR FIBERMAT	SY	1400
722	6140	ADJUST GATE VALVE BOX	EA	2
722	6160	ADJUST INLET	EA	1
748	0100	CURB & GUTTER	LF	58
750	0115	SIDEWALK CONCRETE 4IN	SY	3
750	2109	ADA CURB RAMP	SY	16
752	0922	FENCE REMOVE AND RESET	LF	450
754	0601	REMOVE & RESET SIGNS	EA	1
754	0635	12" X 9" SIGNS	EA	2
754	0637	12" X 18" SIGNS	EA	2
754	0640	24" X 18" SIGNS	EA	4
754	0650	18" X 18" SIGNS	EA	4
754	0655	24" X 24" SIGNS	EA	2
754	0690	30" X 30" SIGNS	EA	1
920	1216	GEOGRID	SY	810
970	0005	LANDSCAPE PREPARATION	LF	1191
970	0110	HERBICIDE WEED CONTROL	LF	1191

BASIS OF ESTIMATE

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BASIS OF ESTIMATE

BORROW

35% ADDITIONAL VOLUME HAS BEEN ADDED TO THE BORROW QUANTITY FOR SHRINKAGE.

WATER

6 GALLONS PER TON FOR RECYCLED BASE COURSE
5 GALLONS PER CUBIC YARD FOR BORROW
4 "M" GALLONS FOR DUST CONTROL

RECYCLED BASE COURSE

1.85 TON PER CUBIC YARD OF RECYCLED BASE COURSE
30 TON PER APPROACH HAS BEEN ADDED TO THE QUANTITIES FOR BASE

HOT BITUMINOUS PAVEMENT, CL. 27

2.00 TON PER CUBIC YARD OF HOT BITUMINOUS PAVEMENT, CL. 27
25 TON PER APPROACH HAS BEEN ADDED TO THE QUANTITIES FOR HBP

PG 58-28 ASPHALT CEMENT

7.0 % PG 58-28 ASPHALT CEMENT PER TON OF HOT BITUMINOUS PAVEMENT, CL. 27

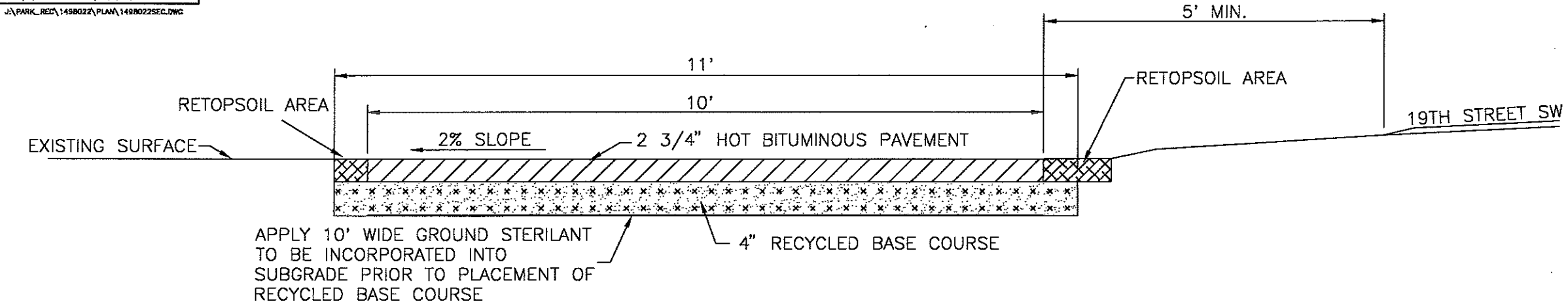
STEEL GALVANIZED POST, 2-1/4" X 2-1/4" SQUARE PERFORATED

SIGNS D11-1 & W11-1	AVERAGE HEIGHT = 9'
SIGNS R1-2-24, R5-3, ETC.	AVERAGE HEIGHT = 7'
POST WITH DOUBLE SIGNS	AVERAGE HEIGHT = 9'

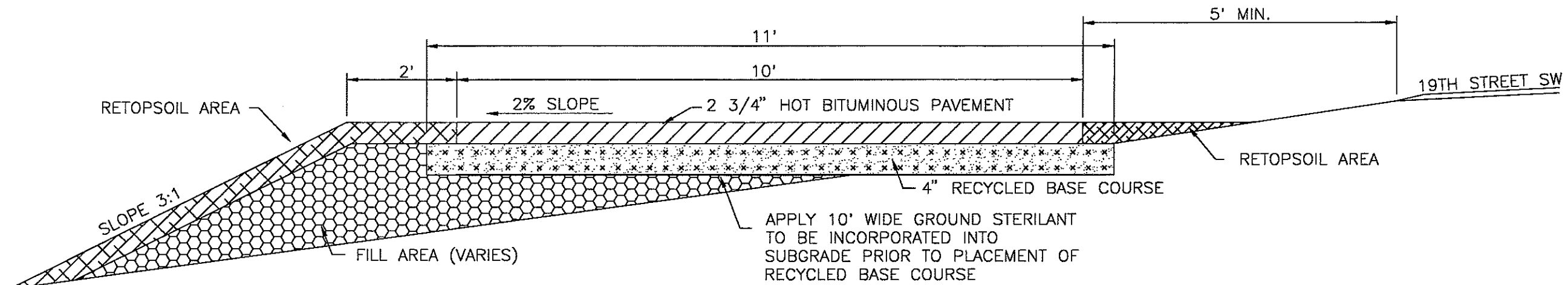
EROSION CHECKS

10 LINEAL FEET PER TYPE A EROSION CHECK (STRAW BALES)

FHWA REGION	STATE	PROJECT NO.	SHEET NO.
	ND	TES-1-808(035)068	8
CITY OF MANDAN MANDAN, NORTH DAKOTA			
Kadmas Lee & Jackson Consulting Engineers and Surveyors		DATE 1498022 2/4/99	DATE 2/4/99
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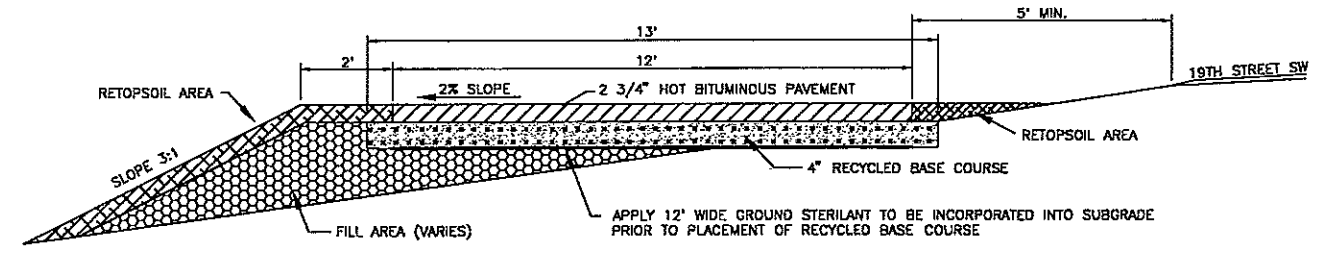


TYPICAL TRAIL SECTION
STA. 0+30 TO STA. 1+00
NO SCALE

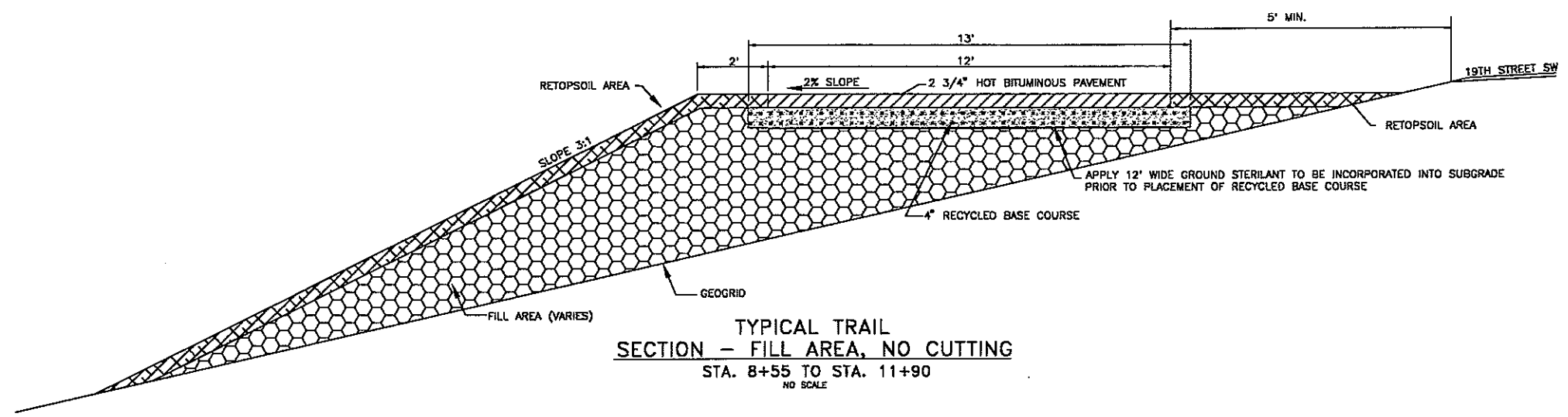


TYPICAL TRAIL SECTION - FILL AREA
STA. 1+00 TO STA. 5+50
NO SCALE

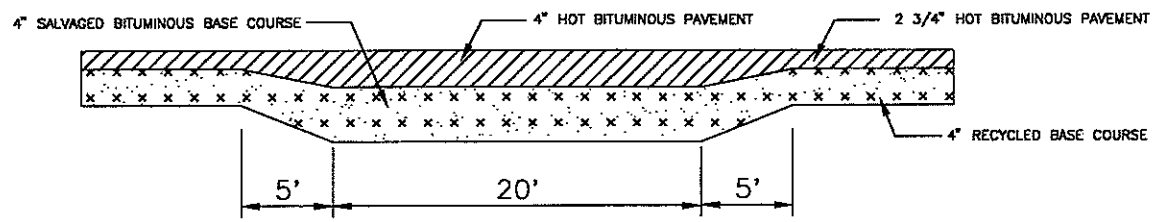
FHWA REGION	STATE	PROJECT NO.	SHEET NO.
	ND	TES-1-806(035)068	9
Kadmas Lee & Jackson Consulting Engineers and Surveyors		CITY OF MANDAN MANDAN, NORTH DAKOTA	
DRAWN BY T. KARY/TJR		DATE 2/4/99	CHECKED BY
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TYPICAL TRAIL SECTION - FILL AREA
STA. 6+00 TO STA. 8+55
NO SCALE



TYPICAL TRAIL SECTION - FILL AREA, NO CUTTING
STA. 8+55 TO STA. 11+90
NO SCALE

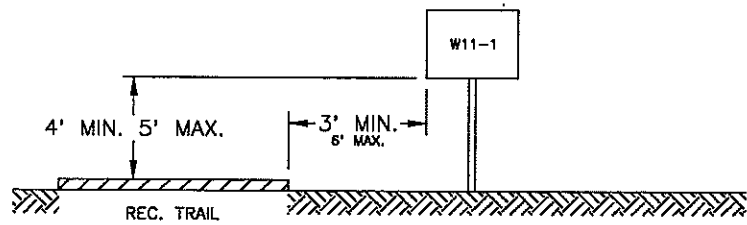


THICKENED HOT BITUMINOUS PAVEMENT SECTION
STA. 5+55 TO STA. 5+75
STA. 8+30 TO STA. 8+50
NO SCALE

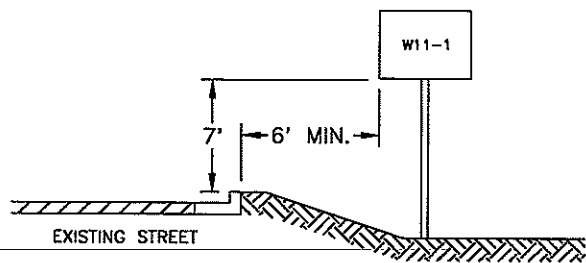
FHWA REGION	STATE	PROJECT NO.	SHEET NO.
	ND	TES-1-806(035)068	10
CITY OF MANDAN MANDAN, NORTH DAKOTA			
Kadmas Lee & Jackson		DATE	2/4/99
1498022		DRAWN BY T. KARY	
CONSULTING ENGINEERS AND SURVEYORS		CHECKED BY	
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DETAILS

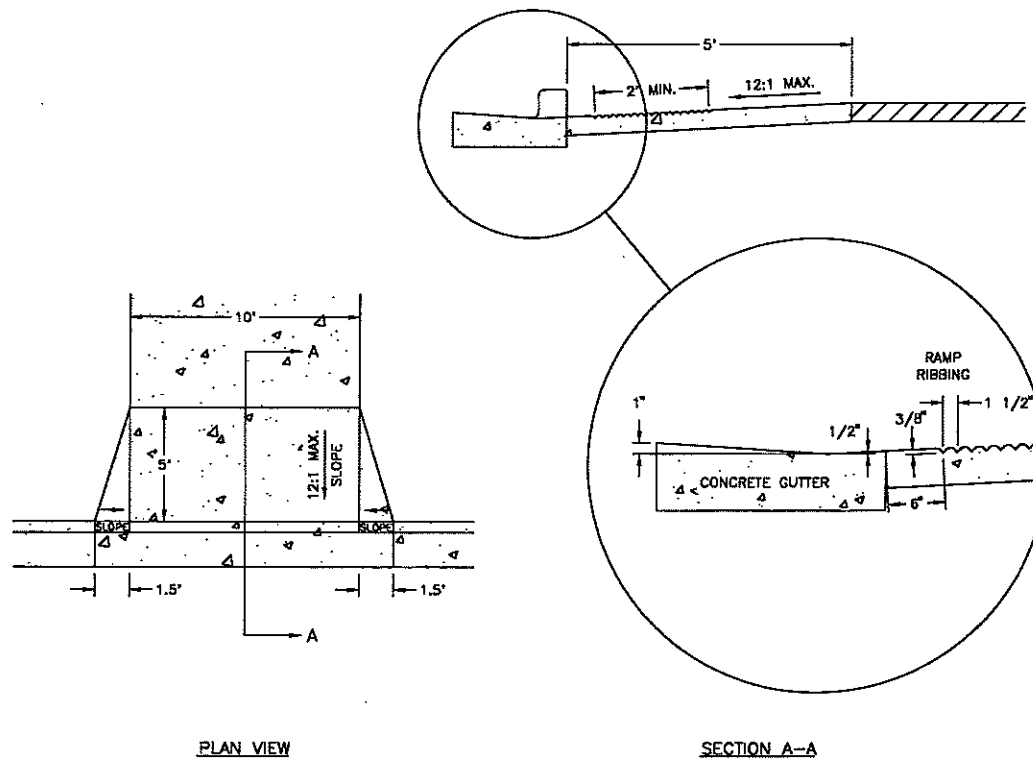


NOTE: SEE PLAN SHEETS FOR SIGN LOCATIONS



TYPICAL SIGN POSITION DETAIL

NO SCALE

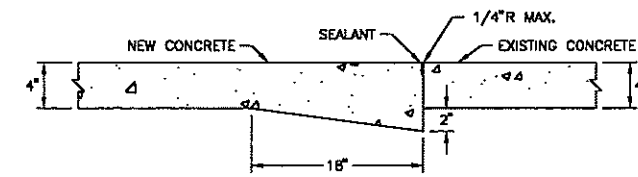


PLAN VIEW

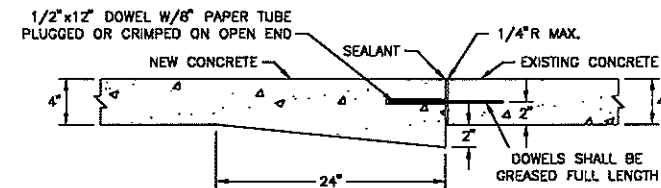
SECTION A-A

WHEEL CHAIR RAMP DETAILS

NO SCALE

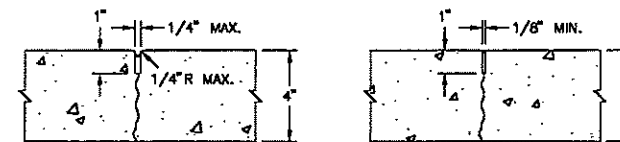


MATCH EXISTING TRANSVERSE JOINTS
CONCRETE SIDEWALK WIDENING



PLACE EXPANSION JOINTS 96\"/>

CONCRETE EXPANSION JOINT



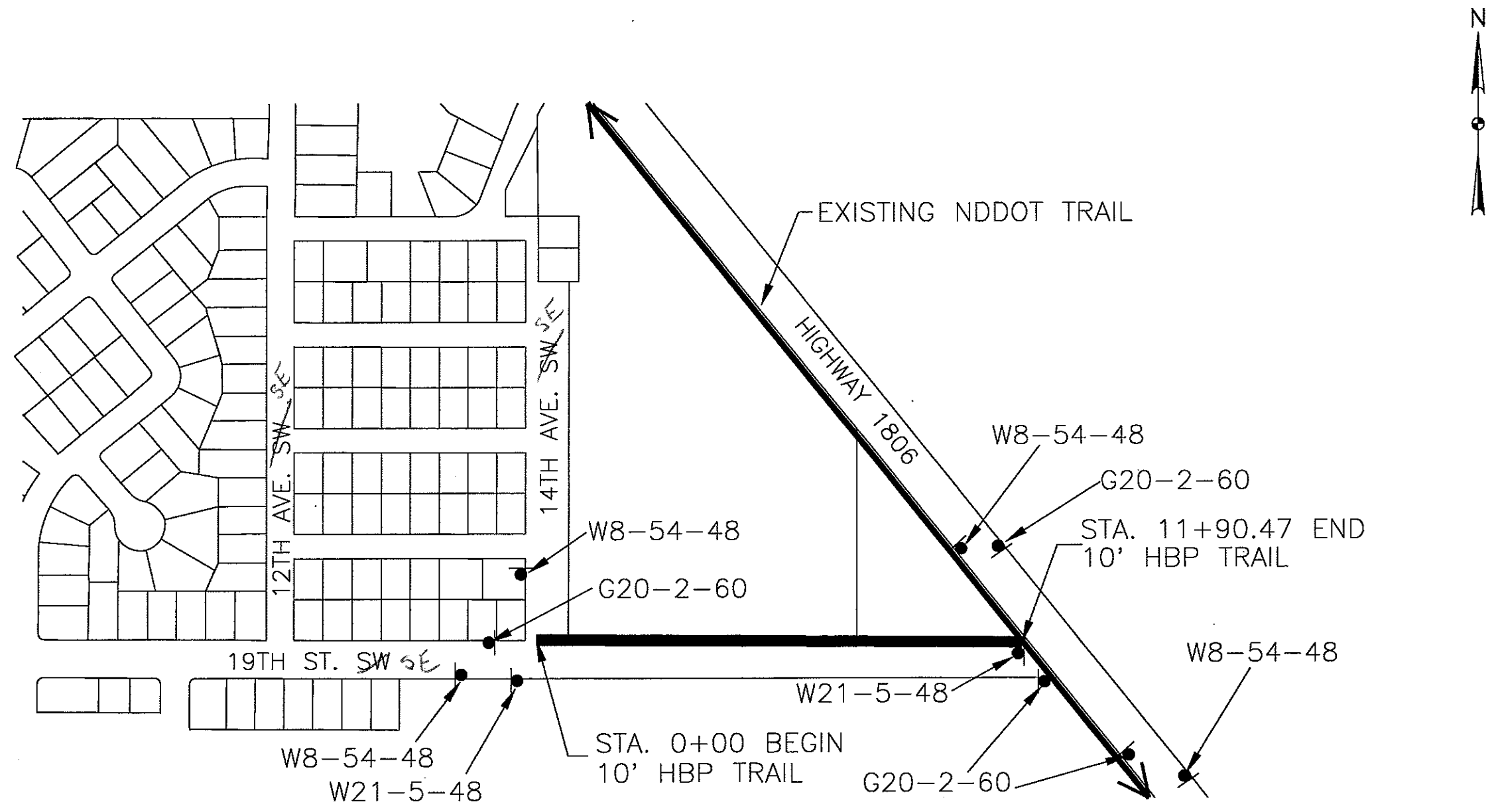
TOOLED
SAWED
TRANSVERSE CONTRACTION JOINT

CONCRETE TRAIL DETAILS

NO SCALE

NINETEENTH STREET SW BIKE TRAIL CONSTRUCTION SIGNING LAYOUT PLAN

FHWA REGION	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
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The sign layout as shown is for general informational purposes only. The contractor will be required to conform to MUTCD and the Standard Drawings when installing the traffic control signing.

FHWA REGION	STATE	FEDERAL AID PROJECT NO.	SHEET NO.
	N.D.	TES-1-806(035)068	12

CONSTRUCTION SIGNING LIST

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB-TOTAL
R1-1-30	30" x 30"	STOP		17	
R1-1-48	48" x 48"	STOP		34	
R1-2-48	48" x 48"	YIELD TO ONCOMING TRAFFIC		45	
R2-1a-24	24" x 18"	MINIMUM FEE \$40		8	
R2-1-48	48" x 60"	SPEED LIMIT		40	
R2-5c-48	48" x 60"	SPEED ZONE AHEAD		40	
R4-1-48	48" x 60"	DO NOT PASS		40	
R4-7-48	48" x 60"	KEEP RIGHT SYMBOL		40	
R4-8-48	48" x 60"	KEEP LEFT SYMBOL		40	
R10-6-48	48" x 72"	STOP HERE ON RED		44	
R11-2-48	48" x 30"	ROAD CLOSED		26	
R11-2a-48	48" x 30"	STREET CLOSED		26	
R11-3a-60	60" x 30"	ROAD CLOSED		30	
R11-3b-60	60" x 30"	BRIDGE OUT	MILES AHEAD LOCAL TRAFFIC ONLY	30	
R11-2a-48	48" x 30"	STREET CLOSED		26	
R11-3c-60	60" x 30"	STREET CLOSED	MILES AHEAD LOCAL TRAFFIC ONLY	30	
R11-4a-60	60" x 30"	STREET CLOSED TO THROUGH TRAFFIC		30	
G20-1a-60	60" x 24"	ROAD WORK NEXT	MILES	28	
G20-2-60	60" x 24"	END CONSTRUCTION		28	112
G20-2a-48	48" x 24"	END ROAD WORK		24	
G20-4-36	36" x 18"	PILOT CAR FOLLOW ME		10	
G20-50a-72	72" x 36"	ROAD WORK NEXT	MILES RT & LT ARROWS	38	
G20-8-48	48" x 36"	TEMPORARY SURFACE NEXT	MILES	30	
M1-4-24	24" x 24"	ROUTE MARKER (POST & INSTALLATION ONLY)		10	
M3-1-24	24" x 12"	NORTH (MOUNTED ON ROUTE MARKER POST)		6	
M3-2-24	24" x 12"	EAST (MOUNTED ON ROUTE MARKER POST)		6	
M3-3-24	24" x 12"	SOUTH (MOUNTED ON ROUTE MARKER POST)		6	
M3-4-24	24" x 12"	WEST (MOUNTED ON ROUTE MARKER POST)		6	
M4-8-24	24" x 12"	DETOUR (MOUNTED ON ROUTE MARKER POST)		6	
M4-8a-24	24" x 18"	END DETOUR		8	
M4-9-30	30" x 24"	DETOUR RIGHT OR LEFT ARROW		10	
M4-10-48	18" x 48"	DETOUR ARROW RIGHT OR LEFT		22	
M5-1-21	21" x 15"	ARROW UP RT. OR UP LT. (MOUNTED ON MARKER POST)		6	
M6-1-21	21" x 15"	ARROW RT. OR LT. (MOUNTED ON ROUTE MARKER POST)		6	
W1-1-48	48" x 48"	RIGHT OR LEFT SHARP CURVE ARROW		34	
W1-2-48	48" x 48"	RIGHT OR LEFT CURVE ARROW		34	
W1-3-48	48" x 48"	RIGHT OR LEFT SHARP REVERSE CURVE ARROW		34	
W1-4-48	48" x 48"	RIGHT OR LEFT REVERSE CURVE ARROW		34	
W1-6-48	48" x 24"	LEFT OR RIGHT ARROW		24	
W3-1a-48	48" x 48"	STOP AHEAD SYMBOL		34	
W3-2a-48	48" x 48"	YIELD AHEAD SYMBOL		34	
W3-3-48	48" x 48"	SIGNAL AHEAD SYMBOL		34	
W5-1-48	48" x 48"	ROAD NARROWS		34	
W6-3-48	48" x 48"	TWO WAY TRAFFIC SYMBOL		34	
W8-1-48	48" x 48"	BUMP		34	
W8-3a-48	48" x 48"	PAVEMENT ENDS SYMBOL		34	
W8-3a-24	24" x 18"	PAVEMENT END PLAQUE		8	
W8-9-48	48" x 48"	LOW SHOULDER		34	
W8-9a-48	48" x 48"	SHOULDER DROP-OFF		34	
W8-12-48	48" x 48"	NO CENTER STRIPE		34	
W8-11-48	48" x 48"	UNEVEN LANES		34	
W8-51-48	48" x 48"	UNEVEN PAVEMENT		34	
W8-53-48	48" x 48"	TRUCKS ENTERING HIGHWAY		34	
W8-54-48	48" x 48"	TRUCKS ENTERING AHEAD Or _____ FT.		34	
W8-55-48	48" x 48"	TRUCKS CROSSING AHEAD Or _____ FT.		34	
W13-1-24	24" x 24"	MPH ADVISORY SPEED PLATE		10	
W13-4-48	48" x 60"	RAMP ARROW		40	
W20-1-48	48" x 48"	ROAD CONSTRUCTION - AHEAD, 1/2 MILE, Or FT.		34	
W20-2-48	48" x 48"	MEN WORKING SYMBOL		34	
W20-3-48	48" x 48"	ROAD or STREET CLOSED AHEAD or _____ FT.		34	
W20-4-48	48" x 48"	ONE LANE ROAD AHEAD or _____ FT.		34	
W20-5-48	48" x 48"	RIGHT OR LEFT LANE CLOSED AHEAD or _____ FT.		34	
W20-7a-48	48" x 48"	FLAGGING SYMBOL		34	
W20-7k-24	24" x 18"	FEET		8	
W20-8-48	48" x 48"	STREET CLOSED		34	
W20-7b-48	48" x 48"	BE PREPARED TO STOP		34	
W20-51-48	48" x 48"	EQUIPMENT WORKING		34	
W20-52-54	54" x 12"	NEXT _____ MILES		10	
W21-2-48	48" x 48"	FRESH OIL		34	
W21-4-48	48" x 48"	ROAD WORK		34	
W21-5-48	48" x 48"	SHOULDER WORK		34	
W21-51-48	48" x 48"	MATERIAL ON ROADWAY		34	68
W22-8-48	48" x 48"	FRESH OIL LOOSE ROCK		34	
R1-1a-18	18" X 18"	STOP and SLOW PADDLE Back to Back		8	
		TOTAL UNITS			316
	TYPE III	8' LONG BARRICADES		EACH	4
	TYPE II	2' MIN. BARRICADES		EACH	
	TYPE I	6' TO 10' BARRICADES		EACH	
	18" x 36" MIN.	DELINEATOR DRUMS		EACH	6
	28" MIN.	TRAFFIC CONES		EACH	8
	8" to 12" x 24"	VERTICAL PANELS		EACH	
	3' x 8"	DELINEATOR		EACH	
		SEQUENCING ARROW PANEL TYPE C		EACH	

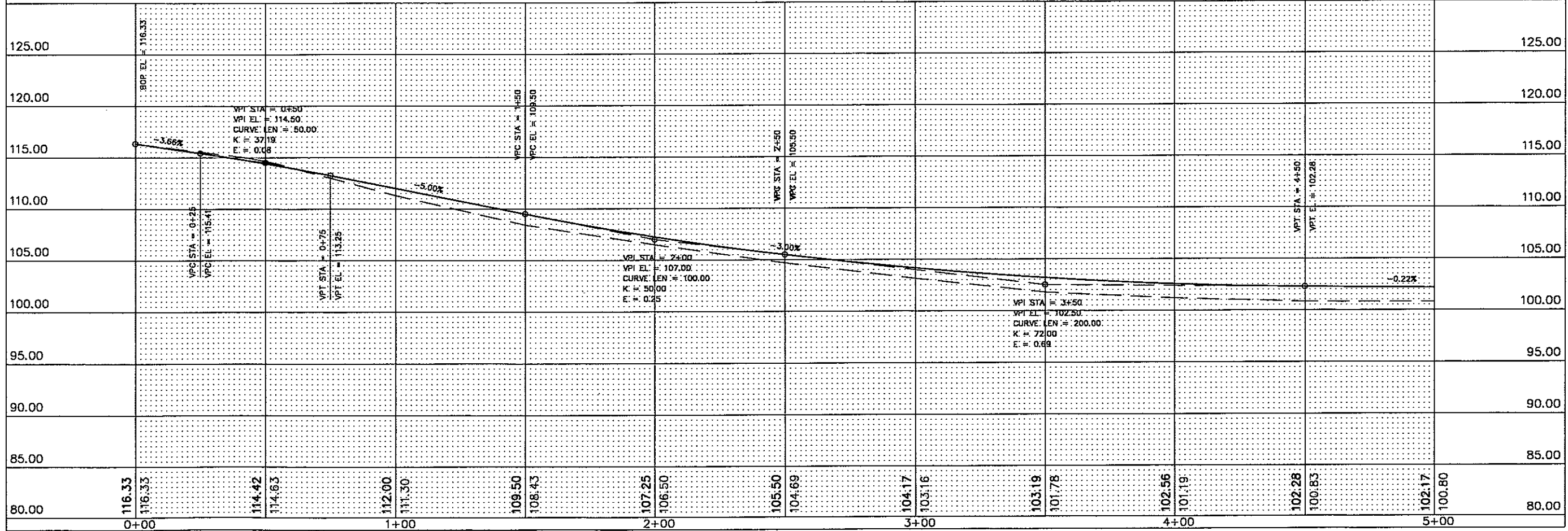
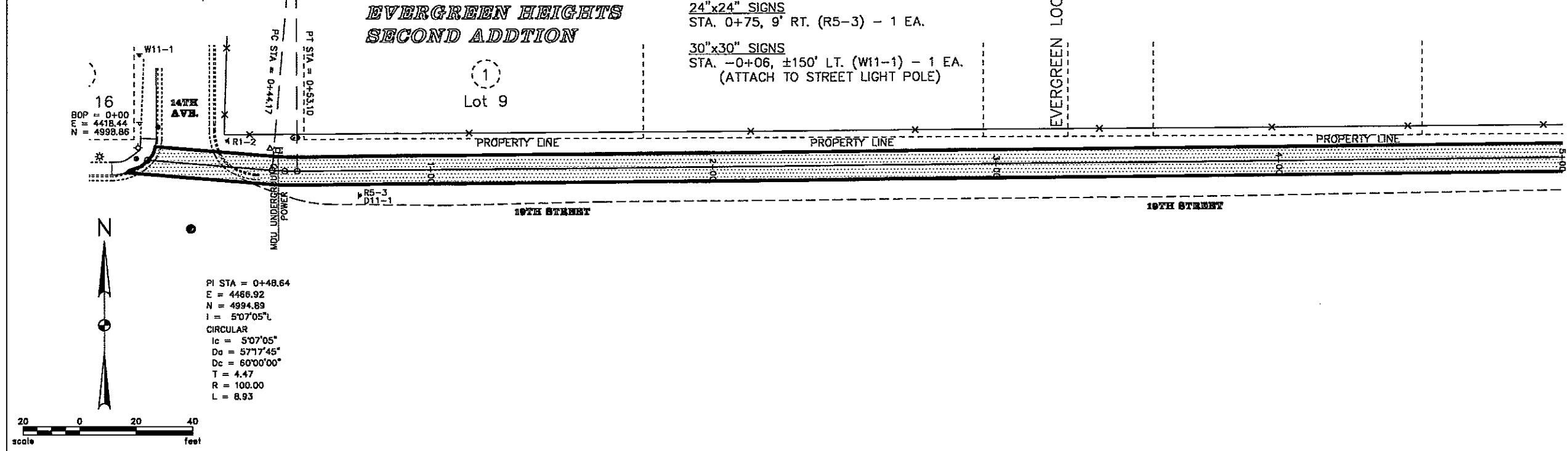
ADJUST GATE VALVE BOX
 STA. 0+03, 12' LT. - 1 EA.
 STA. -0+04, 0' LT. - 1 EA.
 REMOVAL OF CONCRETE
 STA. -0+03, LT. & RT. - 10 SY
 ADA CURB RAMP
 STA. 0+00, 0' LT. - 7 SY
 STA. 0+30, 0' LT. - 9 SY

REMOVAL OF CURB & GUTTER
 STA. 0+00, LT. & RT. - 25 LF
 STA. 0+30, LT. & RT. - 26 LF
 SIDEWALK CONCRETE 4IN
 STA. -0+03, 0' LT. - 3 SY
 CURB & GUTTER
 STA. 0+00, LT. & RT. - 25 LF
 STA. 0+30, LT. & RT. - 33 LF

WOOD EXCELSIOR FIBER MAT
 STA. 0+53 TO 5+00, LT. - 685 SY
 STA. 0+53 TO 5+00, RT. - 65 SY
 18" X 18" SIGNS
 STA. 0+28, 9' LT. (R1-1) - 1 EA.
 24"x18" SIGNS
 STA. 0+75, 9' RT. (D11-1) - 1 EA.
 24"x24" SIGNS
 STA. 0+75, 9' RT. (R5-3) - 1 EA.
 30"x30" SIGNS
 STA. -0+06, ±150' LT. (W11-1) - 1 EA.
 (ATTACH TO STREET LIGHT POLE)

REMOVE & RESET FENCE
 STA. 1+00 TO 5+00, LT. - 400 LF

AREA REGION	STATE	PROJECT NO.	SHEET NO.
	ND	TES-1-806(035)068	13
CITY OF MANDAN MANDAN, NORTH DAKOTA			
Kadmas Lee & Jackson Consulting Engineers and Surveyors		DATE 1498022 2/4/99	DRAWN BY T.L.R. CHECK BY
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FHWA REGION	STATE	PROJECT NO.	SHEET NO.
	ND	TES-1-806(035)068	14
CITY OF MANDAN MANDAN, NORTH DAKOTA			
Kadmas Lee & Jackson Consulting Engineers and Surveyors	CIPR. NO.	DATE	
	1498022	2/4/99	
	DRAWN BY	CHECKED BY	
	T.L.R.		
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18" x 18" SIGNS
 STA. 5+25, 9' RT. (W7-5) - 1 EA.
 STA. 6+25, 9' LT. (W5-4) - 1 EA.

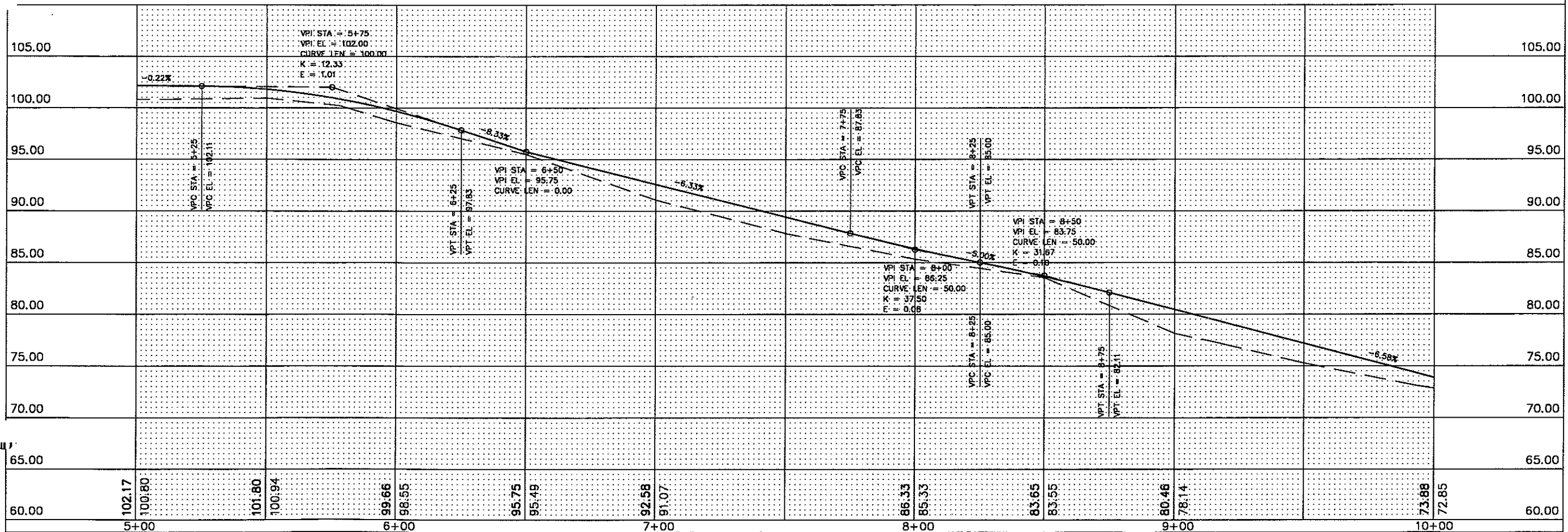
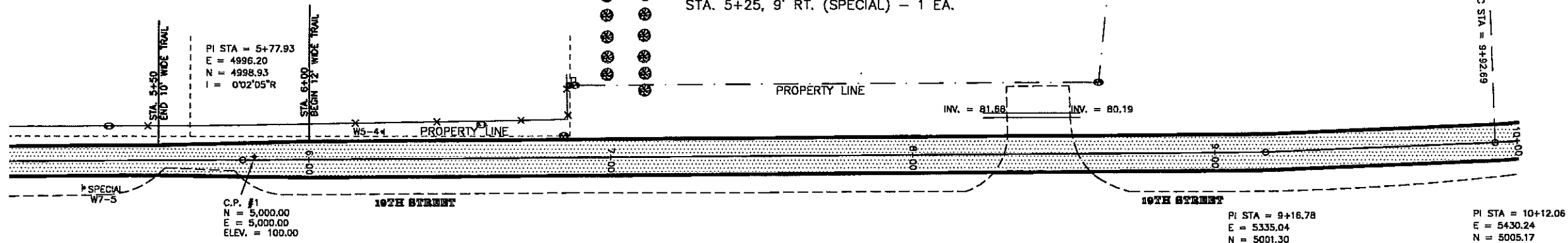
WOOD EXCELSIOR FIBER MAT
 STA. 5+00 TO 10+00, LT. - 360 SY
 STA. 5+00 TO 10+00, RT. - 90 SY

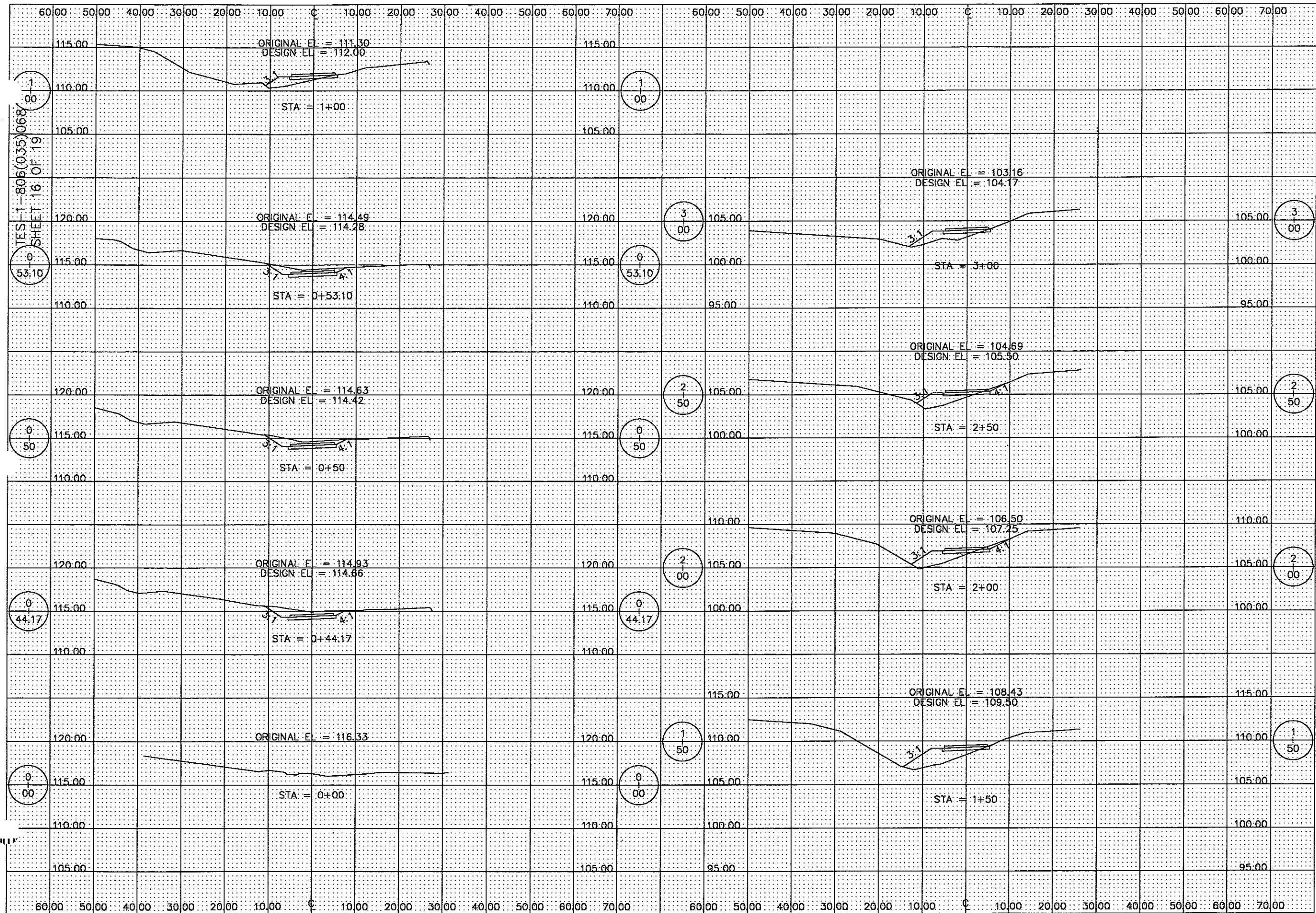
EROSION CHECKS
 STA. 9+00, LT. - 10 LF
 STA. 9+50, LT. - 10 LF

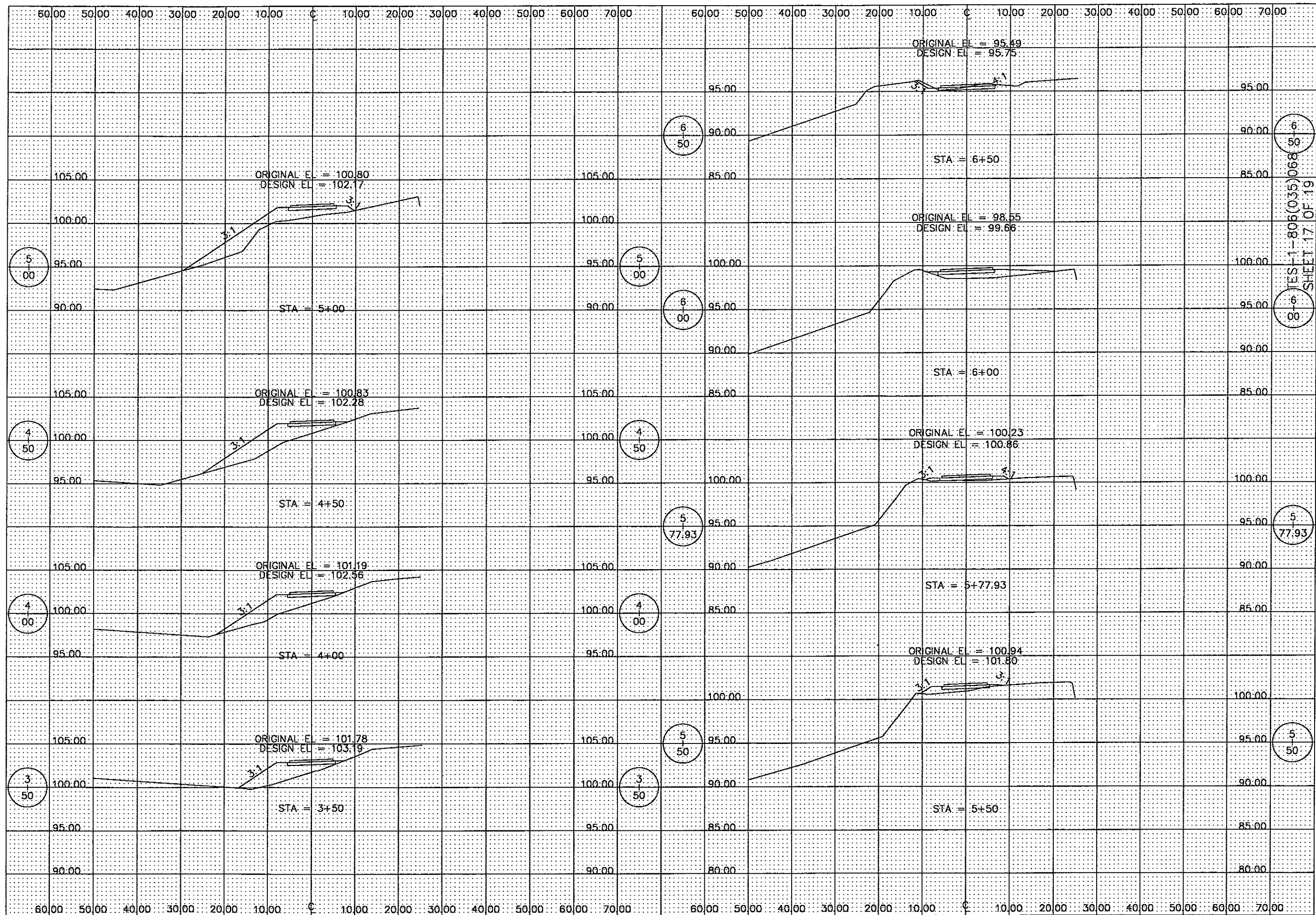
GEOGRID
 STA. 8+55 TO STA. 10+00 - 355 SY

12" x 18" SIGNS
 STA. 5+25, 9' RT. (SPECIAL) - 1 EA.

REMOVE & RESET FENCE
 STA. 5+00 TO STA. 5+50 - 50 LF







6
50
 6
00
 5
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 6
00

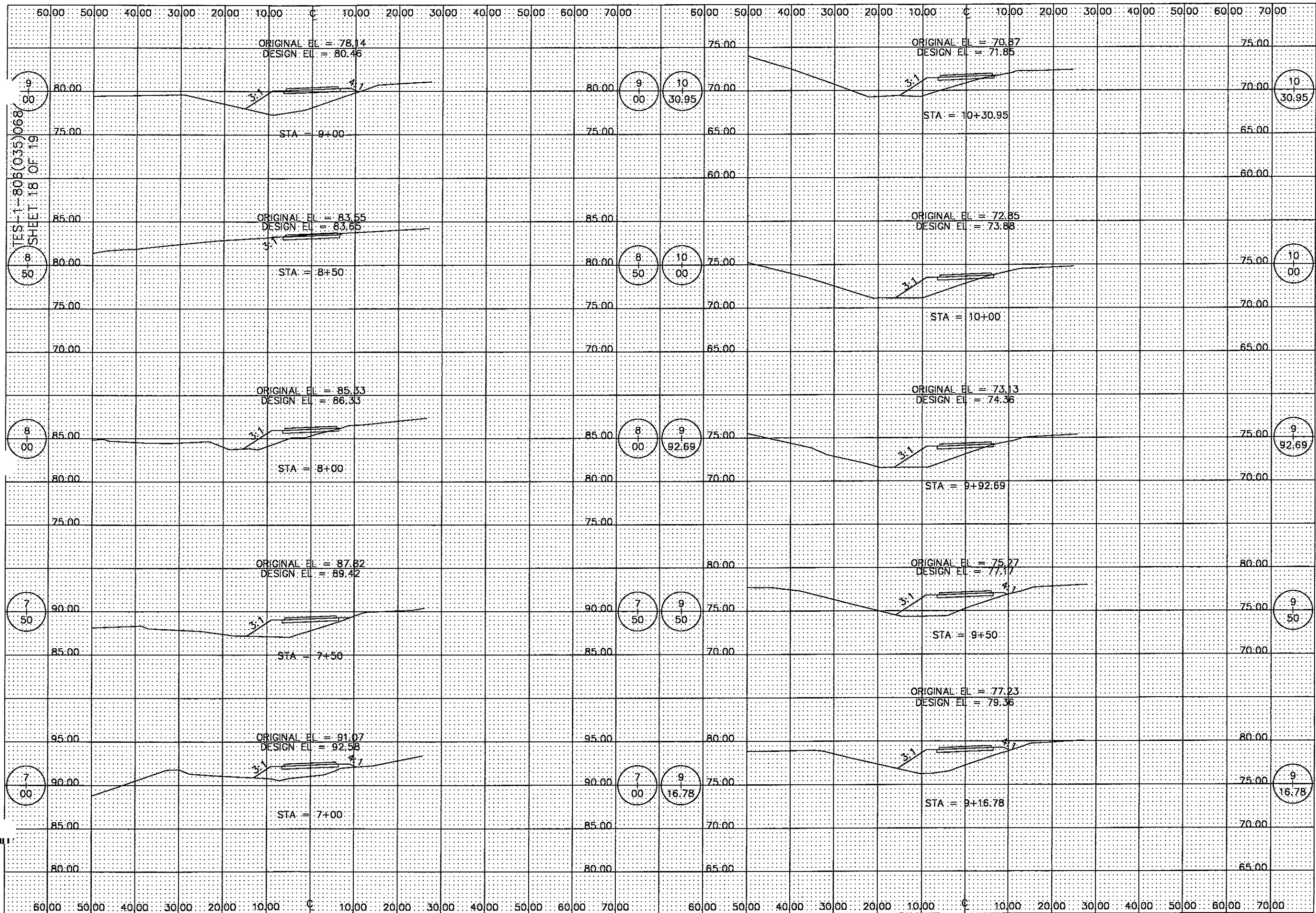
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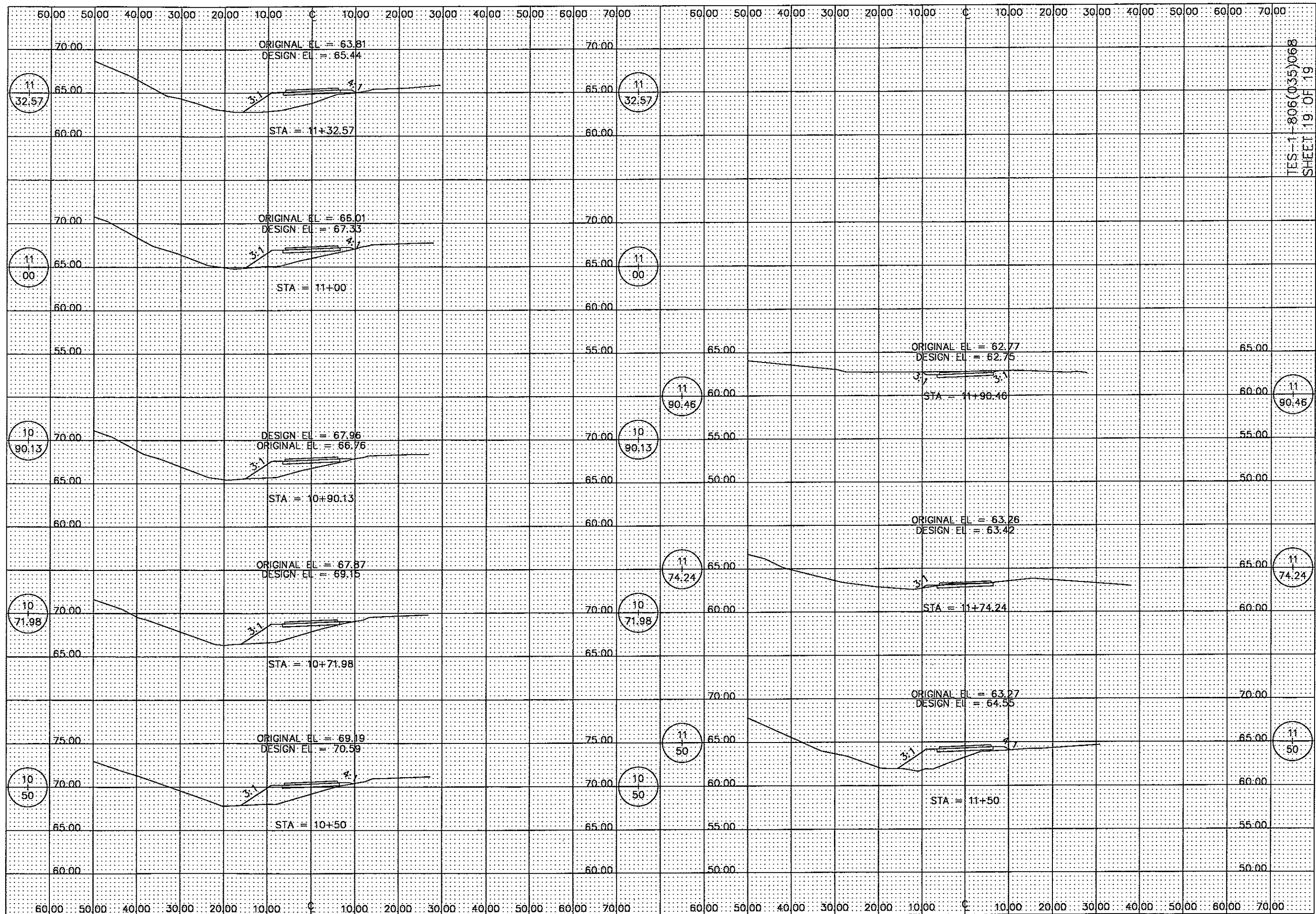
5 50

6 50

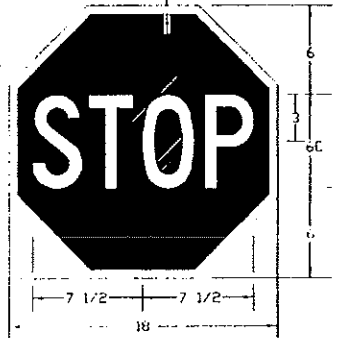
1-806(035)068
 SHEET 17 OF 19

411

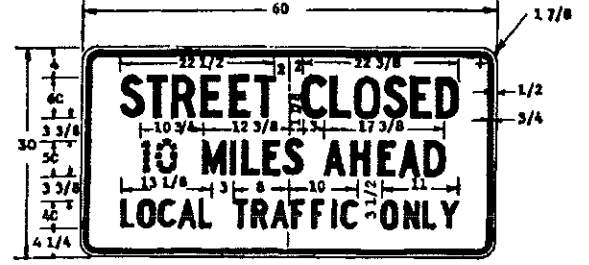




TES-1-806(035)068
 SHEET 19 OF 19



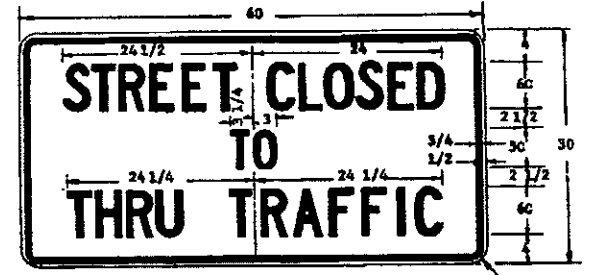
STOP SIGN
MILK LOW PADDED
RED & WHITE
FLAGPERSON PADDED



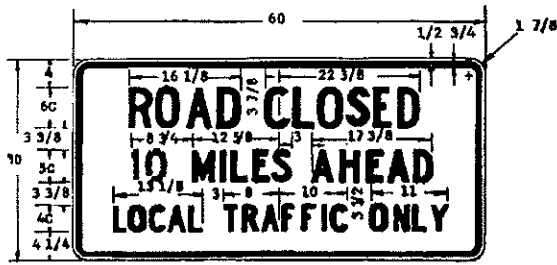
R11-3c-60
BLACK & WHITE



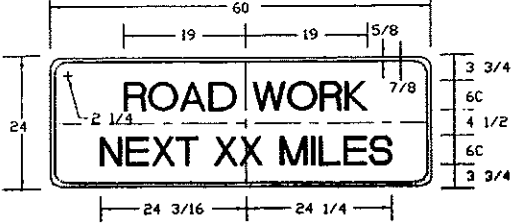
R11-2-48
BLACK & WHITE



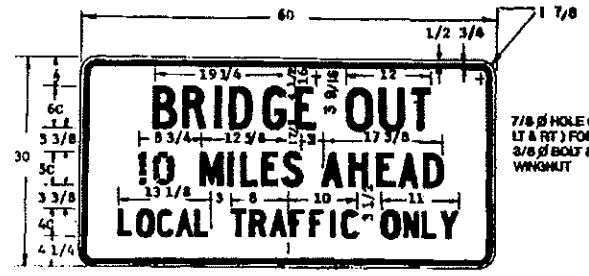
R11-4a-60
BLACK & WHITE



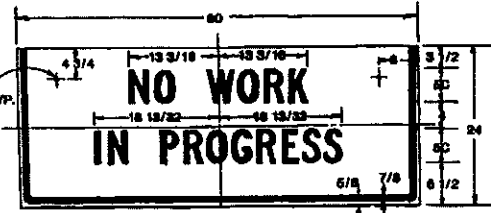
R11-3a-60
BLACK & WHITE



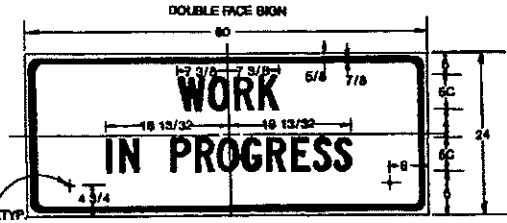
G20-1a-60
BLACK & ORANGE



R11-9-60
BLACK & WHITE

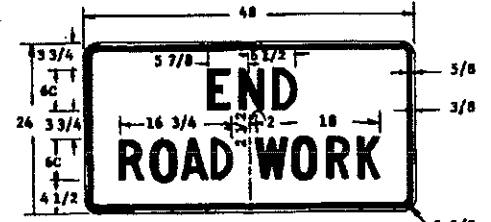


G20-1b-60
DOUBLE FACE SIGN
LEGEND: BLACK (NON-REFL.)
BACKGROUND: ORANGE

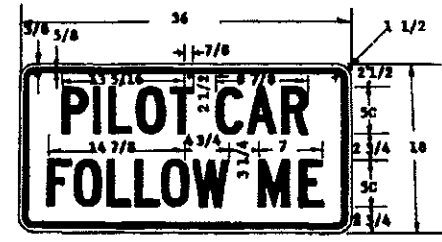


G20-1b-60
LEGEND: BLACK (NON-REFL.)
BACKGROUND: ORANGE

CONSTRUCTION SIGN DETAILS

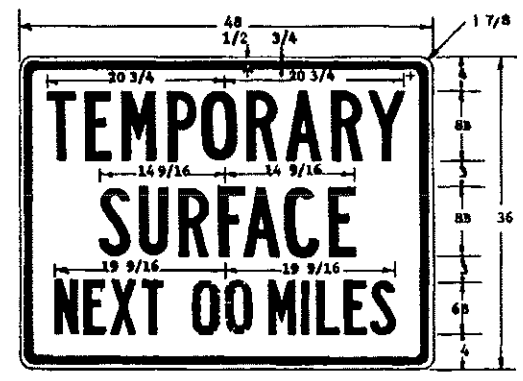


G20-2a-48
BLACK & ORANGE

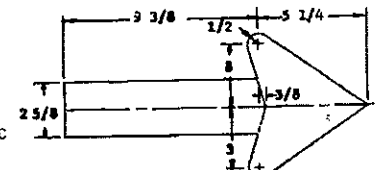


G20-4-36
BLACK & ORANGE

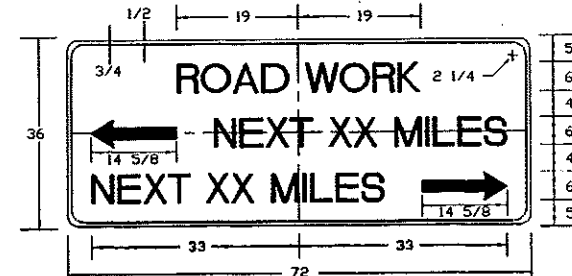
PILOT CAR SIGN SHALL BE MOUNTED ON REAR OF A VEHICLE USED FOR GUIDING CONTROLLED ONE-WAY TRAFFIC THROUGH A CONSTRUCTION AREA.



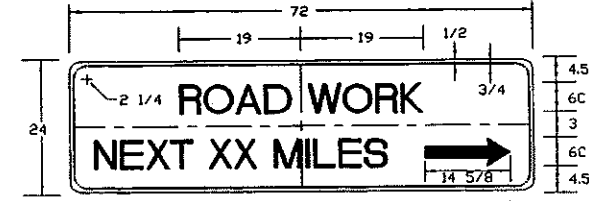
G20-8-48
BLACK & ORANGE



ARROW DETAIL FOR SIGN NOS.
G20-50a-72 & G20-52a-72



G20-50a-72
BLACK & ORANGE

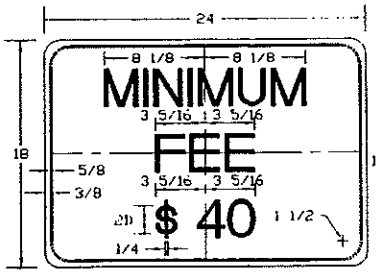


G20-52a-72
BLACK & ORANGE

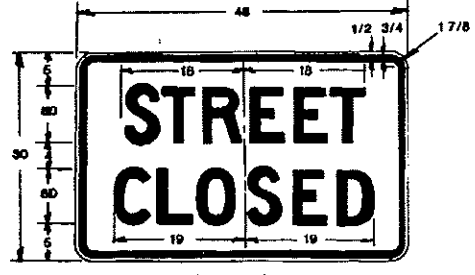
ARROW MAY BE RIGHT OR LEFT OF LEGEND TO INDICATE CONSTRUCTION TO THE RIGHT OR LEFT.



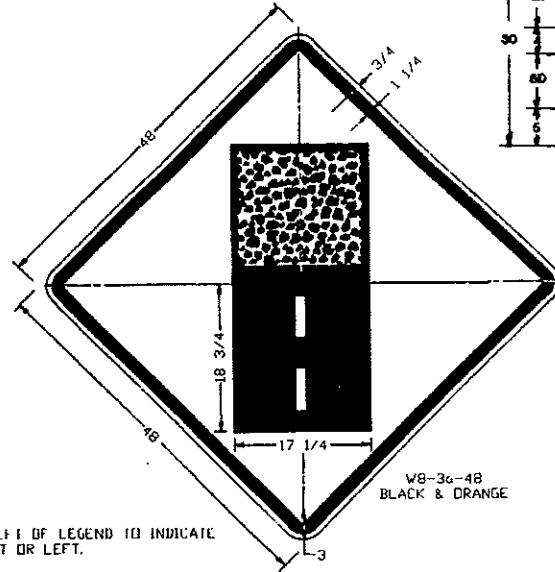
G20-54-48
BLACK & ORANGE



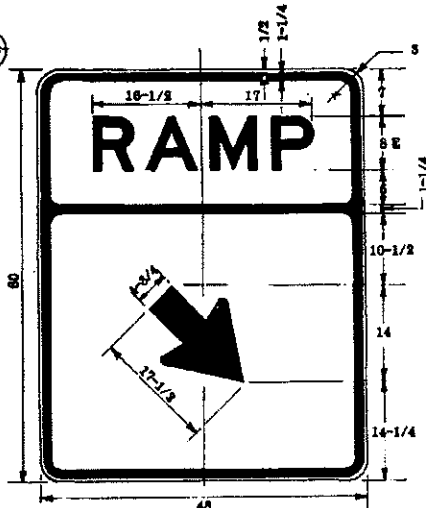
R2-1a-24
BLACK & WHITE



R11-2a-48
BLACK & WHITE



W8-3a-48
BLACK & ORANGE

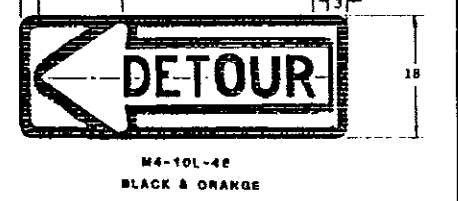
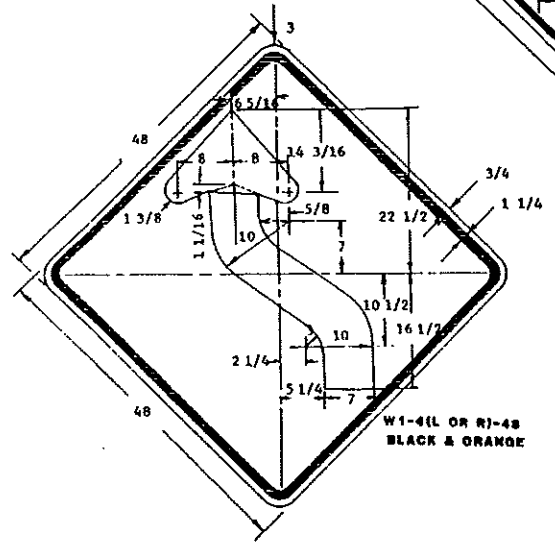
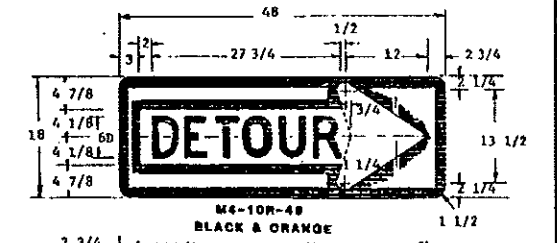
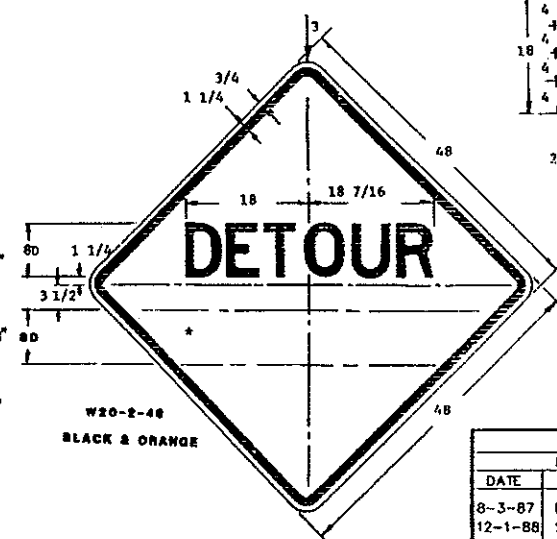
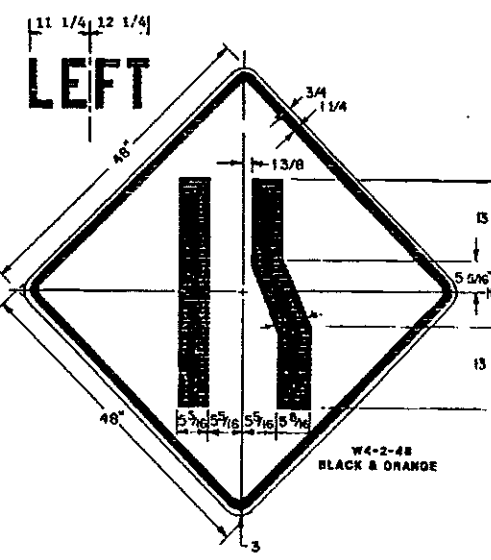
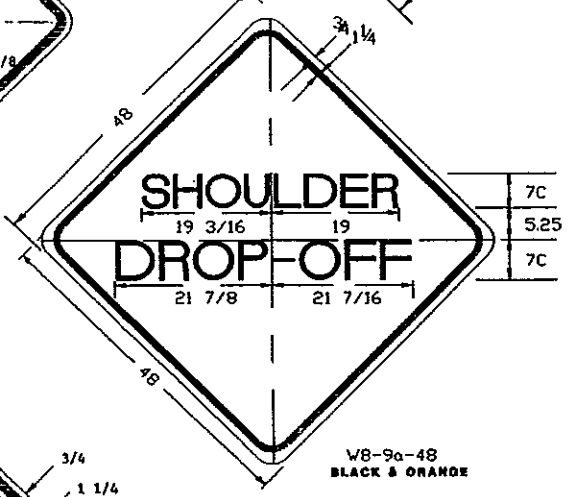
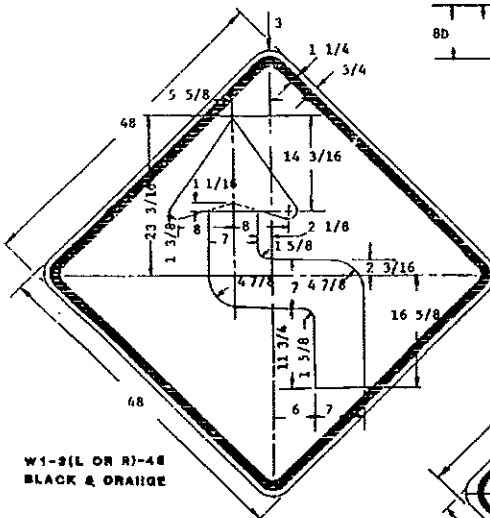
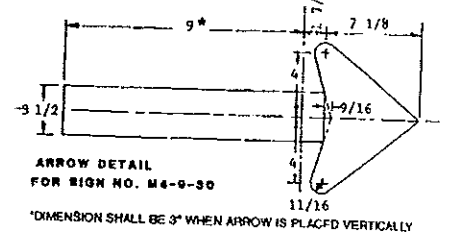
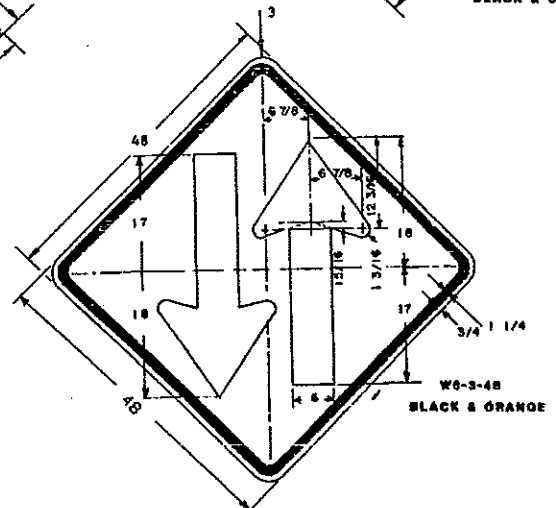
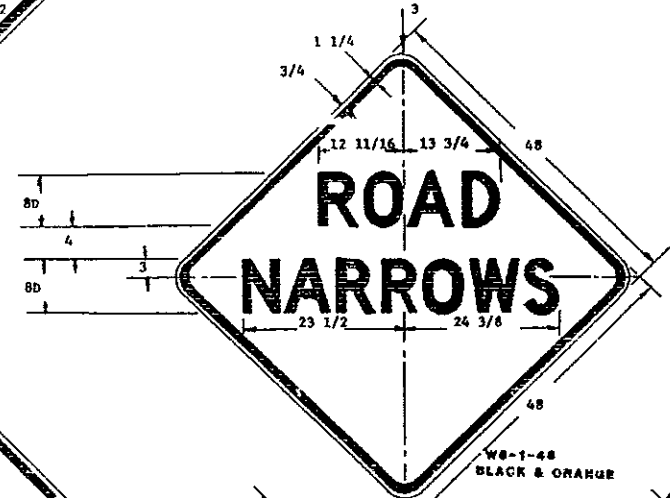
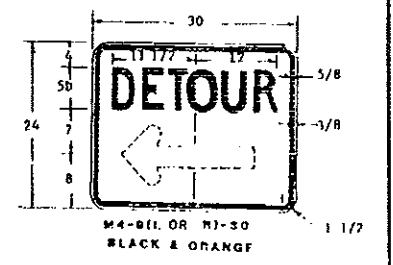
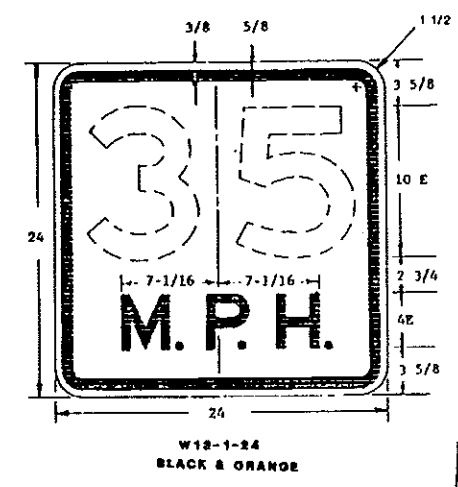
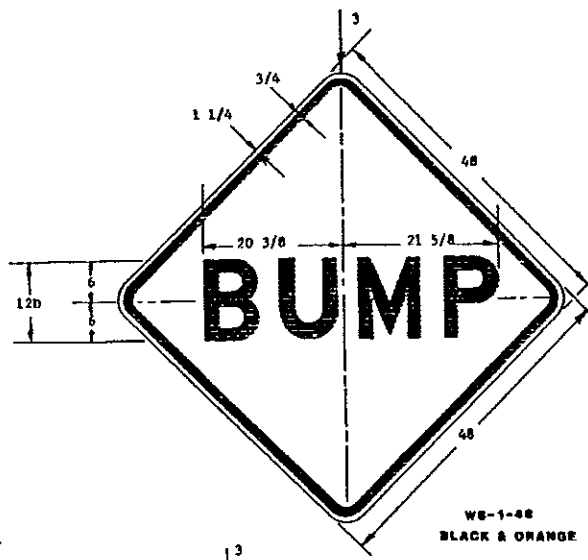
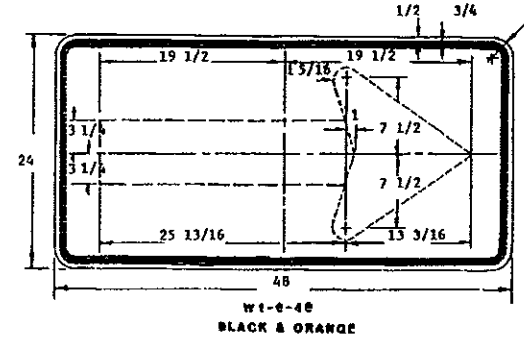
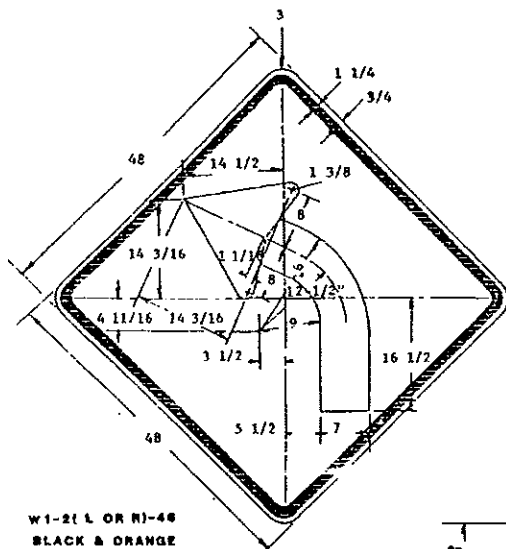


W13-4-48
BLACK & ORANGE

REVISIONS	
DATE	CHANGE
5-1-92	GENERAL REVISIONS
7-26-95	ADD SIGNS G20-1a, G20-50a, & R2-1a
3-4-96	REMOVE G20-2-60

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
APPROVED: *[Signature]*
DESIGN ENGINEER

CONSTRUCTION SIGN DETAILS



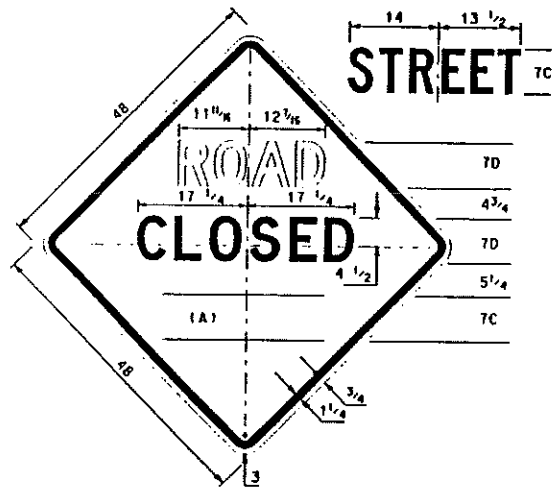
10-1-86	
DATE	REVISIONS
8-3-87	DETOUR NO.
12-1-88	SHOULDER DROP OFF
5-1-92	GENERAL REVISIONS
2-3-95	WB-9a-48
3-4-96	REMOVE W20-1-48

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
APPROVED: *David K. O'Shea*
DESIGN ENGINEER

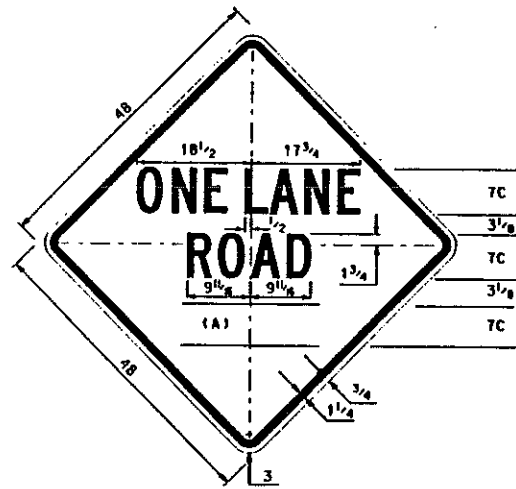
* SEE TABLE ON STANDARD D-704-12 FOR MESSAGE AND DIMENSIONS.

CONSTRUCTION SIGN DETAIL

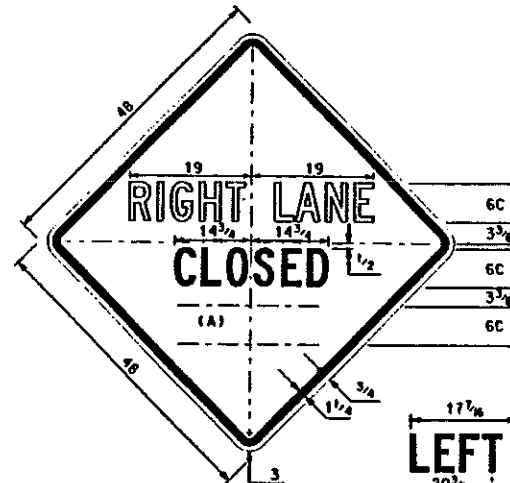
D-704-11



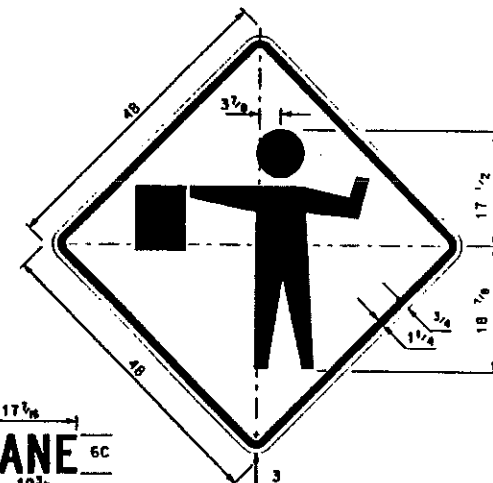
W20-3-48
Black & orange



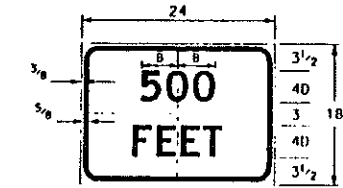
W20-4-48
Black & orange



W20-5-48
Black & orange



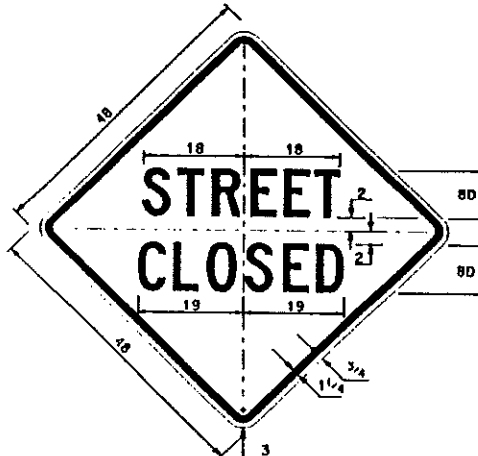
W20-7a-48
Black & orange



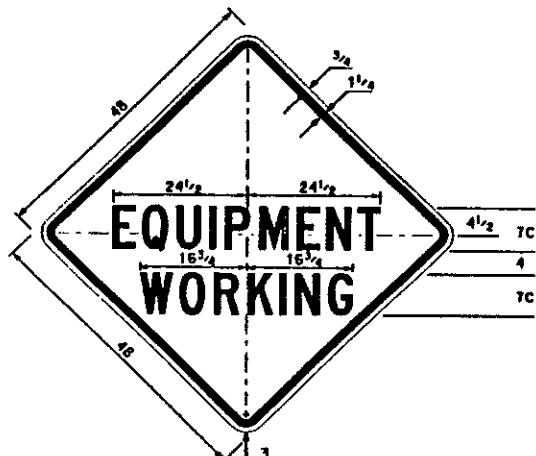
W20-7k-24
Black & orange

SIGN	DIMENSION B (INCHES)
500'	4 11/16
1000'	5 1/2
1500'	5 5/16

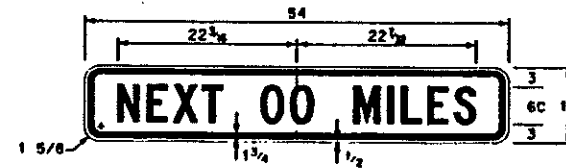
For use with
W20-7a-48 &
W21-1a-48



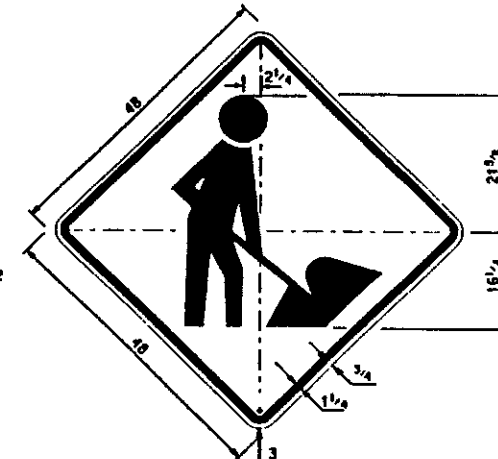
W20-8-48
Black & orange



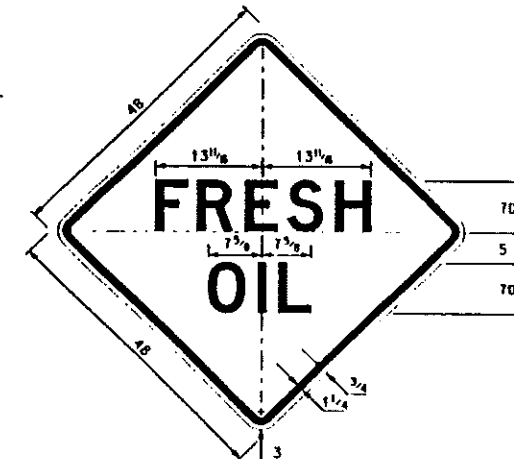
W20-51-48
Black & orange



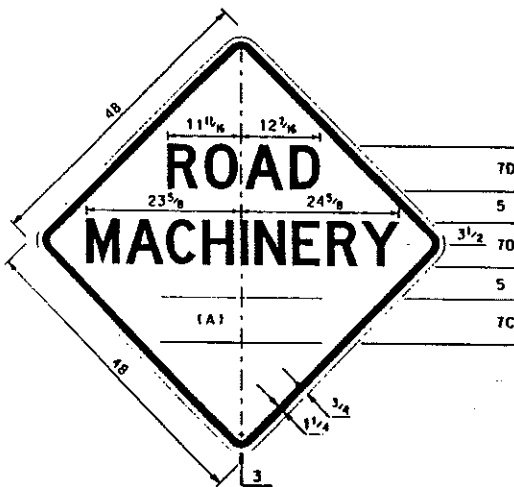
W20-52-48
Black & orange



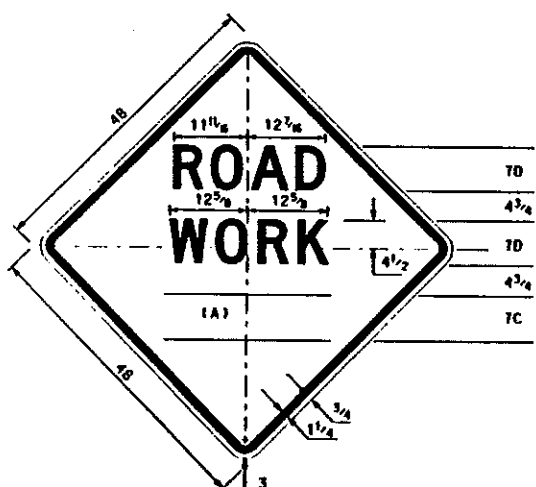
W21-1a-48
Black & orange



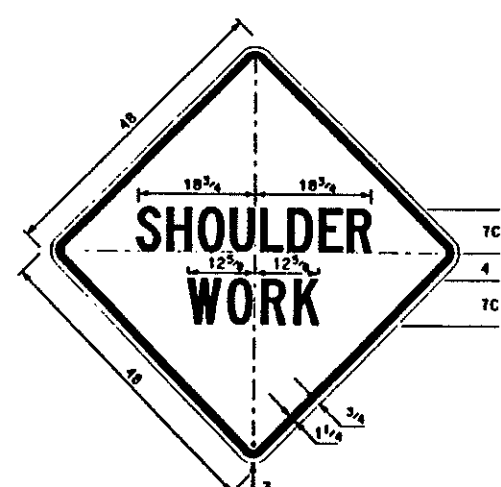
W21-2-48
Black & orange



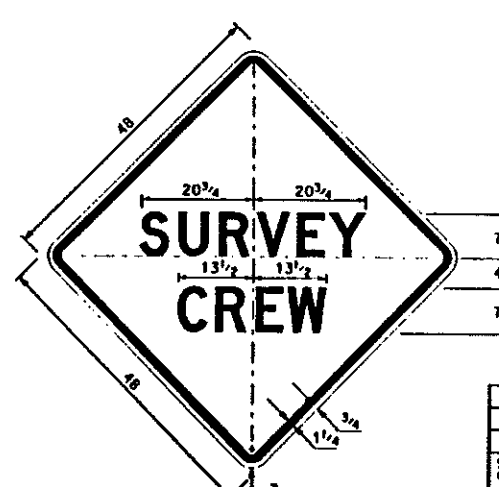
W21-3-48
Black & orange



W21-4-48
Black & orange



W21-5-48
Black & orange

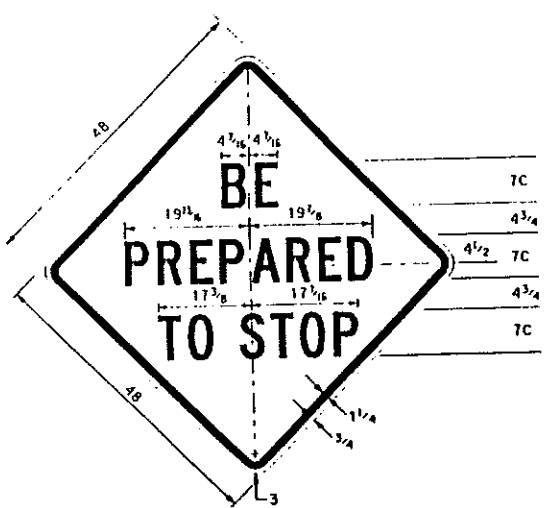


W21-6-48
Black & orange

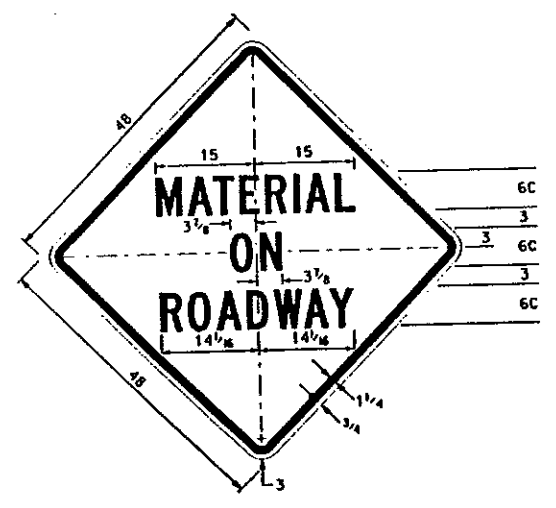
NOTES:
(A) See table on standard D-704-12
for messages and dimensions.
All dimensions are in inches

10-1-86		NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
DATE	REVISIONS	
3-1-82	General revisions	APPROVED: <i>R. H. B. J.</i> DESIGN ENGINEER
6-9-82	Chg TD to TC 10w/ W20-3, W21-5 & W21-4	

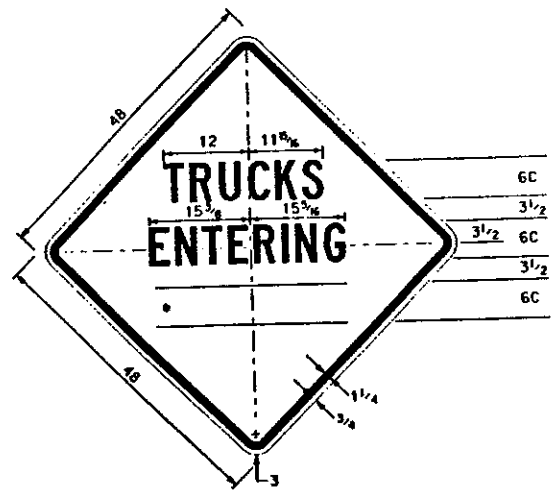
CONSTRUCTION SIGN DETAIL



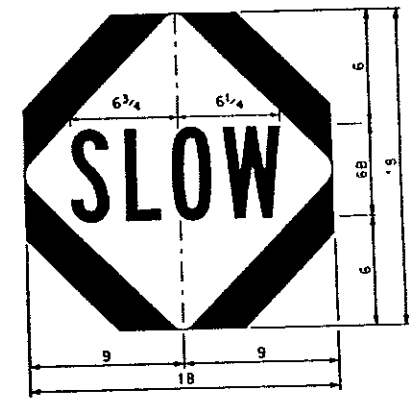
W20-7b-48
Black & orange



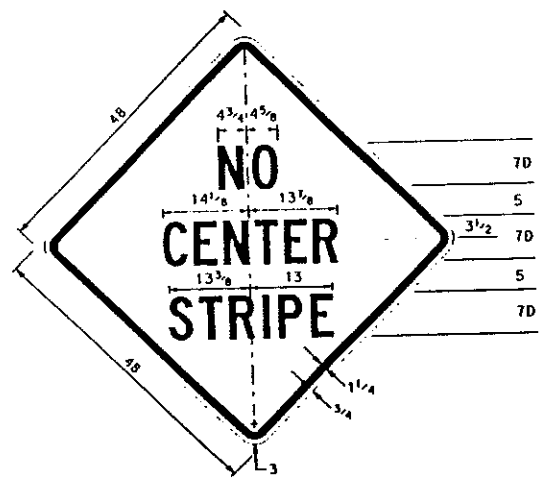
W21-51-48
Black & orange



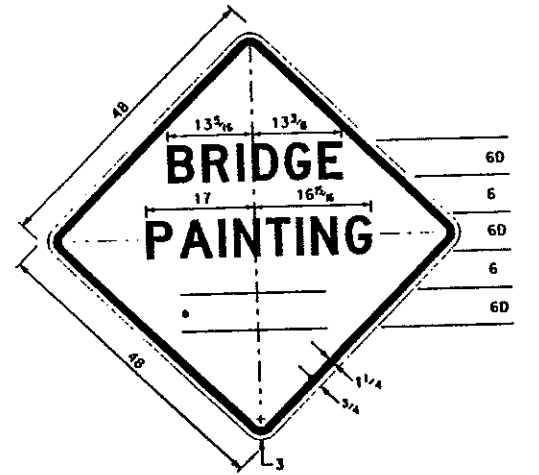
WB-54-48
Black & orange



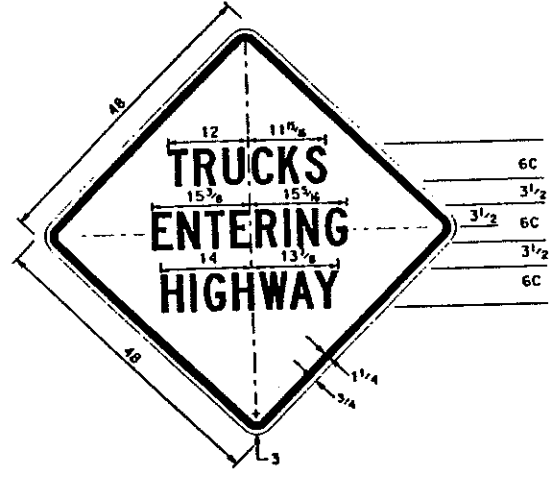
Slow-stop paddle
Black & orange
Flagperson paddle



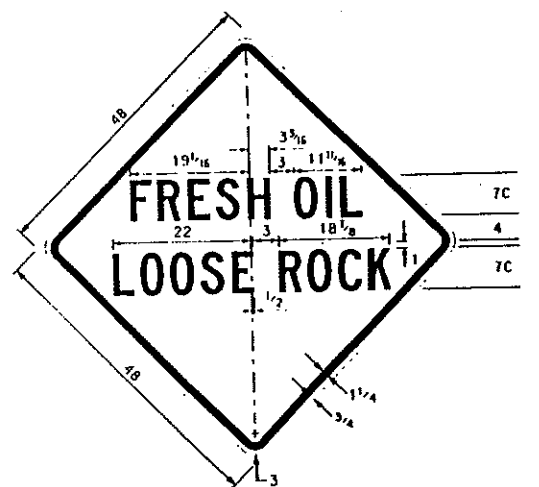
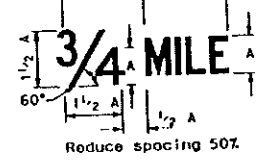
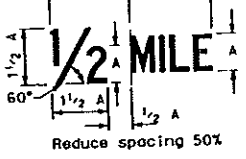
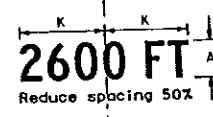
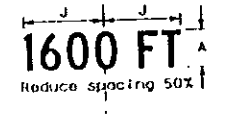
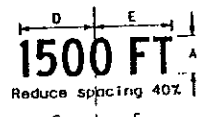
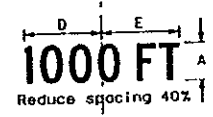
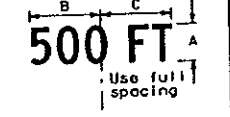
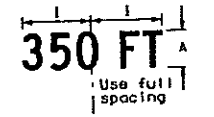
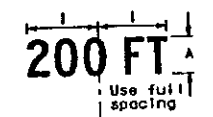
WB-12-48
Black & orange



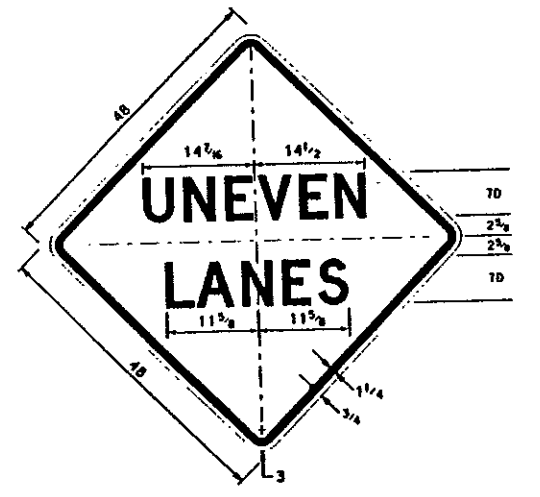
W21-50-48
Black & orange



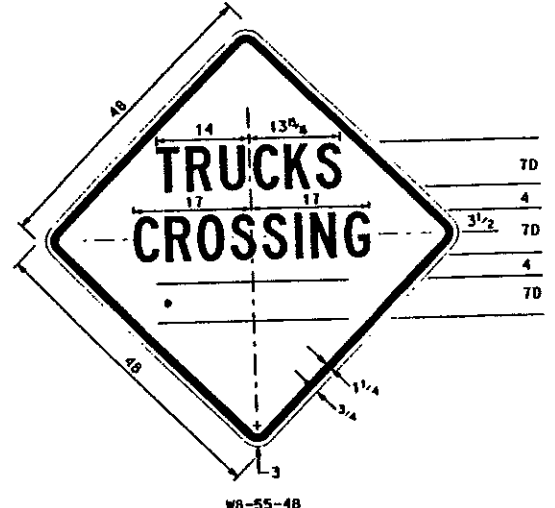
WB-53-48
Black & orange



W22-8-48
Black & orange



WB-11-48
Black & orange



WB-55-48
Black & orange

* DIMENSIONS (INCHES)

	A	B	C	D	E	F	G	H	I	J	K
4C	6 1/8	7	7 1/2	8	8 5/8	9 1/8	9 5/8	10 1/8	10 5/8	11 1/8	11 5/8
5C	8 3/4	8 3/4	9 3/8	10	10 3/8	10 3/4	11 1/8	11 1/8	11 3/4	12 1/8	12 3/8
6C	10 3/8	10 1/2	11 1/4	12	12 1/2	12 1/2	13 1/8	13 1/8	13 3/4	14 1/8	14 3/8
7C	12	12 3/8	13 1/8	14	14 3/8	14 3/8	15 1/8	15 1/8	15 3/4	16 1/8	16 3/8
8C	13 3/4	14	15	16	16 3/8	16 3/8	17 1/8	17 1/8	17 3/4	18 1/8	18 3/8
4D	8 1/8	8 5/8	8 1/2	9	9	9 3/8	9 3/8	9 3/8	10 1/8	10 3/8	10 3/4
5D	10 3/8	10 3/8	11 3/8	11 1/2	11 1/2	11 3/4	11 3/4	11 3/4	12 1/8	12 3/8	12 3/4
6D	12 3/8	12 3/8	12 3/4	13 1/2	13 1/2	13 1/2	13 3/4	13 3/4	14 1/8	14 3/8	14 3/4
7D	14 1/4	15 1/8	14 3/4	15 3/4	15 3/4	15 3/4	16 1/8	16 1/8	16 3/4	17 1/8	17 3/8
8D	16 1/4	17 1/4	17	18	18	18	18 3/4	18 3/4	19 1/8	19 3/8	19 3/4

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
3-1-92	General revisions
1-24-95	WB-12-48
2-3-95	WB-11-48
6-15-95	General revisions
5-19-98	Added 2/11e

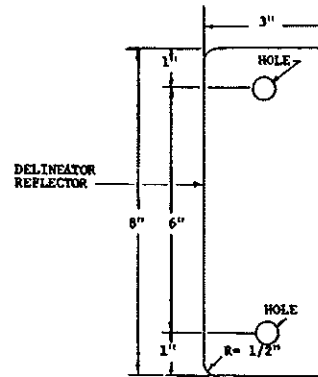
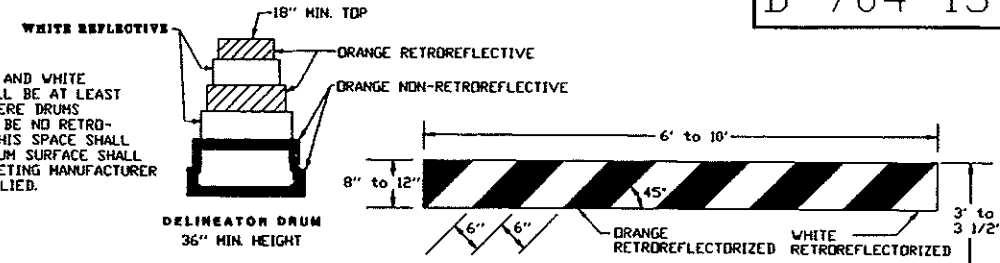
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

APPROVED: *K.E.B.*
DESIGN ENGINEER

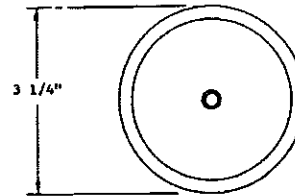
BARRICADE DETAILS

D-704-13

DELINEATOR DRUMS
 THE MARKINGS ON DRUMS SHALL BE ORANGE AND WHITE STRIPES 4 TO 6 INCHES WIDE. THERE SHALL BE AT LEAST TWO ORANGE AND TWO WHITE STRIPES. WHERE DRUMS HAVE RIBS OR INDENTATIONS, THERE SHALL BE NO RETRO-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 RETROREFLECTIVE SHEETING IS APPLIED.

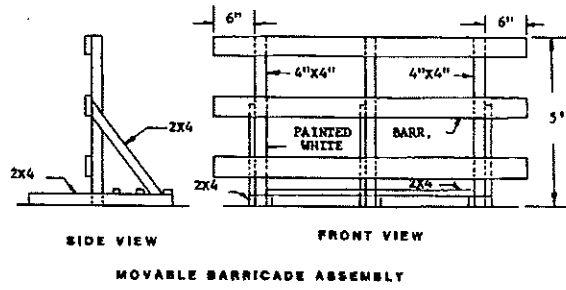
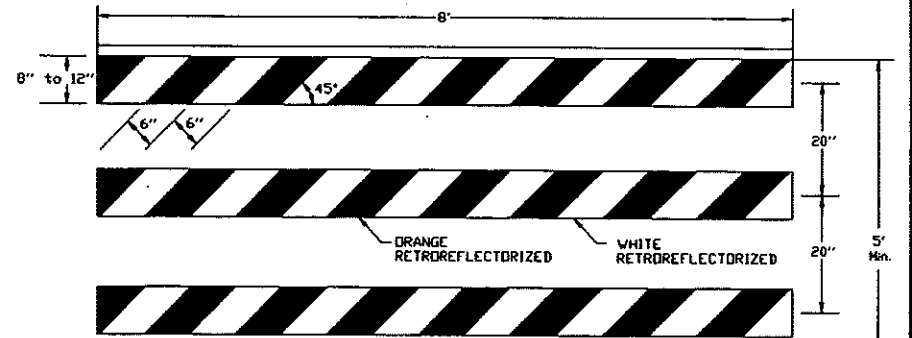
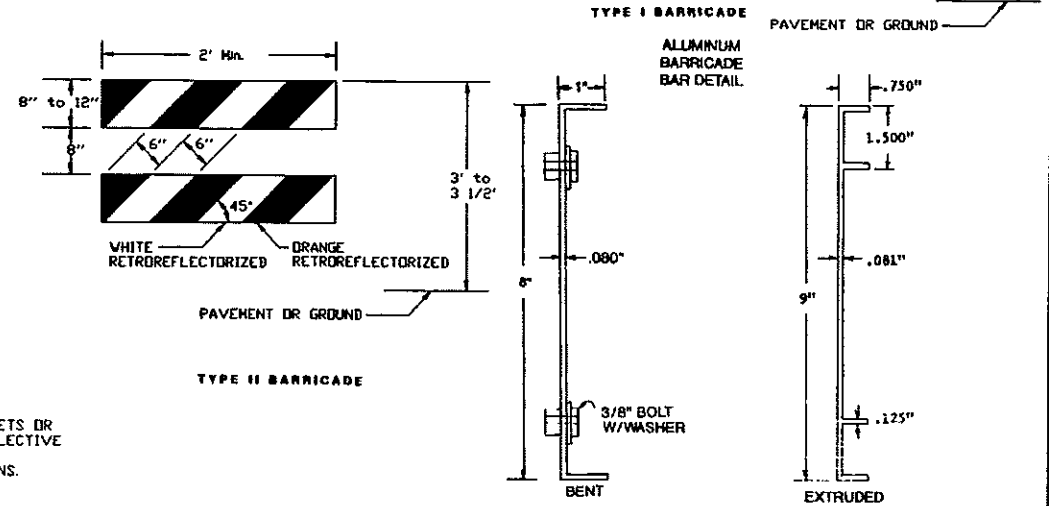


3" x 8" - 18 GAUGE GALVANIZED STEEL SHEETS OR .080" ALUMINUM PLATE WITH WHITE RETROREFLECTIVE SHEETING (TYPE 3A OR 3B) AS SPECIFIED IN SECTION 894 OF THE STANDARD SPECIFICATIONS.

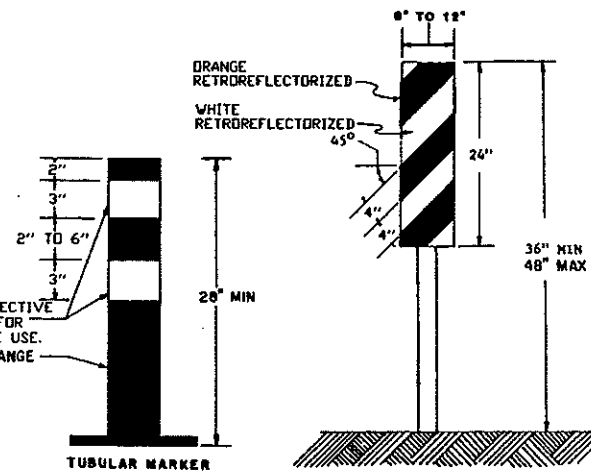
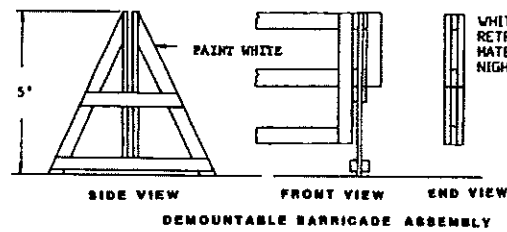
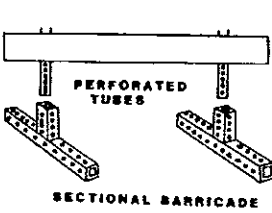
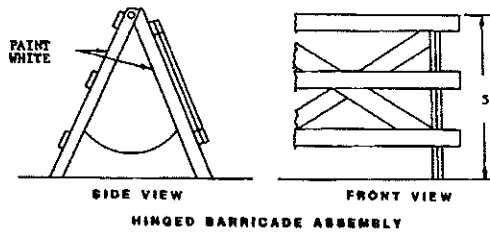


ACRYLIC PLASTIC REFLECTOR
 DELINEATOR REFLECTOR SHALL MEET THE REQUIREMENTS OF SECTION 894.

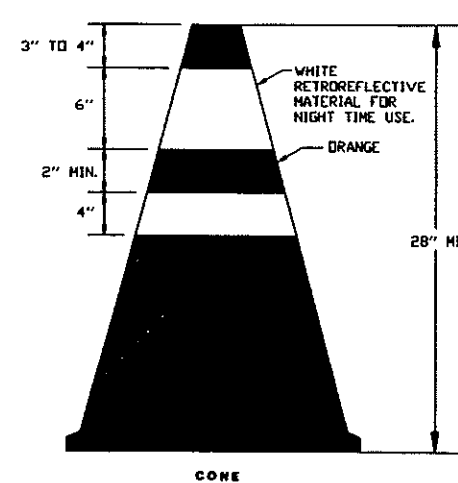
NOTE: VERTICAL PANELS USED ON THE EXPRESSWAYS OR OTHER HIGH SPEED ROADWAYS SHALL BE 12" BY 24".



NOTE: EACH MOVABLE BARRICADE SHALL BE WEIGHTED DOWN BY A SUFFICIENT NUMBER OF SAND BAGS 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.



(RETROREFLECTIVE SHEETING SHALL BE PLACED ON BOTH SIDES)



TYPE III BARRICADE PAVEMENT OR GROUND

BARRICADES: NUMBER OF RETROREFLECTORIZED RAIL FACES

	TYPE I	TYPE II	TYPE III
Direction)	2(One Each	4(Two Each	6(Facing in two
Direction)		Direction)	Directions)

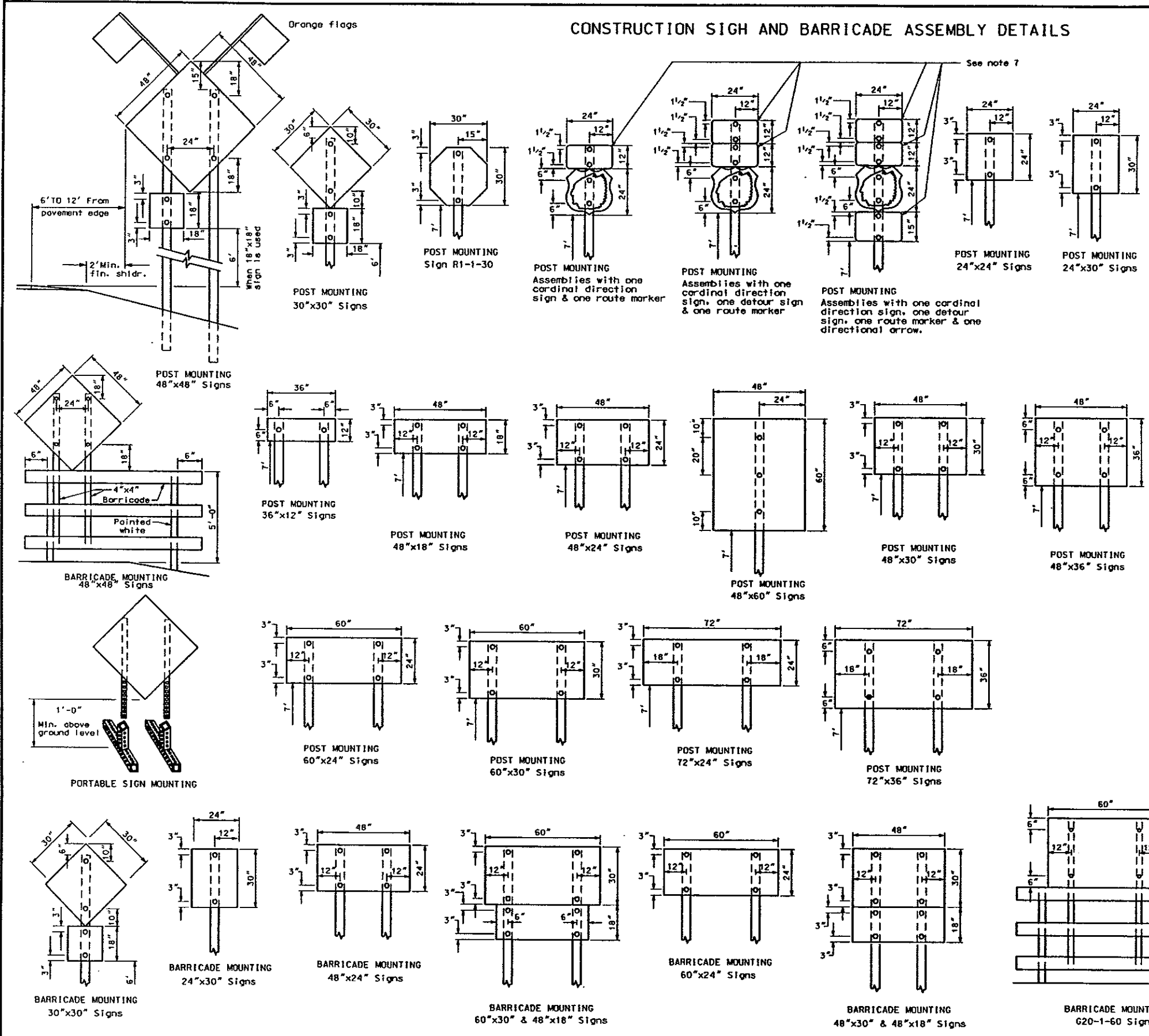
BARRICADE RAIL MATERIAL MAY BE 1" NOMINAL THICKNESS STANDARD LUMBER OR 3/4" PLYWOOD AND PREPARED AS RECOMMENDED BY THE SHEETING MANUFACTURER BEFORE RETROREFLECTIVE SHEETING IS APPLIED.

10-1-86 REVISIONS	
DATE	CHANGE
8-3-87	TYPE SHEETING
10-1-87	DELINEATOR DRUM NOTE
6-9-88	BARRICADES TYPE III
5-1-92	GENERAL REVISIONS
6-10-93	GENERAL REVISIONS
9-23-93	VERTICAL PANEL
6-9-95	RETROREFLECTIVE SHEETING

NORTH DAKOTA
 DEPARTMENT OF TRANSPORTATION
 APPROVED: *David K. O. Lee*
 DESIGN ENGINEER

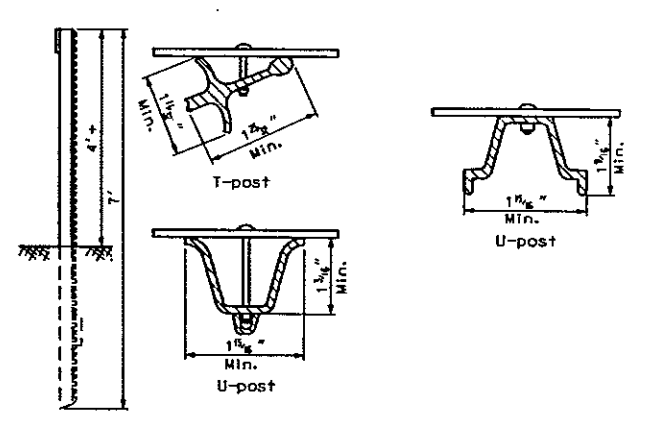
CONSTRUCTION SIGN AND BARRICADE ASSEMBLY DETAILS

D-704-14



NOTES:

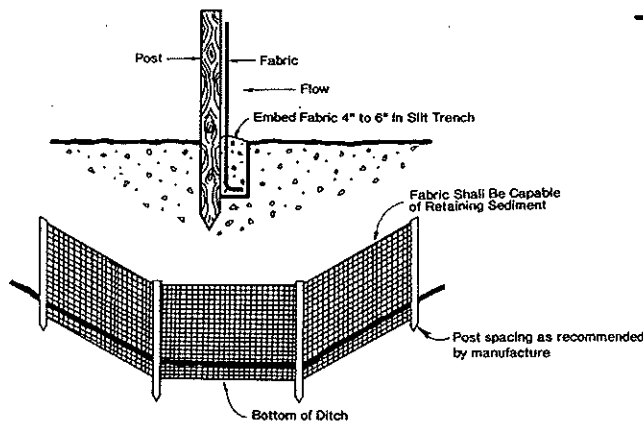
1. Barricade and Sign Supports: Wooden supports shall be painted white. Steel supports shall be galvanized or painted.
2. Barricade Mounting Signs: The bottom of the sign shall be flush with the top of the top rail. Wood sign posts shall be 4"x4" min. SFS or equivalent steel posts. All barricades and barricade mounted signs shall be assembled with 3/8" bolts.
3. Sign Supports: Sign supports shall be 4"x4" min. SFS or equivalent steel post. The anchor for steel supports shall have a stub height of 4" or less. Wood posts more than 4"x4" shall be breakaway. Sign supports shall be imbedded to a sufficient depth so that signs will remain plumb throughout duration of project. It is suggested that wood posts have a min. depth of embedment of 5' and steel posts be embedded a min. 3'-6".
Material: All signs shall be 0.100" aluminum, 12 gauge steel, 1/2" plywood or other approved material.
Notes: All holes to be punched round for 3/8" bolts.
4. Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate without a border and this plate installed and removed as required.
5. Advance Warning Flashing or Sequencing Arrow Panels: The minimum mounting height shall be 7 feet above the roadway to the bottom of the panel, except on vehicle mounted panels which shall be as high as practicable.
6. Delineator Posts: Typical fence post sections are shown in Attachment Details. Other types of metal fence posts may be substituted upon approval of the engineer. These substituted posts shall have reflectors attached similar to the ones shown.
7. Route Marker Auxiliary Signs: The route marker auxiliary signs such as the cardinal direction and directional arrows shall have background colors the same as the route marker they are used with (Interstate route markers, blue background, US and State route markers, white background, Interstate Business loop and spur, green background, and County route markers, blue background).



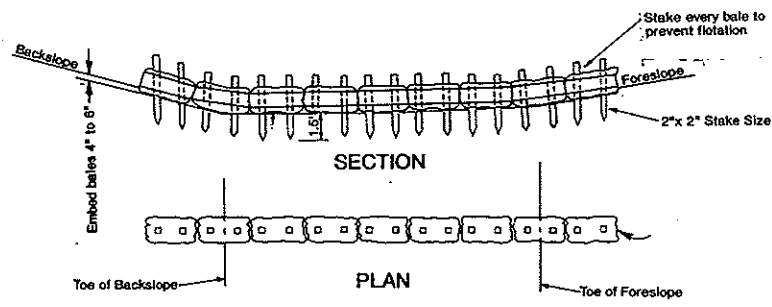
DELINEATOR ATTACHMENT AND POST MOUNTING DETAILS

10-1-86		NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
DATE	REVISIONS CHANGE	
8-1-88	Sign assembly	APPROVED: <i>K. H. B. J.</i> DESIGN ENGINEER
5-1-92	Sign assembly	
3-30-93	Sign supports note	
3-4-96	Sign height	
8-15-96	Note 8	
7-10-97	Note Revision	
7-31-98	Note & portable sign	

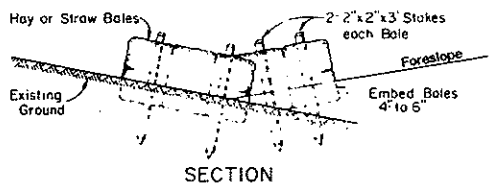
TEMPORARY EROSION AND SILTATION CONTROLS



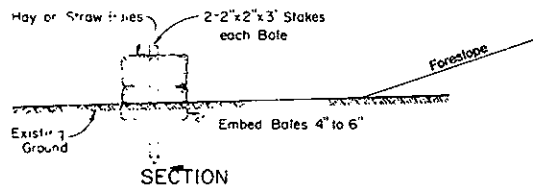
SEDIMENT CONTROL FENCING



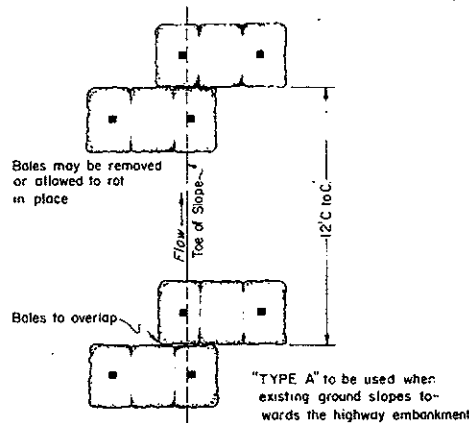
"TYPE A"



SECTION

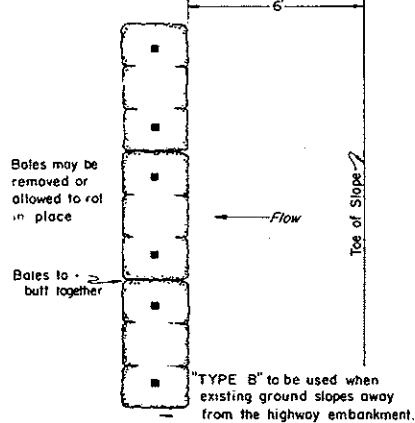


SECTION



"TYPE B"

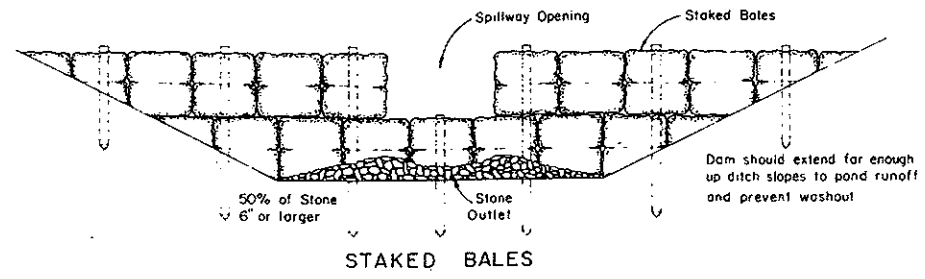
"TYPE A" to be used when existing ground slopes towards the highway embankment.



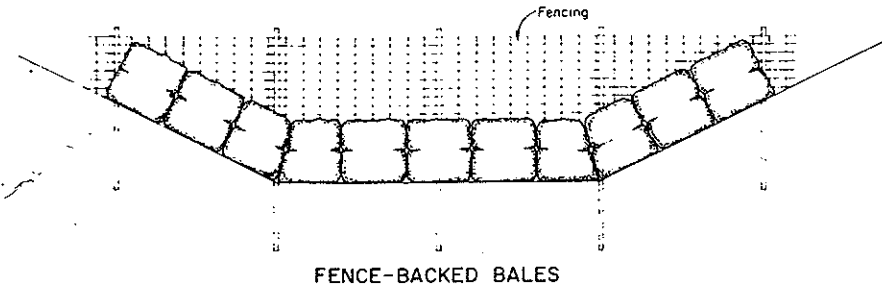
"TYPE C"

"TYPE B" to be used when existing ground slopes away from the highway embankment.

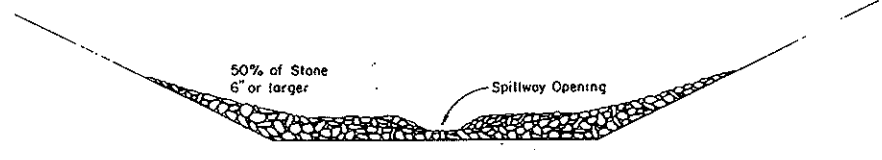
BALED HAY OR STRAW EROSION CHECKS



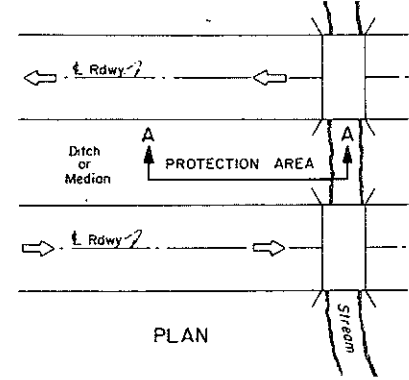
STAKED BALES



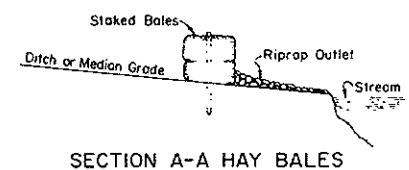
FENCE-BACKED BALES



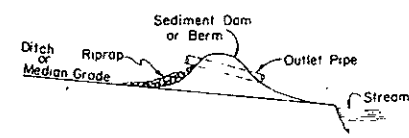
GRADED STONE DITCH EROSION DAMS



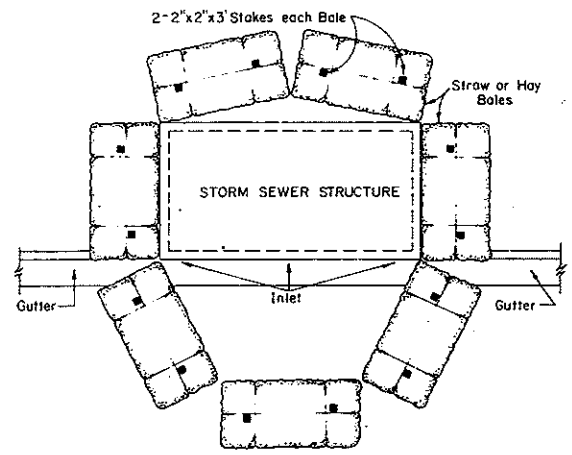
PLAN



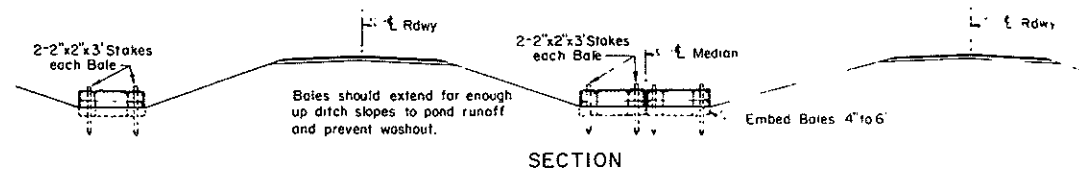
SECTION A-A HAY BALES



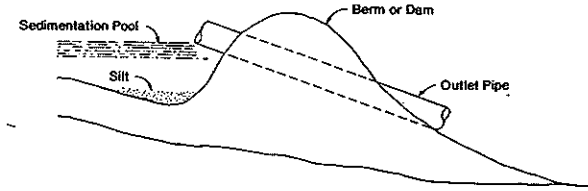
SECTION A-A SEDIMENT DAM OR BERM
MEDIAN OR DITCH PROTECTION AT STREAM CROSSINGS



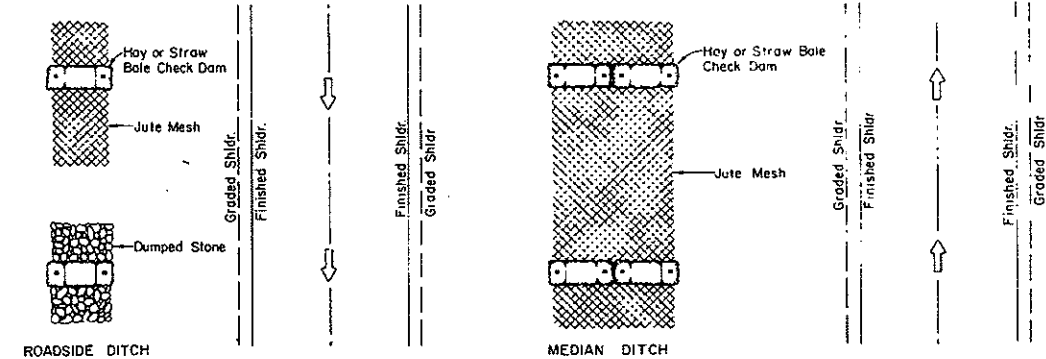
STORM SEWER INLET EROSION & SILTATION BARRIER



SECTION



SMALL SEDIMENT DAM OR BERM



PLAN

STONE, JUTE MESH, OR SOD DITCH & MEDIAN EROSION CONTROL

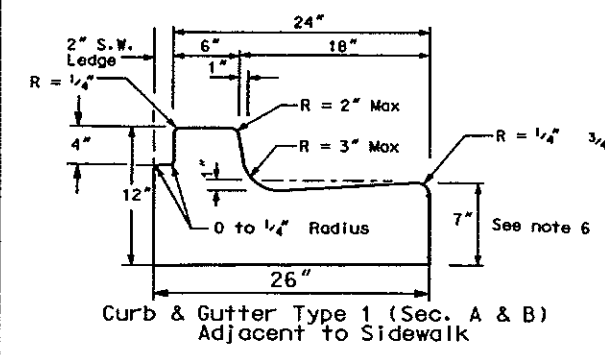
NOTES: These Temporary Erosion and Siltation Controls or modifications thereof may be used by the Contractor or directed by the Engineer to prevent erosion or siltation during the construction stage.

Payment for these items will be incidental unless shown otherwise on the plans.

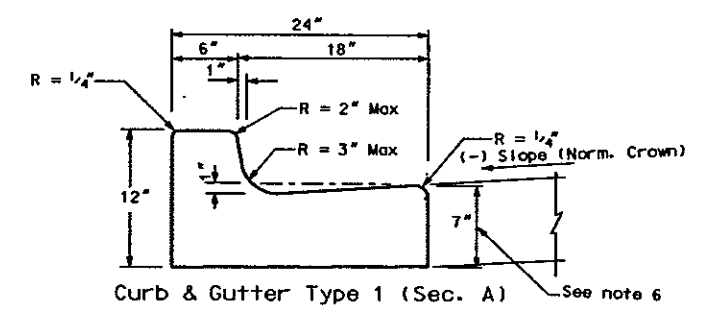
10-1-86	
DATE	REVISIONS
9-4-92	DITCH CHECK
9-16-92	SEDIMENT CONT. FENCING
1-31-95	GENERAL REVISIONS

NORTH DAKOTA STATE HIGHWAY DEPARTMENT
APPROVED: *David M. Lane*
DESIGN ENGINEER

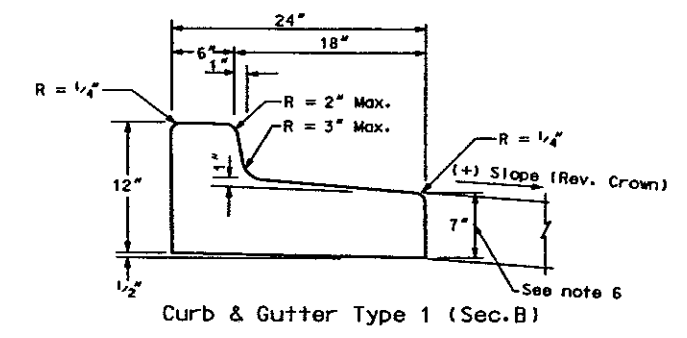
VALLEY GUTTER AND CURB & GUTTER



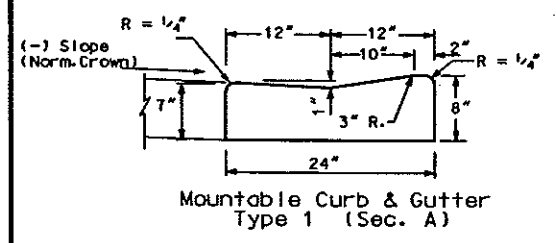
Curb & Gutter Type 1 (Sec. A & B) Adjacent to Sidewalk



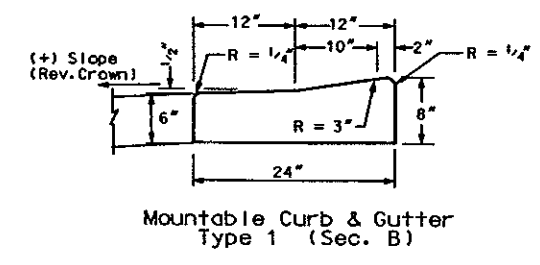
Curb & Gutter Type 1 (Sec. A)



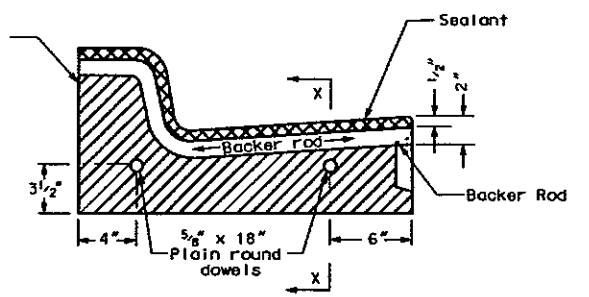
Curb & Gutter Type 1 (Sec. B)



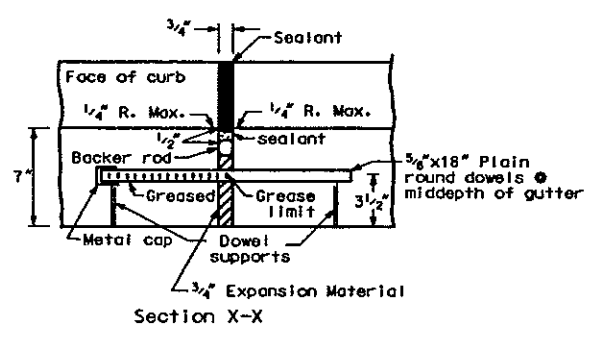
Mountable Curb & Gutter Type 1 (Sec. A)



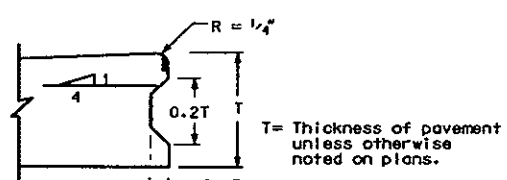
Mountable Curb & Gutter Type 1 (Sec. B)



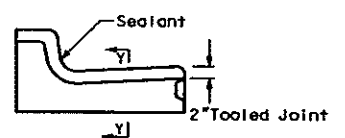
Isolation Joint Detail



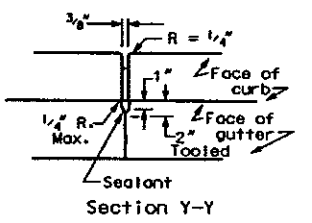
Section X-X



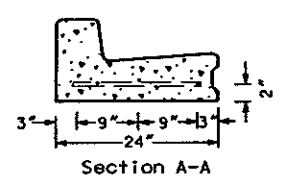
Keyway Detail For Curb & Gutter (To be used with P.C.C. Pavement and Drives.)



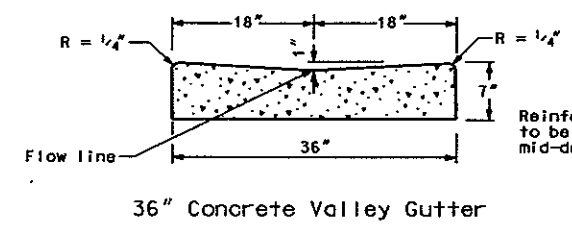
Contraction Joint Detail (10' Max. Spacing)



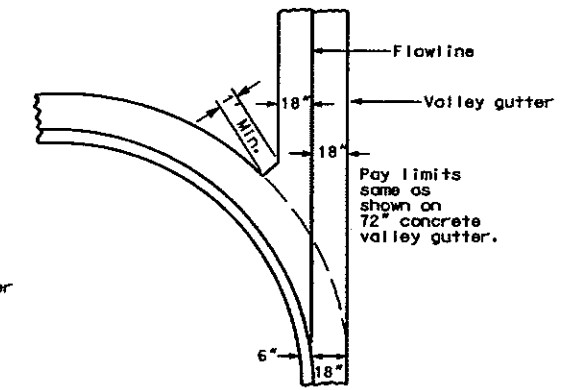
Section Y-Y



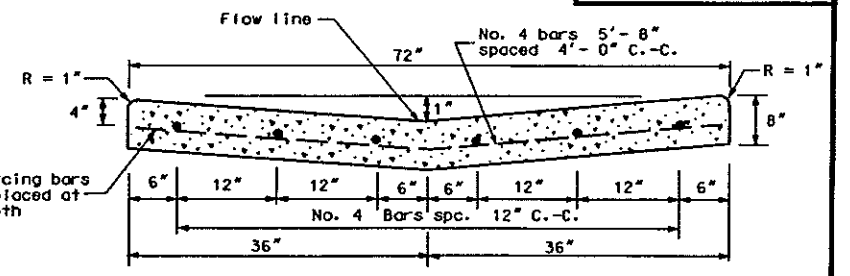
Section A-A



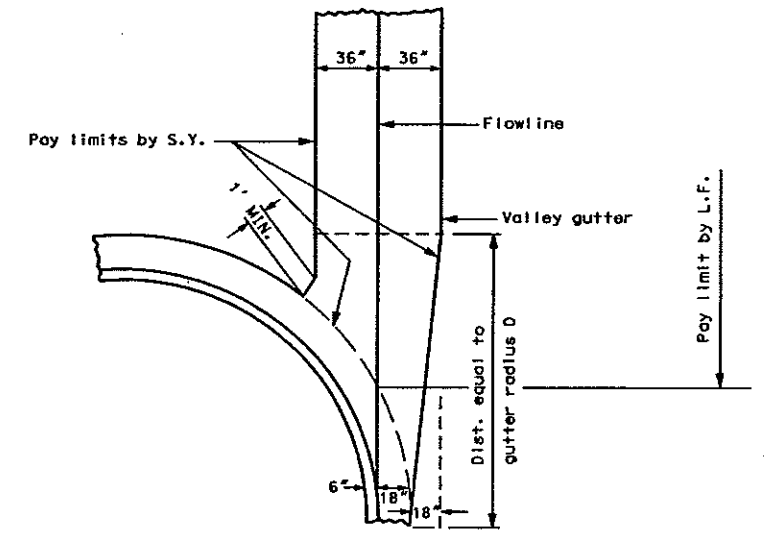
36" Concrete Valley Gutter



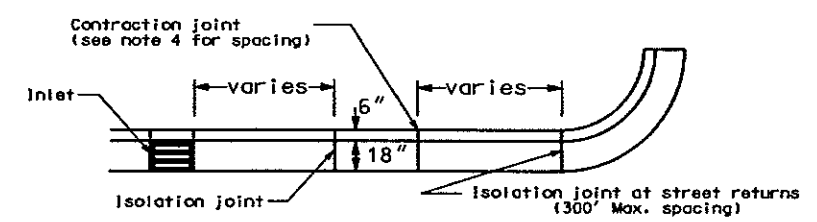
36" Concrete Valley Gutter



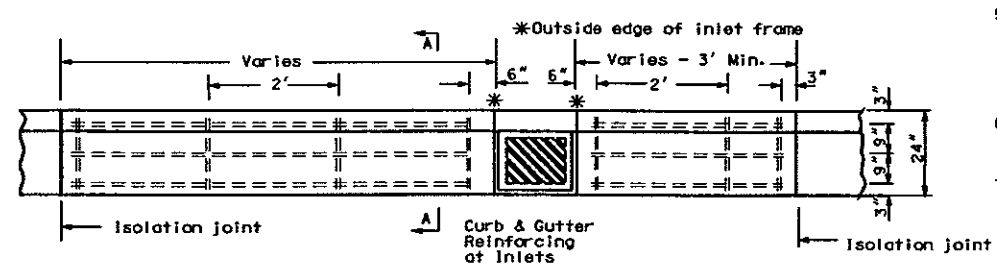
72" Concrete Valley Gutter



72" Concrete Valley Gutter



Joint Location Detail



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 1."

This includes inlets located on radii. The reinforcement shall be extended to the second joint (rebar placed through the first joint) in cases where the 3' min. panel length cannot be obtained.

- NOTES:
1. Curb and Gutter Type 1 to be used. Section "A" to be used with (-) pavement slopes and section "B" to be used with (+) pavement slopes.
 2. Contraction Joints: Tool the Curb & Gutter 2" as shown on the contraction joint details.
 3. Isolation Joints: Isolation joint material shall be 3/4" premolded conforming to section 826.02C or D 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, metal caps and greased dowels shall be installed in the cold joint for the second pour.
 4. Joint Spacing: For hot bituminous pavements the joint spacing for the curb and gutter shall be 10' max. with the panels on each side of the inlets. For concrete pavements the joint spacing for the curb and gutter shall match the pavement joint on PCC Pavements.
 5. Joint sealing: All contraction and isolation joints shall be sealed as shown in the details. The joint sealant for contraction joints shall conform to section 826.02B. The sealant for expansion joints shall be as specified in note 3 above. The sealant shall be tooled and installed in accordance with the manufacturer's recommendations.
 6. Depth of Face of Gutter: For hot bituminous pavement the depth of gutter shall be as shown. For PCC pavements the depth of gutter shall match the adjacent PCC pavement.
 7. The cost for all labor, equipment, and material necessary to construct contraction & isolation joints shall be included in the price bid for curb and gutter.

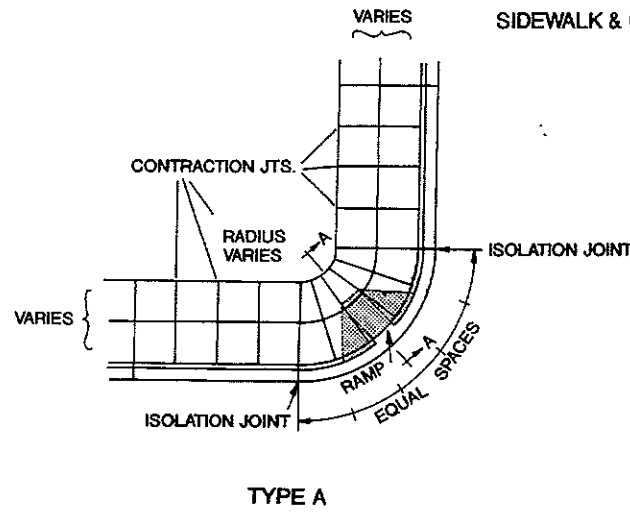
10-1-86	
DATE	CHANGE
10-17-97	GENERAL REVISIONS

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
 APPROVED: *[Signature]*
 DESIGN ENGINEER

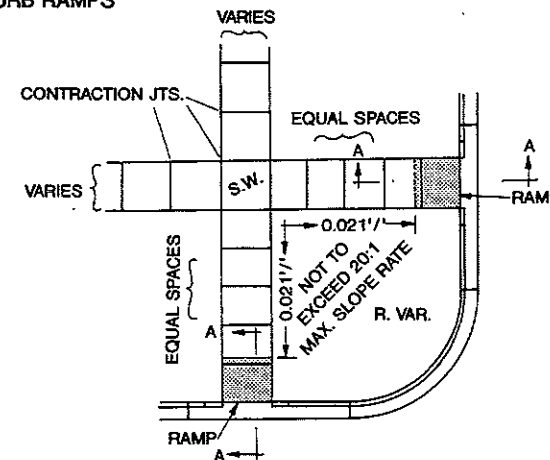
SIDEWALK & CURB RAMPS

NOTES

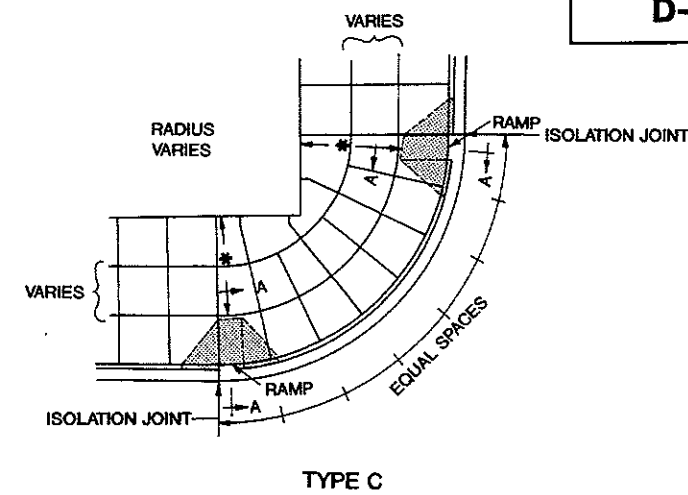
1. THE EXACT LOCATION & TYPE OF RAMP SHALL BE DETERMINED BY THE ENGINEER IN THE FIELD AFTER CONSULTATION WITH THE CITY ENGINEER & CHANGES MADE ACCORDINGLY.
2. THE RAMP SHALL HAVE A SLIP RESISTANT SURFACE
3. METHOD OF PAYMENT: THE CURB RAMP WILL NOT BE PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN THE QUANTITIES & PAID FOR AT THE UNIT PRICE FOR CONCRETE SIDEWALK AND CURB & GUTTER.
4. THE COST FOR ALL LABOR, EQUIPMENT, AND MATERIAL (Pre-molded Expansion Material & Hot Bituminous Joint Filler) NECESSARY TO CONSTRUCT CONTRACTION AND ISOLATION JOINTS SHALL BE INCLUDED IN THE PRICE BID FOR SIDEWALK.



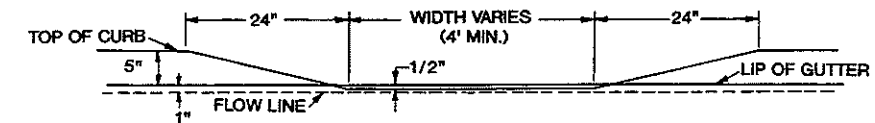
TYPE A



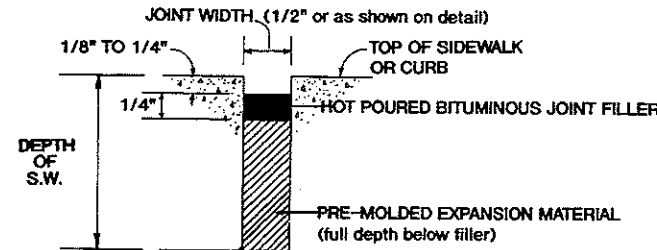
TYPE B



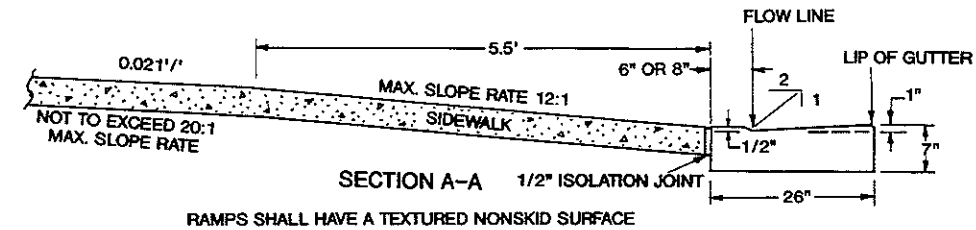
TYPE C



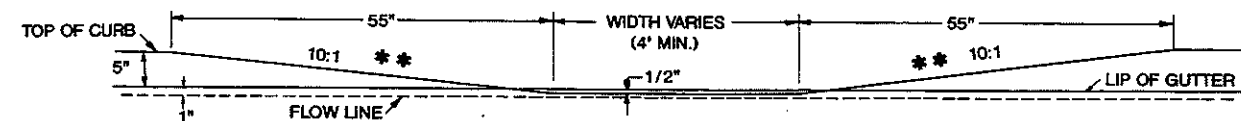
DEPRESSED CURB FOR PEDESTRIAN CROSSING (TYPE B RAMP)



TYPICAL ISOLATION JOINT SEAL (longitudinal and transverse)



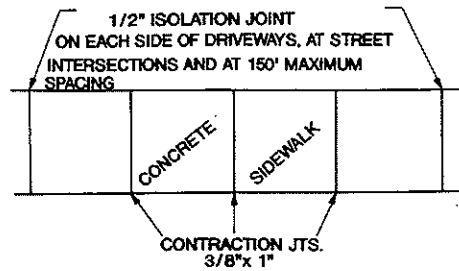
SECTION A-A 1/2" ISOLATION JOINT
RAMPS SHALL HAVE A TEXTURED NONSKID SURFACE



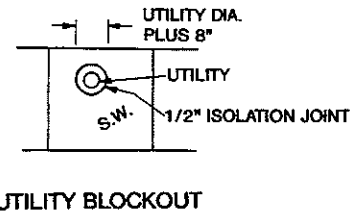
DEPRESSED CURB FOR PEDESTRIAN CROSSING (TYPE A & C RAMPS)

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

TYPE II CURB AS SHOWN ON THE PLANS OR AT THE DIRECTION OF THE ENGINEER, A CURB SHALL BE CONSTRUCTED WHERE THE EXISTING SIDEWALK, 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) PER LINEAL FOOT.



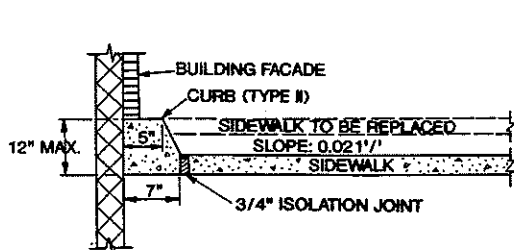
CONCRETE SIDEWALK DETAILS



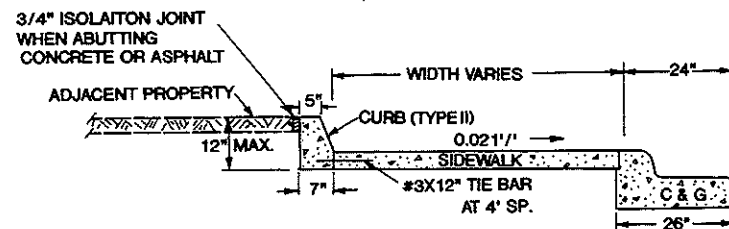
UTILITY BLOCKOUT

SIDEWALK WIDTH	AVERAGE CONTRACTION JOINT SPACING
4'-6"	5'
OVER 6'	6'

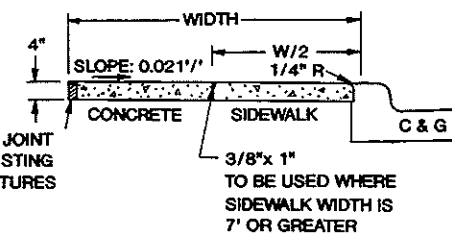
WHEN THE SIDEWALK IS ADJACENT TO THE CURB & GUTTER THE SIDEWALK JOINTS SPACING SHALL BE VARIED SO THAT THE SIDEWALK JOINTS MATCH UP WITH THE CURB & GUTTER JOINTS



TYPE II CURB DETAIL



CURB DETAIL



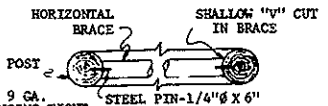
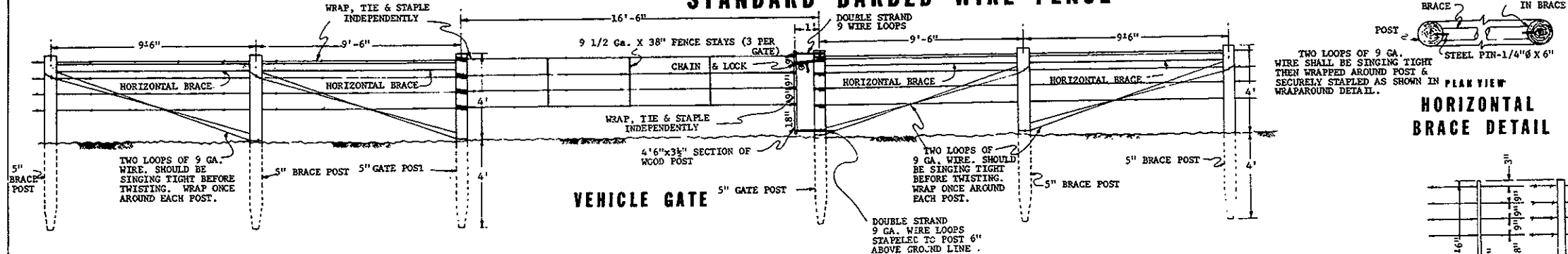
3/4" ISOLATION JOINT WHEN ABUTTING EXISTING CONCRETE OR STRUCTURES

3/8"x 1" TO BE USED WHERE SIDEWALK WIDTH IS 7' OR GREATER

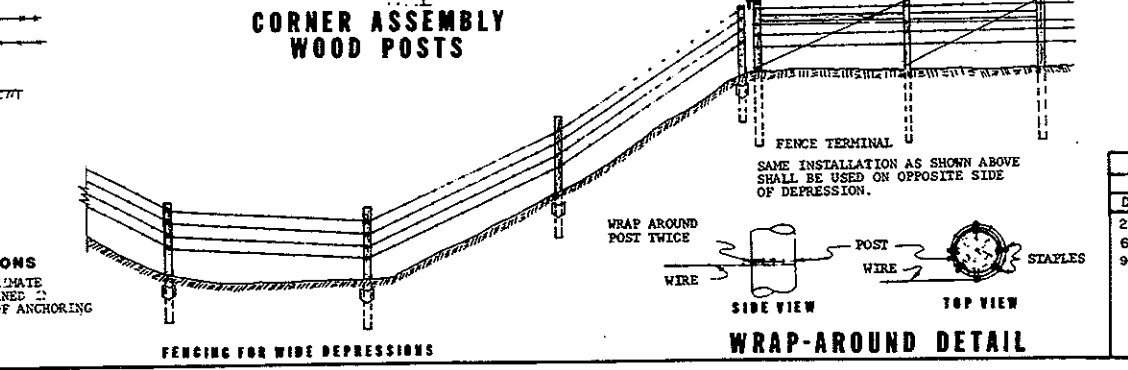
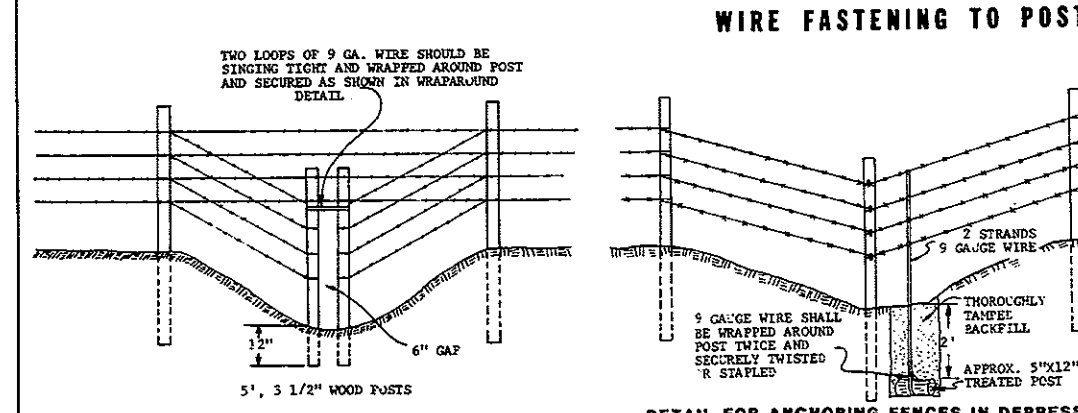
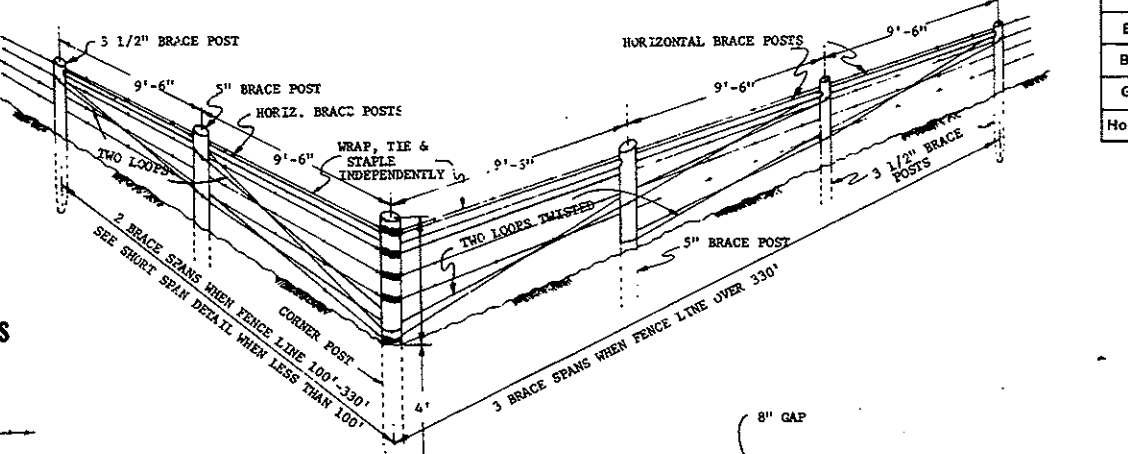
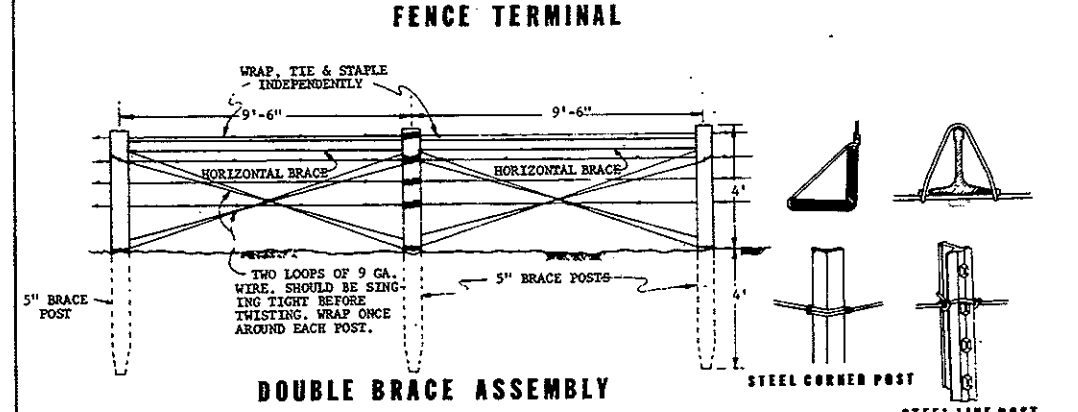
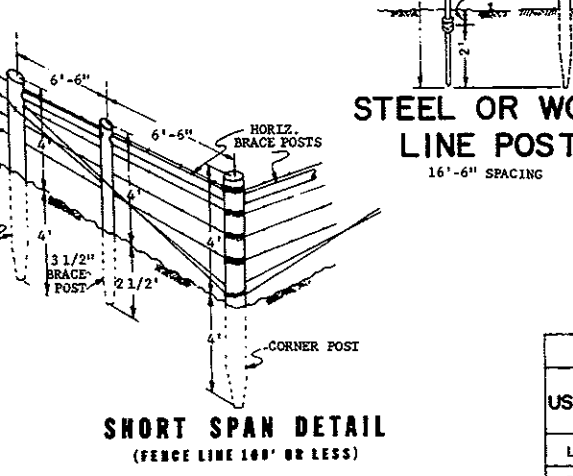
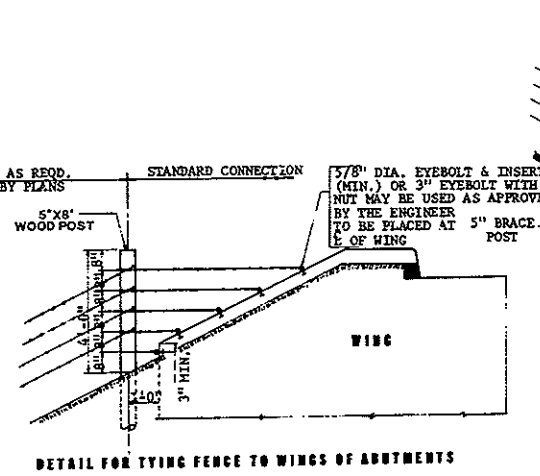
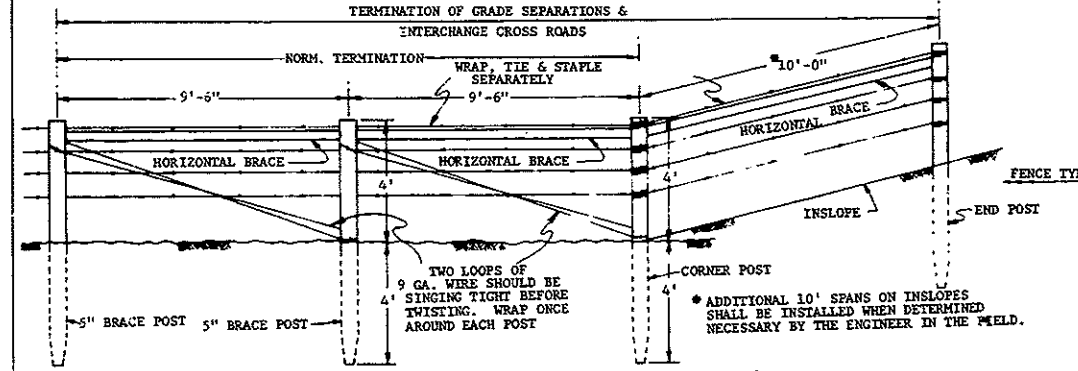
3-19-82	
DATE	REVISIONS
9-1-82	REMOVE DETECTABLE WARNING
9-23-82	REVISED EXPANSION JOINT
12-4-82	ISOLATION JOINT
2-19-84	GENERAL REVISIONS

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
APPROVED *David M. Lee*
DESIGN ENGINEER

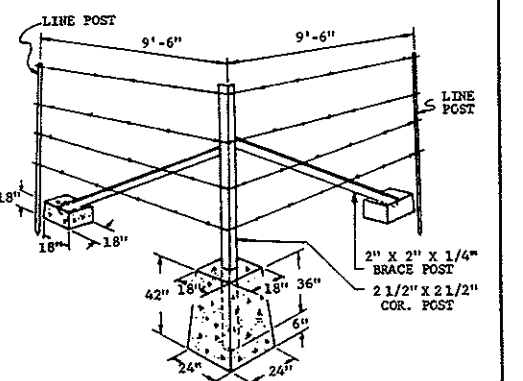
STANDARD BARBED WIRE FENCE



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 TERMINALS. 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.
 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.



USE OF POST	TREATED WOOD		STEEL	
	Post Dia.	Post Length	Post Length	Post Wt. Lbs./Ft.
Line Post	3 1/2"	6'-6"	6'-6"	1.33
Corner Post	8"	8'	7'	4.10 (CONC.)
End Post	5"	8'		
Brace Post	5"	3 1/2"	8'	3.19 (CONC.)
Gate Post	5"	8'		
Horizontal Brace	3 1/2"	VAR.		



10-1-86		REVISIONS	DATE	CHANGE
2-4-87	Gate Post			
6-1-89	Note Wire Gage			
9-4-90	Remove Private Fence Note			

NORTH DAKOTA STATE HIGHWAY DEPARTMENT
 APPROVED: *David K. Larson*
 DESIGN ENGINEER

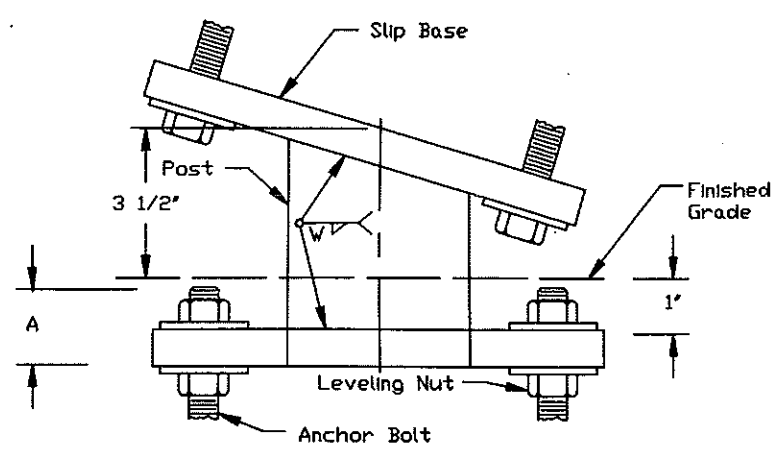
BREAK-AWAY FENCE FOR NARROW DEPRESSIONS SUBJECT TO FLOODING

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.

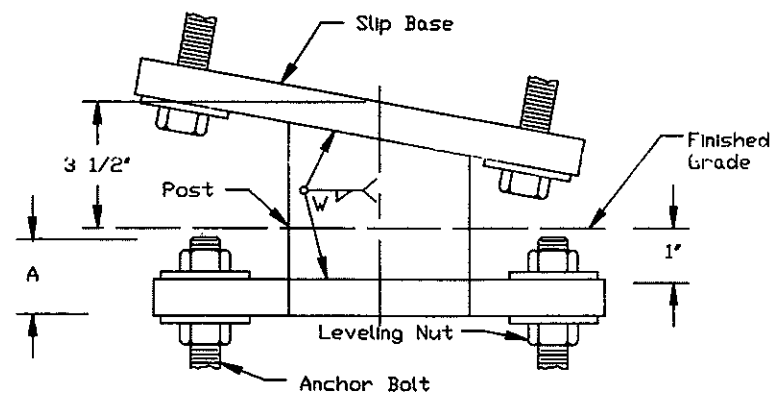
FENCING FOR WIRE DEPRESSIONS

BREAK AWAY BASE AND FOUNDATION DETAILS
ANCHOR BOLT CONNECTION

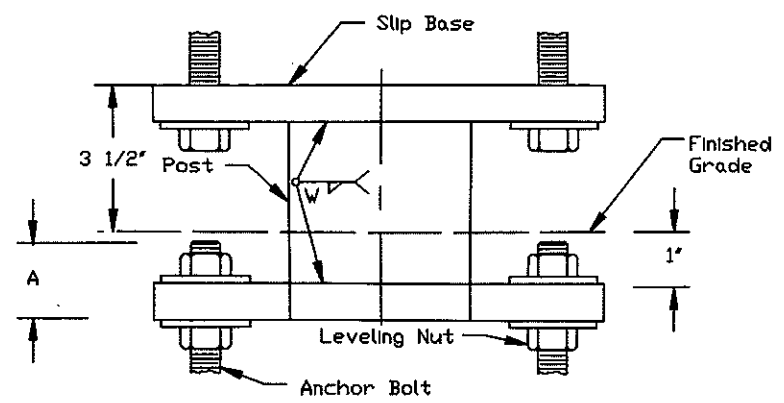
NOTE:
FOUNDATION DATA OBTAINED FROM STANDARD DRAWING D-754-5.
4" VERTICAL CLEARANCE OF BREAK AWAY BASE. THE 4" x 60" MEASUREMENT SHALL BE MADE ABOVE AND BELOW POST LOCATION AND ALSO BACK AND AHEAD OF POST.



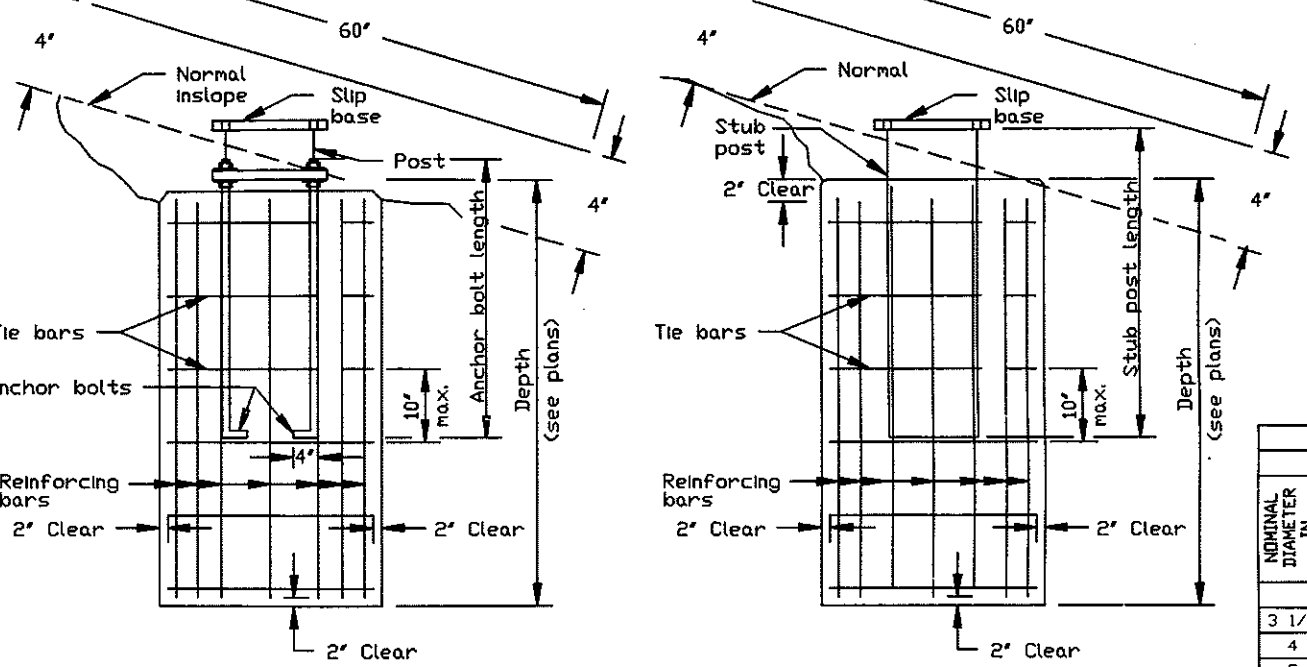
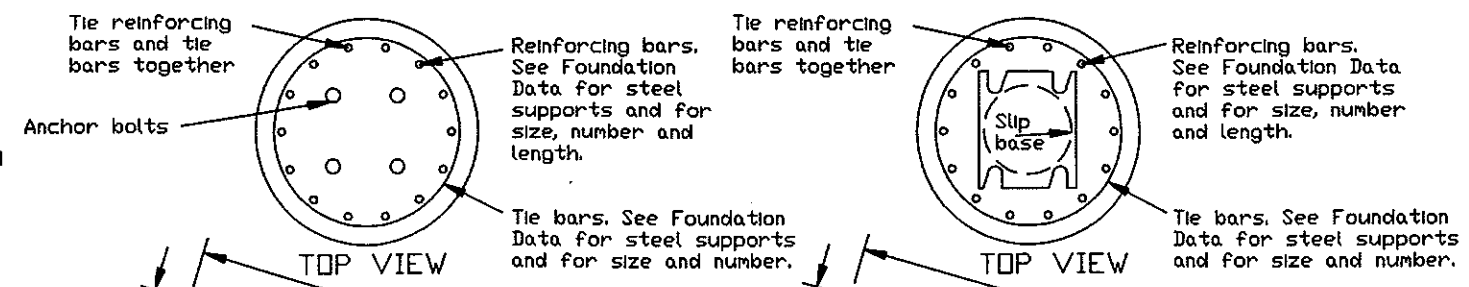
ELEVATION SINGLE POST SIGN AND ANCHOR BOLT CONNECTION



ELEVATION TWO POST SIGN AND ANCHOR BOLT CONNECTION For signs with less than 8' post spacing

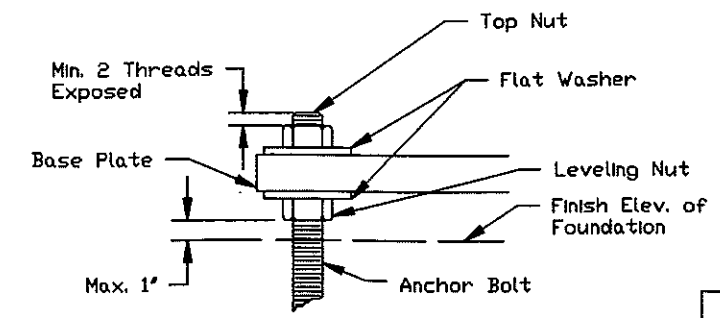


ELEVATION TWO OR MORE POST SIGN AND ANCHOR BOLT CONNECTION For signs with less than 8' post spacing



FRONT VIEW FOUNDATION DETAIL For break away base with anchor bolt connection

FRONT VIEW FOUNDATION DETAIL For break away base with stub post connection



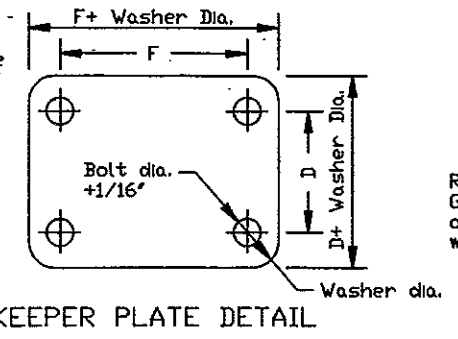
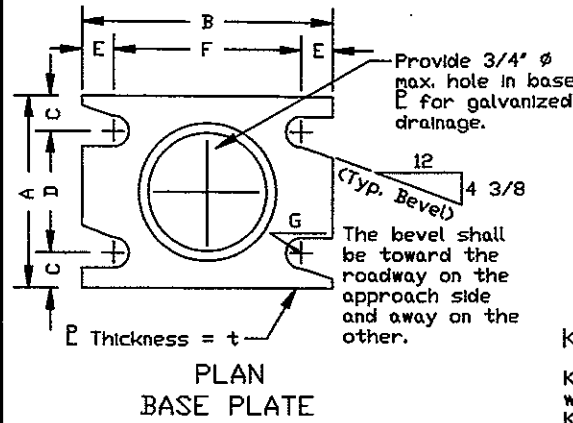
ANCHOR BOLT DETAIL

ROUND METAL POSTS							
DIMENSIONS				PROPERTIES			
NOMINAL DIAMETER IN.	OUTSIDE DIAMETER IN.	INSIDE DIAMETER IN.	WALL THICKNESS IN.	WEIGHT PER FOOT POUND	MOMENT OF INERTIA IN ⁴	CROSS SECT. AREA IN. SQ.	SECTION MODULUS IN ³
STEEL POSTS							
3 1/2	4.000	3.548	.226	9.11	4.788	2.680	2.394
4	4.500	4.026	.237	10.79	7.233	3.174	3.215
5	5.563	5.047	.258	14.62	15.16	4.300	5.449
6	6.625	6.065	.280	18.97	28.14	5.581	8.495
8	8.625	8.071	.277	24.70	63.35	7.265	14.69
10	10.750	10.192	.279	31.20	125.9	9.178	23.42
12	12.750	12.090	.330	43.77	248.5	12.88	38.98
12	12.750	12.000	.375	49.56	279.3	14.58	43.81
ALUMINUM POSTS							
3 1/2	4.000	3.548	.226	3.151	4.788	2.680	2.394
4	4.500	4.026	.237	3.733	7.232	3.174	3.214
5	5.563	5.047	.258	5.057	15.16	4.300	5.451
6	6.625	6.065	.280	6.564	28.14	5.581	8.496
8	8.625	8.071	.277	8.543	63.35	7.265	14.69
8	8.625	7.981	.322	9.878	72.49	8.399	16.81
10	10.750	10.192	.279	10.79	125.8	9.178	23.41
10	10.750	10.136	.307	11.84	137.4	10.072	25.57
10	10.750	10.020	.365	14.00	160.7	11.908	29.90
12	12.750	12.090	.330	15.14	248.5	12.88	38.98
12	12.750	12.000	.375	17.14	279.3	14.579	43.81
12	12.750	11.750	.500	22.63	361.5	19.242	56.71

FOUNDATION DIAMETER	POST SIZE	ANCHOR BOLTS		A
		SIZE	NO.	
1'-4"	3 1/2" x 4"	3/4" x 2'-6"	4	4"
1'-9"	5"	1" x 2'-6"	4	2 1/2"
1'-9"	6"	1" x 2'-6"	4	2 3/4"
2'-0"	8"	1 1/4" x 2'-6"	4	3 1/4"
2'-4"	10"	1 1/2" x 2'-6"	4	3 1/2"
2'-6"	12"	1 1/2" x 2'-6"	4	3 1/2"

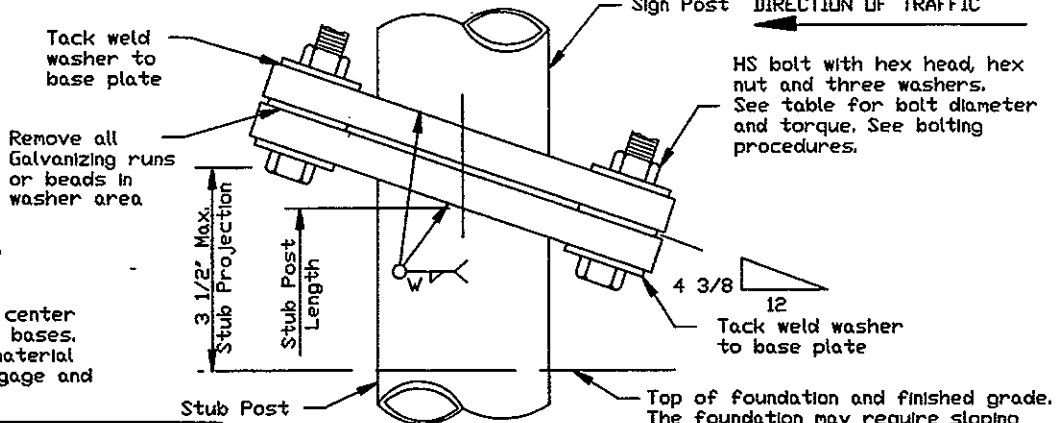
7-15-94	
REVISIONS	
DATE	CHANGE

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
David K. Lee
APPROVED: DESIGN ENGINEER

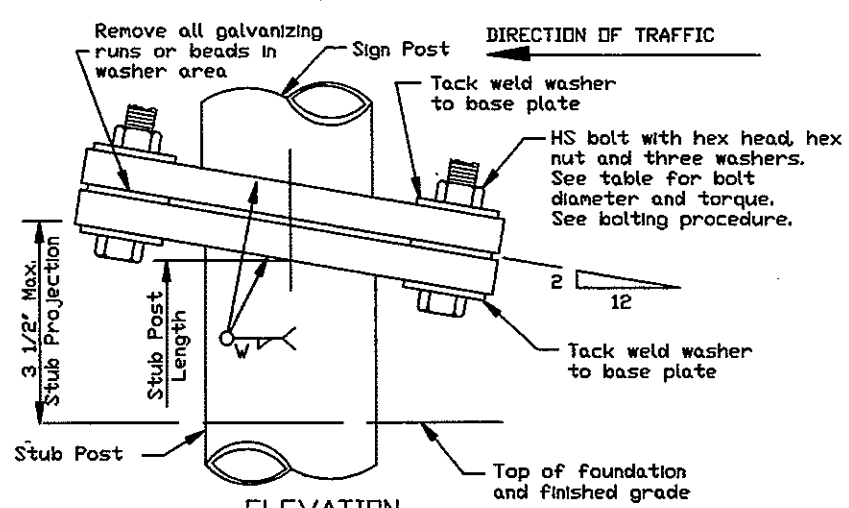


KEEPER PLATE DETAIL
 Keeper plate shall be placed above the center washer between the top and bottom slip bases. Keeper plate shall be fabricated from material conforming to ASTM A-446 grade "A" 28 gage and galvanized after fabrication.

BREAK-AWAY BASE STUB POST

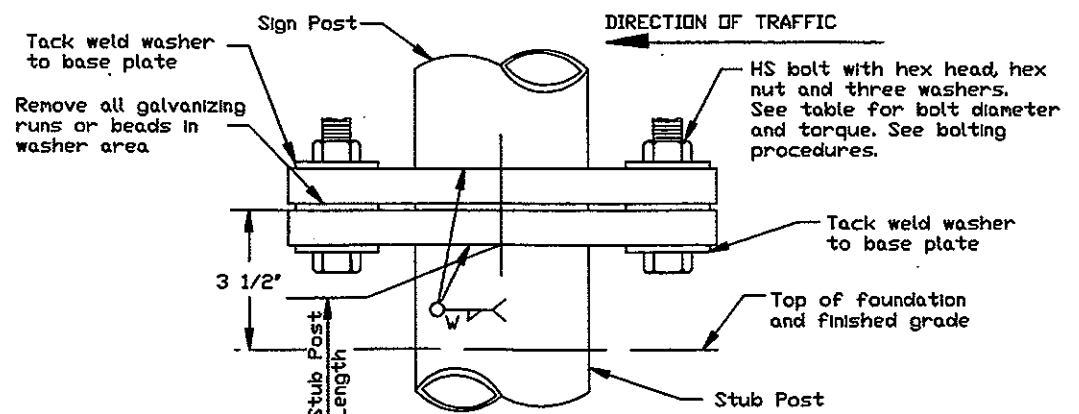


ELEVATION SINGLE POST SIGN AND STUB POST Type A

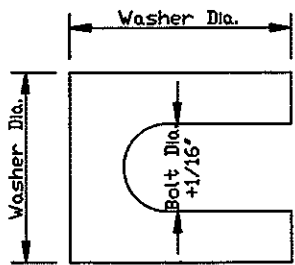


ELEVATION TWO POST SIGN AND STUB POST FOR SIGNS WITH LESS THAN 8' POST SPACING Type B

DIMENSION		BASE DATA TABLE										
NOM. PIPE SIZE	BOLT SIZE	TORQUE SIZE	A	B	C	D	E	F	G	t	W	STUB POST LENGTH
STEEL												
3 1/2"	1/2" x 2-1/2"	12	5-1/2"	8-3/8"	13/16"	3-7/8"	13/16"	6-3/4"	9/32"	3/4"	3/8"	1'-6"
4"	5/8" x 2-3/4"	29	5-1/2"	8-3/4"	1"	3-1/2"	1"	6-3/4"	11/32"	3/4"	3/8"	1'-6"
5"	3/4" x 3-1/2"	46	6-1/2"	10"	1-1/8"	4-1/4"	1-1/8"	7-3/4"	13/32"	1"	7/16"	2'-0"
6"	1" x 4-1/4"	61	7-1/2"	11-3/4"	1-3/8"	4-3/4"	1-3/8"	9"	17/32"	1-1/4"	7/16"	2'-0"
8"	1" x 4-1/4"	61	9-1/2"	13-1/4"	1-3/8"	6-3/4"	1-3/8"	10-1/2"	17/32"	1-1/4"	7/16"	2'-6"
10"	1" x 4-1/4"	61	11-3/4"	15-1/4"	1-3/8"	9"	1-3/8"	12-1/2"	17/32"	1-1/4"	1/2"	3'-0"
12"	1-1/4" x 5"	135	13-3/4"	18"	1-5/8"	10-1/2"	1-5/8"	14-3/4"	21/32"	1-1/2"	1/2"	3'-0"
ALUMINUM												
3 1/2"	1/2" x 2-1/2"	12	5-1/2"	8-3/8"	13/16"	3-7/8"	13/16"	6-3/4"	9/32"	3/4"	3/8"	1'-6"
4"	5/8" x 2-3/4"	29	5-1/2"	8-3/4"	1"	3-1/2"	1"	6-3/4"	11/32"	1"	7/16"	1'-6"
5"	3/4" x 3-1/2"	46	6-1/2"	10"	1-1/8"	4-1/4"	1-1/8"	7-3/4"	13/32"	1"	1/2"	2'-0"
6"	1" x 4-1/4"	61	7-1/2"	11-3/4"	1-3/8"	4-3/4"	1-3/8"	9"	17/32"	1-1/4"	1/2"	2'-0"
8"	1" x 4-1/4"	61	9-1/2"	13-1/4"	1-3/8"	6-3/4"	1-3/8"	10-1/2"	17/32"	1-1/4"	1/2"	2'-6"
10"	1" x 4-3/4"	61	11-3/4"	15-1/4"	1-3/8"	9"	1-3/8"	12-1/2"	17/32"	1-1/2"	7/16"	3'-0"
12"	1-1/4" x 5-1/2"	135	13-3/4"	18"	1-5/8"	10-1/4"	1-5/8"	14-3/4"	21/32"	1-3/4"	11/16"	3'-0"



ELEVATION TWO OR MORE POST SIGN AND STUB POST FOR TWO POST SIGNS WITH 8' OR MORE POST SPACING AND ALL THREE OR MORE POST SIGNS Type C



Furnish 2 ea. .012"± thick and 2 ea. .032"± shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM-B36.

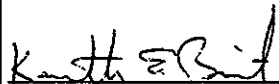
SHIM DETAIL

NOTES:

- KEEPER PLATE - A KEEPER PLATE MAY BE USED IN LIEU OF TACK WELDING WASHER TO THE BASE PLATE.
- ALUMINUM BASE PLATE WASHERS - WHEN THE BASE PLATE IS FABRICATED FROM ALUMINUM, THE WASHERS SHOWN AS TACK WELDED TO BASE SHALL BE ALUMINUM.
- FUSE JOINT CUTS - STEEL POSTS MAY BE CUT AFTER GALVANIZING AND CUT SURFACE TREATED WITH AN APPROVED ZINC SOLDER MEETING THE FEDERAL SPEC. 0.G-93 (STICK ONLY) OR THE CUT MAY BE GALVANIZED AFTER FABRICATION. ALUMINUM POSTS WILL NEED NO TREATMENT.

ASSEMBLY PROCEDURE

- ASSEMBLE POST TO STUB WITH BOLTS AND WITH ONE FLAT WASHER BETWEEN BASE PLATES AND KEEPER PLATE.
- SHIM AS REQUIRED TO PLUMB POST.
- TIGHTEN ALL BOLTS THE MAXIMUM POSSIBLE WITH 12" TO 15" WRENCH TO BED WASHERS AND SHIMS AND TO CLEAN BOLT THREADS, THEN LOOSEN.
- RETIGHTEN BOLTS IN A SYSTEMATIC ORDER TO PRESCRIBED TORQUE. (SEE TABLE)
- LOOSEN EACH BOLT AND APPLY THREAD LOCKING LIQUID RESIN, THE LIQUID LOCKING RESIN SHALL BE "LOCTITE" MANUFACTURED BY LOCKTITE CORPORATION OR EQUAL. THE THREAD LOCKER SHALL SECURE THE ENTIRE ASSEMBLY FROM VIBRATION, PRESSURE AND CORROSION. THE THREAD LOCKER SHALL FILL THE GAPS BETWEEN THE THREAD AND THE MATING SURFACE TO FORM SOLID ONE PART ASSEMBLIES.
- RETIGHTEN EACH BOLT TO PRESCRIBED TORQUE IN THE SAME ORDER AS INITIAL RETIGHTENING.

7-15-94		REVISIONS		NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
DATE	CHANGE				
6-20-95	NOTES				
8-14-95	STUB POST DIMENSION				
				 APPROVED: DESIGN ENGINEER	

ASSEMBLY DETAILS

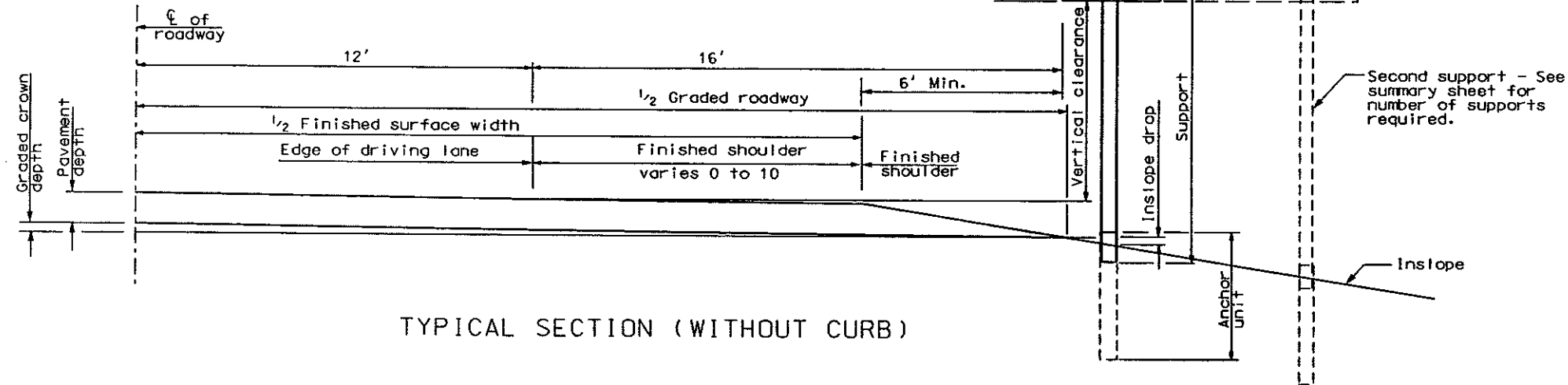
D-754-23

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 routes shall have a 3' minimum horizontal clearance from the edge of the bike route to the edge of the sign.

MINIMUM VERTICAL CLEARANCE:

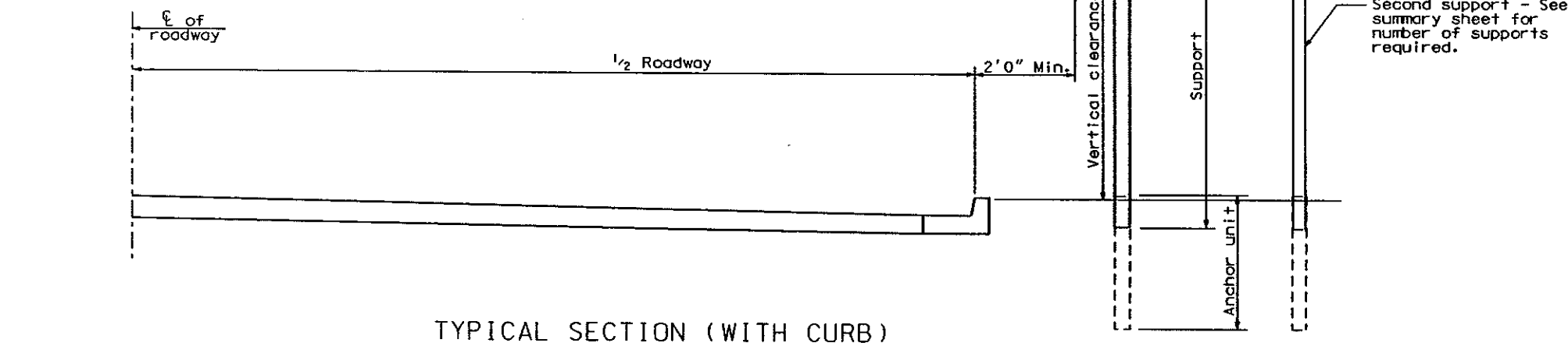
- 5' Rural roadways
- 6' On rural or urban expressways
- 7' On freeways



TYPICAL SECTION (WITHOUT CURB)

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)

NOTES:

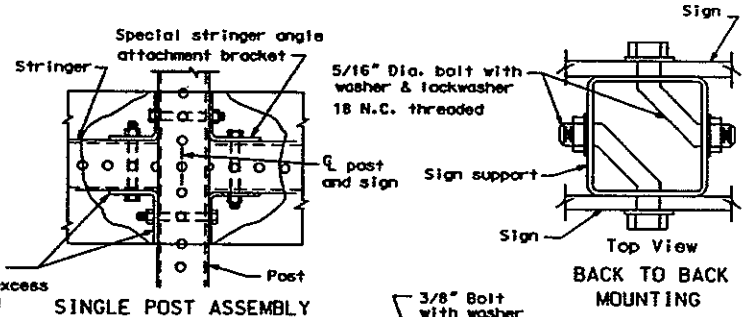
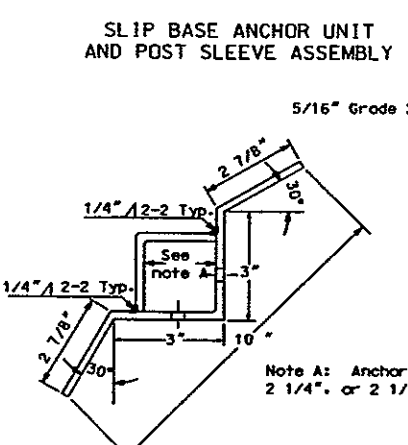
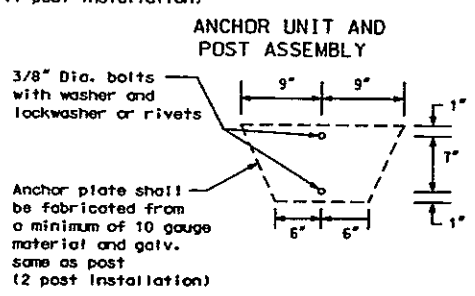
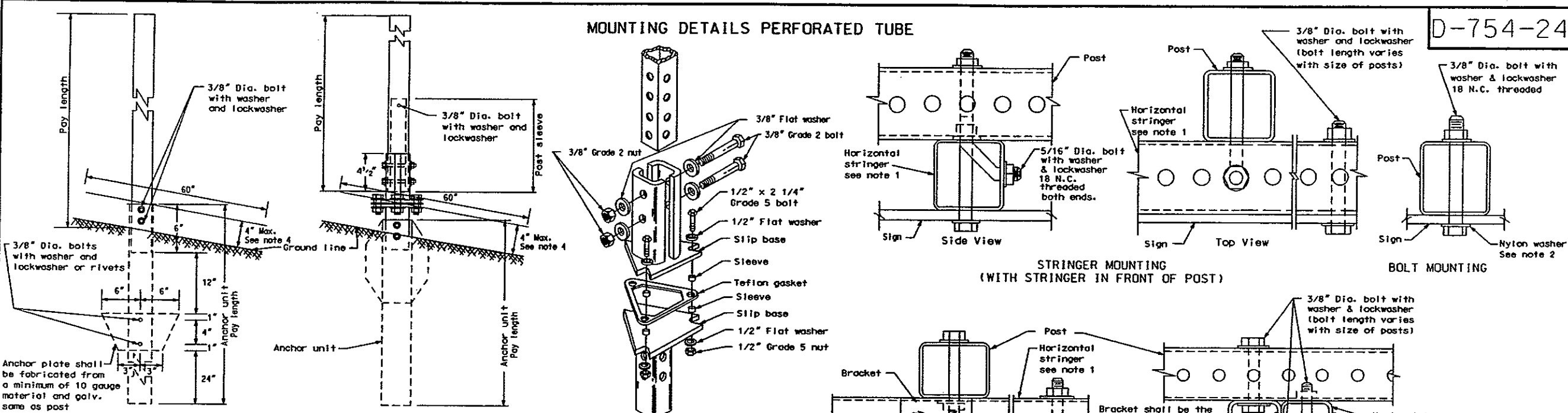
Pavement Depth: The pavement depth used to develop summary sheets should be the ultimate pavement depth. See plans for sign numbers and assembly numbers. Sign punching and stringers shall be as shown on standards.

Horizontal Clearance: The support 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.

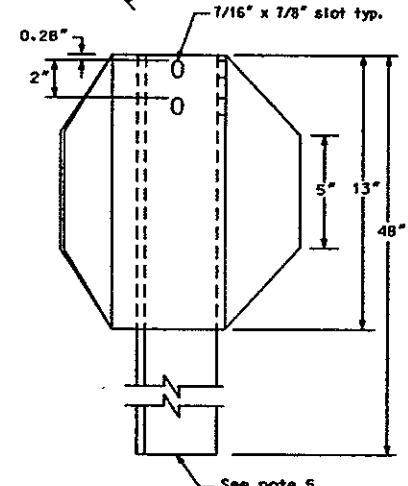
10-1-86	
REVISIONS	
DATE	CHANGE
8-1-88	Freeways
9-4-90	Min. overhang from shoulder
5-1-92	General revisions
9-3-92	Min. clearance
9-8-95	Pay length
2-2-98	General revisions
11-5-98	Vert. cl.

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

APPROVED: *K. H. B. B.*
DESIGN ENGINEER

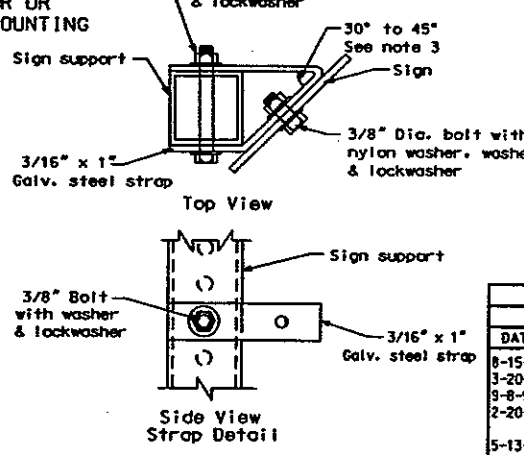


Telescoping Perforated Tube						
Number of Posts	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.
1	2	12		12	No	2 1/4
1	2 1/4	12		12	No	2 1/2
1	2 1/2	12		12	No	2 1/2
1	2 1/2	10		10	Yes	
1	2 1/2	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2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



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

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.



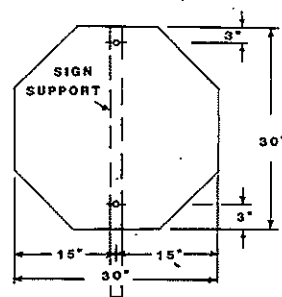
- Notes:**
- Horizontal stringers - In lieu of perforated tubes, the contractor may substitute z bar stringers. The z bar stringers shall be 1 3/4" x 3/16" thick, 1.08 lbs./ft. aluminum or 3.16 lbs./ft. steel.
 - Metal washer and nylon washers used on sign face shall have a minimum outside diameter of 15/16" ± 1/16" and 10 gauge thickness.
 - No Parking Signs: All no parking signs with directional arrows shall be placed at a 30 to 45 degree angle with the line of traffic flow. No parking signs required at the above angles may have the support turned to the correct angle. If the no parking sign is placed with another sign that has to be placed at a 90 degree angle with the line of traffic flow, the detailed angle strap should be used to mount the no parking sign. Material used for the attachment strap shall be included in the price bid flat sheet for signs. Flat washers and lockwashers shall be used with all nylon washers.
 - 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
 - Anchor material shall be 7 gauge (179-188) H.R.P.D. Commercial quality ASTM A569.

B - The 2 1/2" 12 gauge posts do not need slip bases when placed in standard soils. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are defined as boggy, wet, or loose soil areas.

10-1-86		REVISIONS	
DATE	CHANGE	DATE	CHANGE
8-15-94	Anchor detail		
3-20-95	Rev. 4x4 post		
9-8-95	Pay length		
2-20-96	Perforated tube table		
5-13-96	B note		
11-3-97	Anchor unit		
2-10-98	Anchor unit		

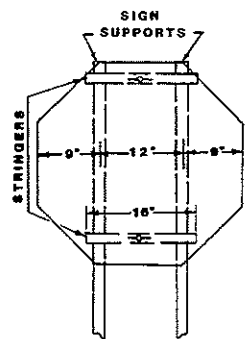
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
 APPROVED: *K. H. B. B.*
 DESIGN ENGINEER

**SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS
REGULATORY, WARNING, AND GUIDE SIGNS**

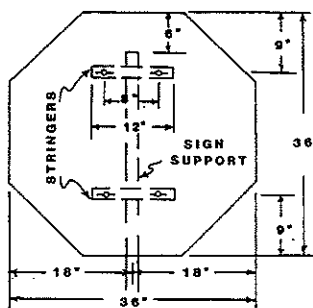


1 POST

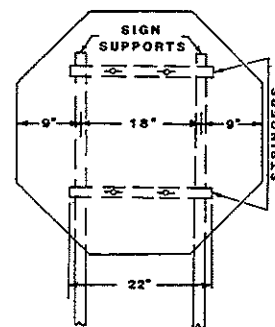
ASSEMBLY NO. 1



2 POSTS

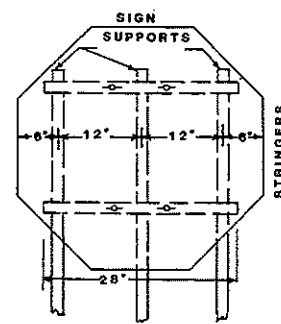


1 POST

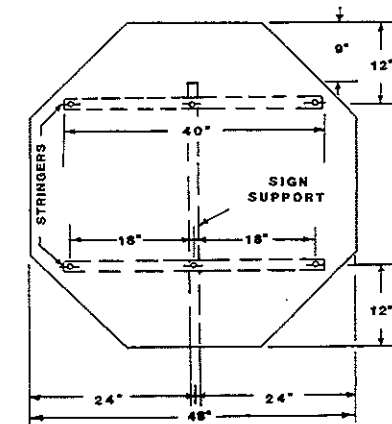


2 POSTS

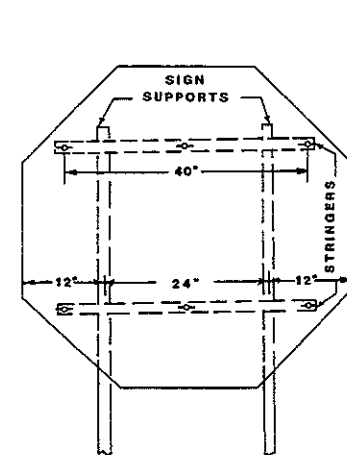
ASSEMBLY NO. 2



3 POSTS

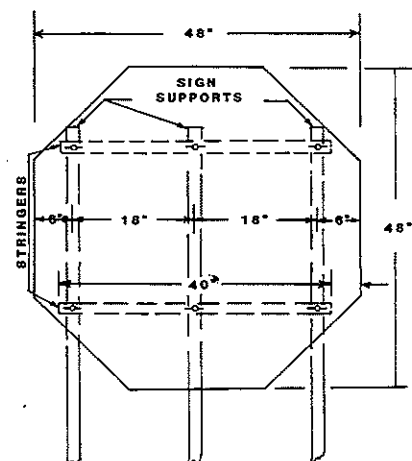


1 POST

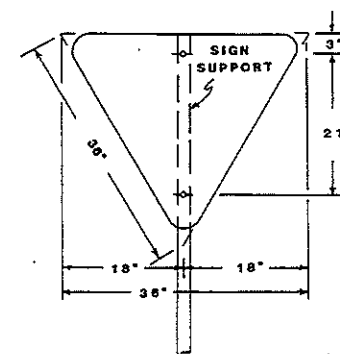


2 POSTS

ASSEMBLY NO. 3

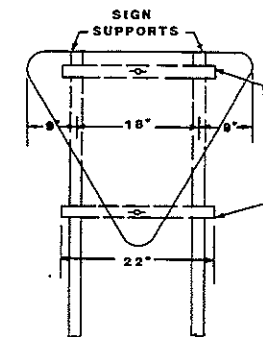


3 POSTS



1 POST

ASSEMBLY NO. 4



2 POSTS

NOTE:

Material:

Signing Backing: The sign backing material thickness shall be as follows.

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 1/2" x 1/2" and of the length shown.

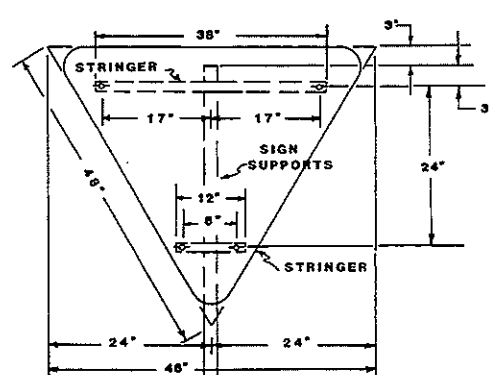
Holes:

Flange Channel: All holes shall be punched round for 3/8" diameter bolts.

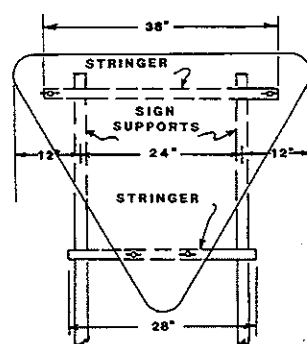
Square Tube, Perforated: All holes shall be punched round for 3/8" diameter bolts.

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.

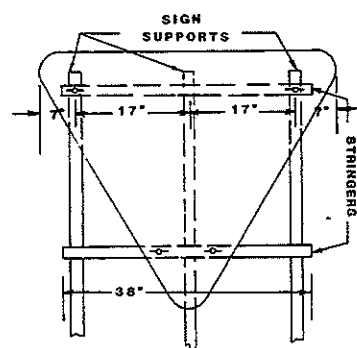


1 POST



2 POSTS

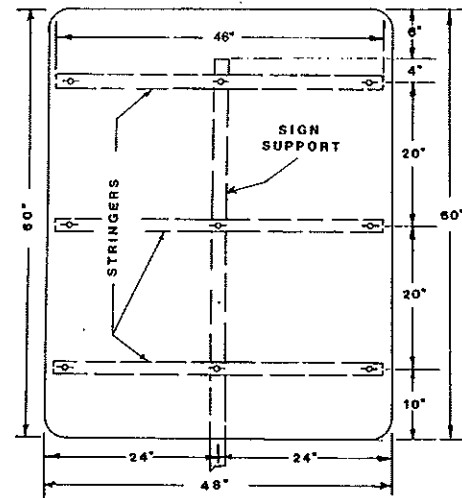
ASSEMBLY NO. 5



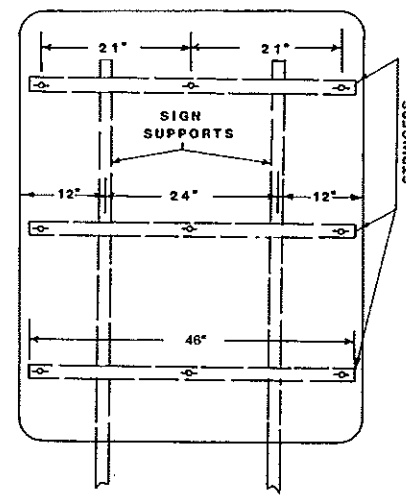
3 POSTS

10-1-86		NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
REVISIONS		
DATE	CHANGE	APPROVED: <i>David R. Bear</i> DESIGN ENGINEER
5-1-92	GENERAL REVISIONS	

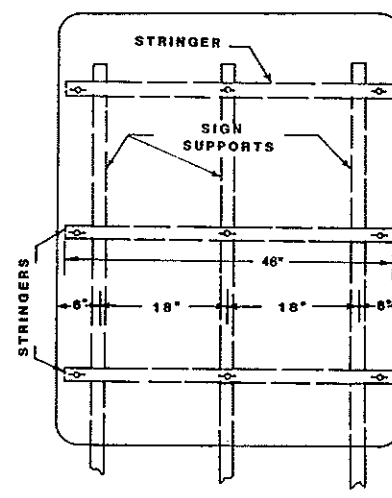
**SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS
REGULATORY, WARNING, AND GUIDE SIGNS**



1 POST

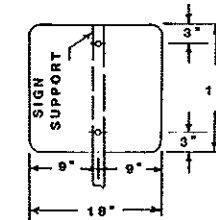


2 POSTS



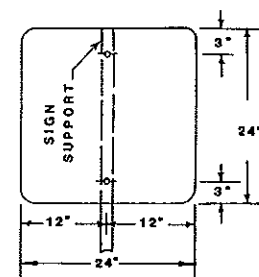
3 POSTS

ASSEMBLY NO. 12



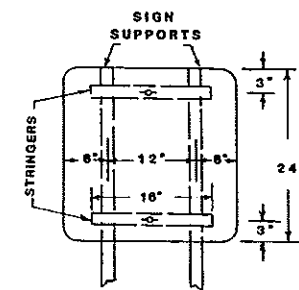
1 POST

ASSEMBLY NO. 13

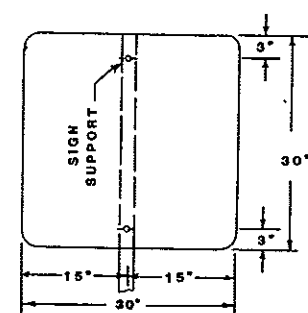


1 POST

ASSEMBLY NO. 14

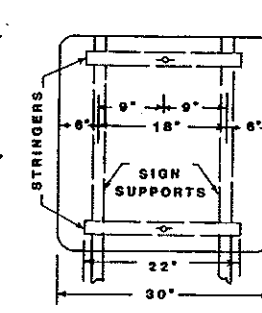


2 POSTS

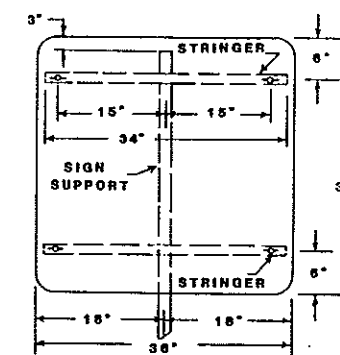


1 POST

ASSEMBLY NO. 15



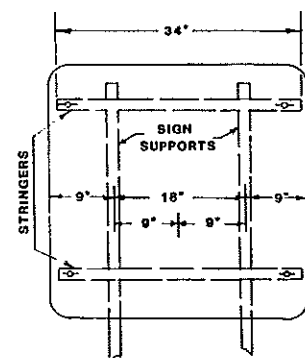
2 POSTS



1 POST

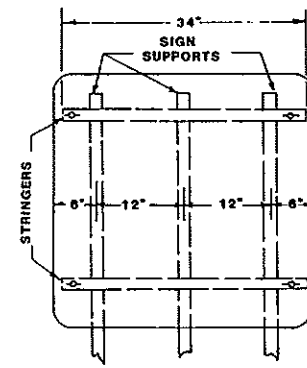
NOTE:

- Material**
Sign Backing: The sign backing material thickness shall be as follows.
- Aluminum: Aluminum Alloy 6061-T6 and 5052-H38 shall 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.
- 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.

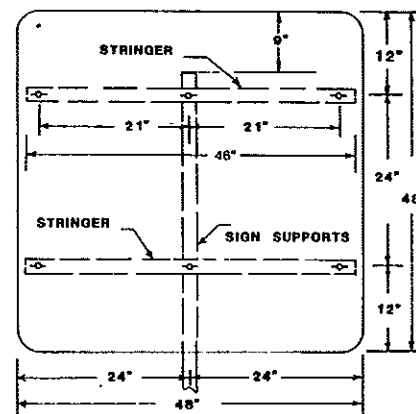


2 POSTS

ASSEMBLY NO. 16

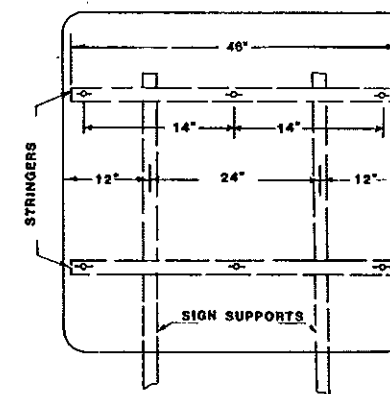


3 POSTS



1 POST

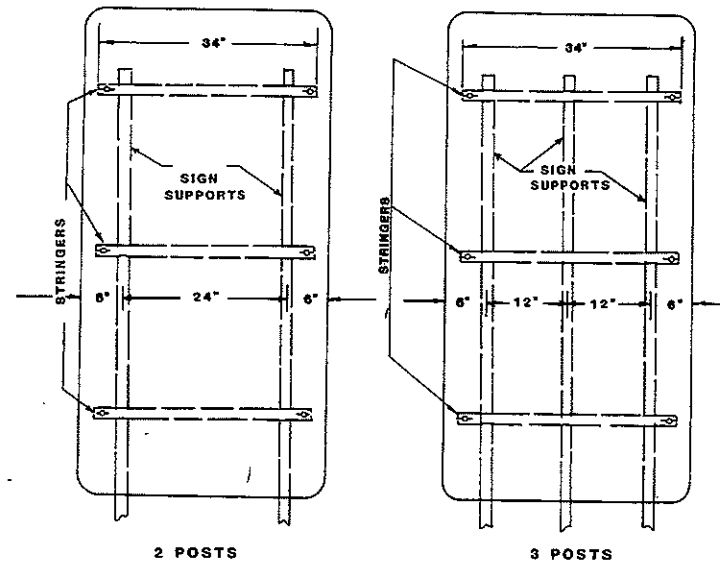
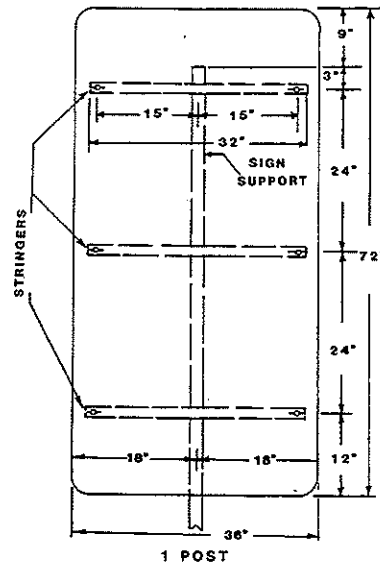
ASSEMBLY NO. 17



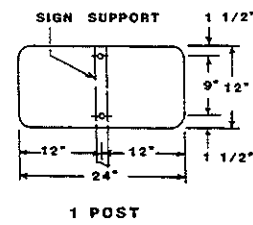
2 POSTS

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DATE	REVISIONS	
5-1-92	CHANGE	
7-14-95	GENERAL REVISIONS	
	46" Stringer	

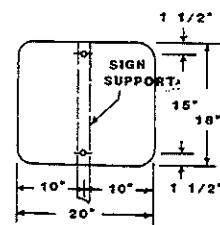
**SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS
REGULATORY, WARNING, AND GUIDE SIGNS**



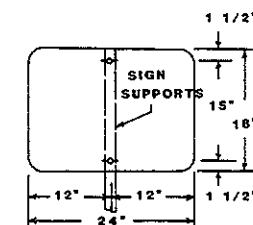
ASSEMBLY NO. 24



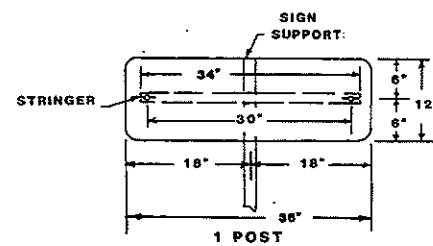
ASSEMBLY NO. 26



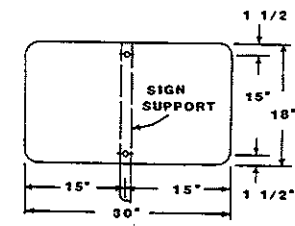
ASSEMBLY NO. 28



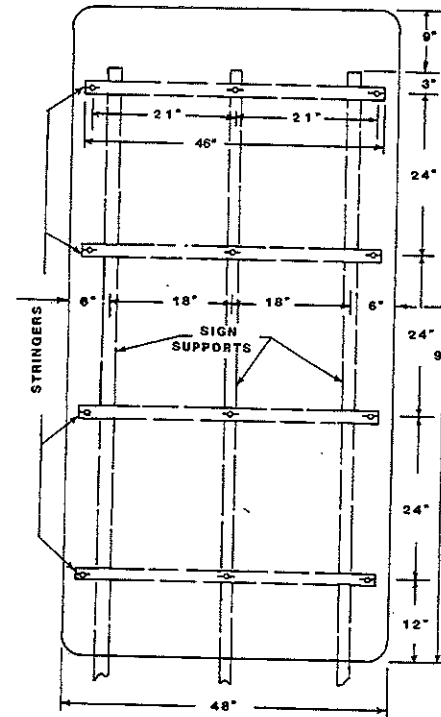
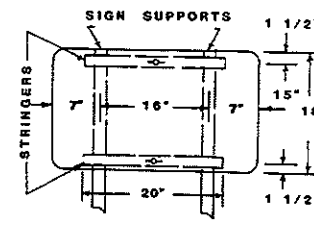
ASSEMBLY NO. 29



ASSEMBLY NO. 27



ASSEMBLY NO. 30



**3 POSTS
ASSEMBLY NO. 25**

NOTE:

Material:
Sign Backing: The sign backing material thickness shall be as follows.

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 1.125 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.

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	NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
DATE	CHANGE		
5-1-92	GENERAL REVISIONS		APPROVED: <i>David K. Olson</i> DESIGN ENGINEER
7-14-95	46" Stringer		