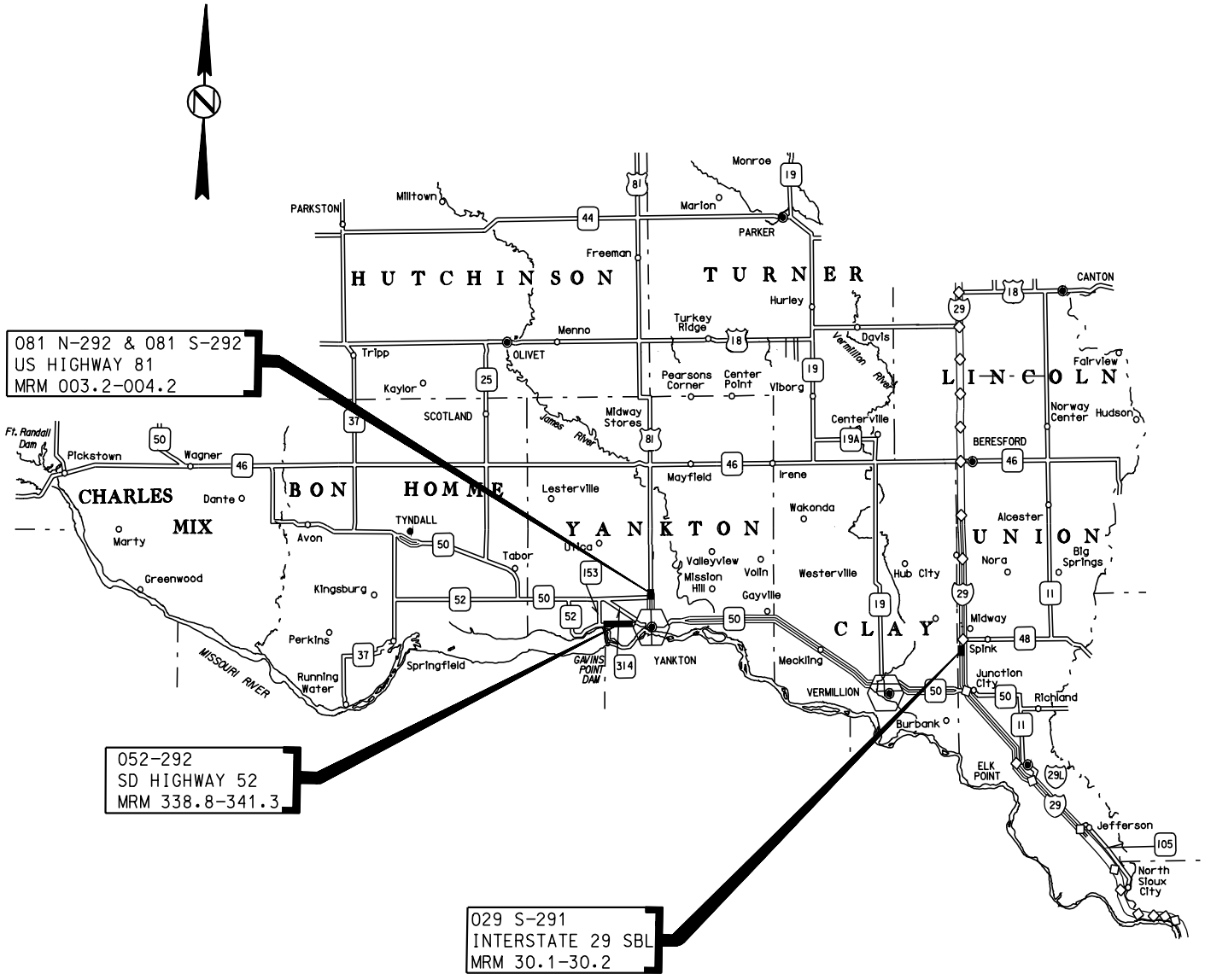
029 S-291, 081 N-292, 081 S-292 & 052-292
UNION & YANKTON COUNTIES
CRC & PCC PAVEMENT REPAIR
PCN 01G0, 01G6, I15A & 01GA



INDEX OF SHEETS

DESIGN DESIGNATION

PROJECT	029 S-291	081 N&S-292	052-292
ROUTE	I29	US81	SD52
MRM-MRM	30.1-30.2	3.2-4.2	338.8-341.3
ADT(2006)	5180	6310	1975
ADT(2026)	10005	7695	3030
DHV	1380	1195	515
D	100%	50%	50%
T DHV	11.6%	2.7%	9.9%
T ADT	25.5%	6.0%	21.7%
V	75 MPH	45 MPH	65 MPH

ESTIMATE OF QUANTITIES

BID ITEM NUMBER	ITEM	029 S-291 QUANTITY	081 N-292 QUANTITY	081 S-292 QUANTITY	052-292 QUANTITY	TOTAL QUANTITY	UNIT
009E0010	Mobilization	<----------LUMP SUM---------->				Lump Sum	LS
380E5020	Fast Track Concrete for PCC Pavement Repair	-	16.0	16.0	-	32.0	SqYd
380E5030	Nonreinforced PCC Pavement Repair	-	71.0	-	76.8	147.8	SqYd
380E5100	Continuously Reinforced PCC Pavement Repair	18.7	-	-	-	18.7	SqYd
380E6000	Dowel Bar	-	44	24	24	92	Each
380E6110	Insert Steel Bar in PCC Pavement	30	82	34	144	290	Each
380E6200	Tie Bar Retrofit, Stitching	-	-	-	50	50	Each
634E0010	Flagging	5	20	5	5	35	Hour
634E0100	Traffic Control	497	541	462	80	1580	Unit
634E0120	Traffic Control, Miscellaneous	<----------LUMP SUM---------->				Lump Sum	LS
634E0310	Temporary Road Markers	900	4860	1800	4800	12360	Ft
634E0420	Type C Advance Warning Arrow Panel	1	3	3	1	8	Each

TABLE FOR PCC PAVEMENT REPAIR

PROJECT 081 N-292
US81: MRM 3.2-4.2

US81 MRM	LANE	LENGTH (Ft)	WIDTH (Ft)	PCCP (SqYd)	PCCP FAST TRACK (SqYd)	STEEL BAR (Each)	DOWEL BAR (Each)	REMARKS
3.256	NBDL	12	6		8.0	16	12	
3.256	NBPL	12	6		8.0	18	12	
4.144	NBDL	4	10	4.4		11	4	
4.144	NBDL	14	40	62.2		26	12	
4.144	NBDL	4	10	4.4		11	4	
081 N-292 TOTALS				**71.0**	**16.0**	**82**	**44**	

PROJECT 081 S-292
US81: MRM 3.2-3.3

US81 MRM	LANE	LENGTH (Ft)	WIDTH (Ft)	PCCP (SqYd)	PCCP FAST TRACK (SqYd)	STEEL BAR (Each)	DOWEL BAR (Each)	REMARKS
3.256	SBTL	12	6		8.0	16	12	
3.256	SBPL	12	6		8.0	18	12	
081 S-292 TOTALS				**0.0**	**16.0**	**34**	**24**	

PROJECT 052-292
SD52: MRM 338.8-341.3

SD52 MRM	LANE	LENGTH (Ft)	WIDTH (Ft)	PCCP (SqYd)	PCCP FAST TRACK (SqYd)	STEEL BAR (Each)	DOWEL BAR (Each)	REMARKS
338.874	CTL	12	4	5.3		16		
339.180	WBDL	14	6	9.3		18		
339.180	WBPL	12	6	8.0		16		50' Cross-stitch
339.190	WBPL	6	6	4.0		10	6	
340.387	WBLs	6	6	4.0		12	6	In both DL and PL
340.387	EBDL	12	6	8.0		18	12	
340.640	WBDL	14	6	9.3		20		
341.280	WBDL	14	10	15.6		18		
341.280	WBPL	12	10	13.3		16		
052-292 TOTALS				**76.8**	**0.0**	**144**	**24**	

TABLE OF STEEL BAR QUANTITIES

	EACH
No. 5 BARS	**46**
No. 9 BARS	**141**
1-1/4" DOWEL BARS	**73**
TOTAL	**260**
Dowel Bars TOTAL for Dowel Bar Assembly	**92**

Key for lane abbreviations:
C = center
WB = westbound
EB = eastbound
TL = turn lane
DL = driving lane
PL = passing lane
Ls = both driving and passing lanes

TABLE FOR CRC PAVEMENT REPAIR

PROJECT 029 S-291
I29: MRM 30.1-30.2

MRM	LANES	PASSING LANE LENGTH (Ft)	PASSING LANE WIDTH (Ft)	DRIVING LANE LENGTH (Ft)	DRIVING LANE WIDTH (Ft)	BOTH LANES CONT. REINF. PCCP (SqYd)	INSTALL STEEL BAR IN PCCP - IN TRANSVERSE JOINT (Each)	INSTALL STEEL BAR IN PCCP - IN LONGITUDINAL JOINT (Each)
30.130	SBDL			12	14	18.7	26	4
			029 S-291 TOTALS			**18.7**	**26**	**4**

SPECIFICATIONS

Standard Specifications for Roads and Bridges, 2004 Edition and Required Provisions, Supplemental Specifications and/or Special Provisions as included in the Proposal.

COMPLETION DATE

All work shall be completed on or before October 15, 2008.

SCOPE OF WORK

This project consists of:

- Full depth replacement of concrete pavement in areas where concrete pavement blowups or major failures have occurred. Full depth areas vary in length and width; however the minimum length is 6 feet in driving lanes and 4 feet in turn lanes.
- Full depth replacement of Continuously Reinforced Concrete (CRC) Pavement in areas where major failures have occurred. Full depth areas may vary in length and width; however the minimum length is 12 feet.
- Tie Bar Retrofit, Stitching repair of random cracks.

WASTE DISPOSAL SITE

The Contractor will be required to furnish a site(s) for the disposal of construction/demolition debris generated by this project.

Construction/demolition debris may not be disposed of within the State ROW.

All construction/demolition debris generated by this project shall be cleaned up and disposed of by the Contractor.

The waste disposal site(s) shall be managed and reclaimed in accordance with the following from the General Permit for Highway, Road, and Railway Construction/Demolition Debris Disposal Under the South Dakota Waste Management Program issued by the Department of Environment and Natural Resources.

The waste disposal site(s) shall not be located in a wetland, within 200 feet of surface water, or in an area that adversely affects wildlife, recreation, aesthetic value of an area, or any threatened or endangered species, as approved by the Engineer.

If the waste disposal site(s) is located such that it is within view of any ROW, the following additional requirements shall apply:

1. Construction/demolition debris consisting of concrete, asphalt concrete or other similar materials shall be buried in a trench completely separate from wood debris. The final cover over the construction/demolition debris shall consist of a minimum of 1 foot of soil capable of supporting vegetation. Waste disposal sites provided outside of the State ROW shall be seeded in accordance with Natural Resources Conservation Service recommendations. Seeding recommendations may be obtained through the appropriate County NRCS Office. The Contractor shall control the access to waste disposal sites not within the State ROW through the use of fences, gates and placement of a sign or signs at the entrance to the site stating No Dumping Allowed.
2. Concrete and asphalt concrete debris may be stockpiled within view of the ROW for a period of time not to exceed the duration of the project. Prior to project completion, the waste shall be removed from view of the ROW or buried and the waste disposal site reclaimed as noted above.

The above requirements will not apply to waste disposal sites that are covered by an individual solid waste permit as specified in SDCL 34A-6-58, SDCL 34A-6-1.13, and ARSD 74:27:10:06.

Failure to comply with the requirements stated above may result in civil penalties in accordance with South Dakota Solid Waste Law, SDCL 34A-6-1.31.

Cost for furnishing waste disposal site(s), disposing of waste, maintaining control of access (fence, gates & signs) and reclamation of the waste disposal site(s) shall be incidental to the contract unit prices for the various items.

RESTORATION OF GRAVEL CUSHION

An inspection of the gravel cushion subgrade shall be made after removing concrete from each pavement replacement area. Areas of excess moisture shall be dried to the satisfaction of the Engineer. Loose material shall be removed. Each replacement area shall be leveled and compacted to the satisfaction of the Engineer.

If additional gravel cushion material is required, the Contractor shall obtain, place and compact gravel cushion to the satisfaction of the Engineer at no additional cost to the State. Additional gravel cushion can be obtained from the Department of Transportation Maintenance shops located in Beresford, Junction City or Yankton.

Cost for this work shall be incidental to the contract unit prices per square yard for Nonreinforced PCC Pavement Repair, Fast Track Concrete for PCC Pavement Repair or Continuously Reinforced PCC Pavement Repair.

EXISTING PCC PAVEMENT

The existing 8.5" PCC Pavement on SD52 and US81 is nonreinforced. The aggregate in the existing PCC pavement is quartzite.

EXISTING CRC PAVEMENT

The existing pavement on I 29 is 10" continuously reinforced PCC Pavement. The longitudinal reinforcing steel consists of No. 6 deformed bars spaced 6½" center to center, and the transverse reinforcing steel consists of No. 4 deformed bars spaced 4' center to center.

The aggregate in the existing CRC Pavement is quartzite.

NONREINFORCED PCC PAVEMENT REPAIR - GENERAL

Locations and size (length or width) of concrete repair areas are subject to change in the field, at the discretion of the Engineer, at no additional cost to the state. Payment will be based on actual area replaced.

Existing concrete pavement shall be sawed full depth at the beginning and end of the PCCP repair areas. When either the beginning or end of a PCCP repair area falls close to an existing joint or crack, the PCCP repair area shall be extended to eliminate the existing joint or crack. Where possible, new working joints shall be adjacent to existing working joints.

Existing concrete pavement in the replacement areas shall be removed by the lift out method or by means that minimize damage to the base and sides of remaining in place concrete. All removed material shall be removed from within the right-of-way by the end of the workday. Damage to adjacent concrete caused by the Contractor's operations shall be removed and replaced at the Contractor's expense.

If the pavement replacement area is entirely on either side of the existing contraction joint, the location of one of the working joints will be at the original location. Any existing dowel bar assemblies shall be sawed off or removed.

Concrete placed adjacent to gravel or asphalt shoulders shall be formed full depth to match the width of existing concrete pavement. Asphalt shoulders adjacent to concrete pavement replacements shall be repaired with new hot-mix asphalt.

At repair locations where the new working joint is not opposite the existing working joint, the Contractor shall place a ¼ inch preformed asphalt expansion joint material along the longitudinal joint from the existing working joint to the new working joint. The expansion joint material shall meet the requirements of AASHTO M33. Cost for this material shall be incidental to the contract unit price per square yard for Nonreinforced PCC Pavement Repair.

All joints (longitudinal and transverse) through and around the repair areas will be sawed and sealed in accordance with the details shown in these plans. Refer to Saw and Seal Joints notes.

NONREINFORCED PCC PAVEMENT REPAIR

New pavement thickness shall be a minimum thickness of 8.5" where the existing pavement thickness is 8.5".

Concrete for four-lane roadway repair shall meet the requirements of the Standard Specifications Section 380, except as modified by the following notes:

NONREINFORCED PCC PAVEMENT REPAIR (CONTINUED)

The slump requirement will be limited to 3" maximum after water reducer is added and the concrete shall contain 4.5% to 7.0% entrained air. Coarse aggregate shall be crushed ledge rock, Size No. 1. The Contractor is responsible for the mix design used. The Contractor shall submit a mix design and supporting documentation for approval at least 2 weeks prior to use. In lieu of submitting a mix design the contractor may use one of the following dependent upon type of cement to be used:

	LB./CU.YD.	LB./CU.YD.
CEMENT	800 (TYPE I or II)	710 (TYPE III)
WATER	282	300
FINE AGGREGATE	1039	1114
COARSE AGGREGATE	1726	1668

The use of a high range water reducer at manufacturer's recommended dosage will be required.

The concrete shall be cured for a minimum of 48 hours before opening to traffic. The 48 hours is based upon a concrete surface temperature of 60 degrees Fahrenheit or higher throughout the cure period. If the concrete temperature falls below 60 degrees Fahrenheit, the cure time shall be extended or other measures shall be taken, at no additional cost to the State. In addition to the time requirements, a strength of 4000 psi must be attained prior to opening to traffic.

The concrete shall be cured with white pigmented curing compound (AASHTO M148, Type 2) applied as soon as practical at a rate of 125 square feet per gallon. In addition, the concrete shall be immediately covered with suitable insulation blanket consisting of a layer of closed cell polystyrene foam protected by at least one layer of plastic. The insulation blanket shall have an R value of at least 0.5, as rated by the manufacturer. The insulation blanket shall be left in place, except for joint sawing operations, until the 3800 psi strength is attained.

Cost for performing the aforementioned work including sawing and removing concrete, furnishing and placing concrete, sawing and sealing joints, repairing asphalt and gravel shoulders, labor, tools and equipment shall be included in the contract unit price per square yard for Nonreinforced PCC Pavement Repair.

FAST TRACK CONCRETE FOR PCC PAVEMENT REPAIR

New pavement thickness shall be a minimum thickness of 8.5” where the existing pavement thickness is 8.5”.

Fast Track Concrete shall be used for two-lane roadway repair locations to ensure that the pavement repair area can be opened to traffic within 8 hours after placement.

The slump requirement prior to use of a set accelerator or super-plasticizer will be limited to 2" maximum and after the addition of all admixtures the maximum slump is 8”. The concrete shall contain 4.5% to 7.0% entrained air. Coarse aggregate shall be crushed ledge rock, Size No. 1. The Contractor is responsible for the mix design used. The Contractor shall submit a mix design and supporting documentation for approval at least 2 weeks prior to use. In lieu of submitting a mix design the contractor may use the following:

	LB./CU.YD.
CEMENT (TYPE I, II or III)	784
FINE AGGREGATE	1162
COARSE AGGREGATE	1650

The use of a set accelerator and super-plasticizer (high range water reducer) at manufacturer's recommended dosage will be required. Both the accelerator and super-plasticizer shall be added at the project site.

The special mix shall be designed to produce a minimum compressive strength of 3800 psi in 8 hours of curing time.

Fast Track Concrete shall be cured with white pigmented curing compound (AASHTO M148, Type 2) applied as soon as practical at a rate of 125 square feet per gallon. In addition, the concrete shall be immediately covered with suitable insulation blanket consisting of a layer of closed cell polystyrene foam protected by at least one layer of plastic. The insulation blanket shall have an R value of at least 0.5, as rated by the manufacturer. The insulation blanket shall be left in place, except for joint sawing operations, until the 3800 psi strength is attained.

FAST TRACK CONCRETE FOR PCC PAVEMENT REPAIR (CONTINUED)

The contraction joint sawing shall be performed as soon as possible after placement of concrete to avoid random cracking. Contraction joints shall be initially sawed to the plans detailed depth and to a width of 1/8".

The concrete repair area shall be removed, replaced, and opened to traffic in the same day during daylight hours. If the repair cannot be accomplished within the same day the Contractor shall place and compact gravel cushion within the repair area prior to night fall and the roadway shall be open to normal traffic. The Contractor shall be responsible for the additional cost for providing, placing and compacting the gravel cushion. The Contractor is also responsible for the added costs of providing traffic control past 8 hours of curing time if 3800 psi concrete strength is not obtained in 8 hours.

Cost for performing the aforementioned work including sawing and removing concrete, furnishing and placing Fast Track Concrete, sawing and sealing joints, repairing asphalt and gravel shoulders, labor, tools and equipment shall be included in the contract unit price per square yard for Fast Track Concrete for PCC Pavement Repair.

CONTINUOUSLY REINFORCED PCC PAVEMENT REPAIR

The Engineer will mark the location of the area to be repaired on construction. Where repair crosses both the passing and driving lanes, the passing lane should be repaired first.

The Contractor shall saw the in place concrete transversely at four locations for each repair area. Two saw cuts, spaced a minimum of 4', shall be full depth. The other two saw cuts shall be partial depth saw cuts and shall be made to a depth just above the in place reinforcing steel (3"+), and be placed 4' outside of the previous full depth saw cuts. The outside cuts shall be a minimum of 6" from the nearest tight crack outside of the patch.

The Contractor shall lift out or break out the center section (including reinforcing steel) and then use light chipping hammers (not exceeding 15 pounds) to remove the remaining 4' of concrete at each end of the repair area, leaving the reinforcing steel in place. Care shall be taken not to cut, bend or otherwise damage the in place reinforcing steel. Damage to in place reinforcing steel or to in place concrete beyond the repair area will be replaced at the Contractor's expense, to the satisfaction of the Engineer.

The Contractor shall remove and dispose of the in place concrete and in place asphalt concrete.

Existing exposed reinforcing steel and concrete faces shall be cleaned by sandblasting and compressed air to remove dirt and debris prior to placement of concrete.

Place reinforcing steel according to the notes for Reinforcing Steel and Steel Bar Insertion.

Concrete placed adjacent to asphalt concrete shoulders shall be formed full depth to match the width of existing concrete pavement. The excavated area of the asphalt concrete shoulder adjacent to repair areas shall be filled with asphalt concrete.

Concrete shall not be placed in the repair areas before 12:00PM and should be placed in the late afternoon. Temperature of the concrete at the time of placement shall be between 50°F and 90°F. The temperature of the concrete shall be maintained above 40°F during the curing period.

Saw cuts that extend beyond the repair area shall be filled with a non-shrinkage mortar mix at the Contractor's expense.

Upon placement of the concrete, repair areas shall be straight edged to ensure a smooth riding surface and shall be textured longitudinally with the pavement by finishing with a stiff broom. Repair areas shall then be checked with a 10' foot straight edge. The permissible longitudinal and transverse surface deviation shall be 1/8" in 10'.

New pavement thickness shall be equal to existing pavement thickness (10").

Concrete shall meet the requirements of the Standard Specifications Section 380, except as modified by the following notes:

CONTINUOUSLY REINFORCED PCC PAVEMENT REPAIR (CONTINUED)

The Slump requirement will be limited to 3" maximum after water reducer is added and the concrete shall contain 4.5% to 7.0% entrained air. Coarse aggregate shall be crushed ledge rock, Size No. 1. The Contractor is responsible for the mix design used. The Contractor shall submit a mix design and supporting documentation for approval at least 2 weeks prior to use. In lieu of submitting a mix design the contractor may use one of the following dependent upon type of cement to be used.

	LB./CU.YD.	LB./CU.YD.
CEMENT	800 (Type I or II)	710 (Type III)
FLY ASH	112	112
WATER	255	270
FINE AGGREGATE	1035	1110
COARSE AGGREGATE	1645	1590

The concrete mix design shall be approved by the Engineer before beginning repair operations.

The use of a water reducer at manufacturer's recommended dosage will be required.

The concrete shall be cured for a minimum of 48 hours before opening to traffic. The 48 hours is based upon a concrete surface temperature of 60 degrees Fahrenheit or higher throughout the cure period. If the concrete temperature falls below 60 degrees Fahrenheit, the cure time shall be extended or other measures shall be taken, at no additional cost to the State. In addition to the time requirements, a strength of 4000 psi must be attained prior to opening to traffic.

The concrete shall be cured with white pigmented curing compound (AASHTO M148, Type 2) applied as soon as practical at a rate of 125 square feet per gallon. In addition the concrete shall be covered with suitable insulation blanket consisting of a layer of closed cell polystyrene foam protected by at least one layer of plastic. Insulation blanket shall have an R-value of at least 0.5, as rated by the manufacturer. Insulation blanket shall be left in place, except for joint sawing operations. Insulation blanket shall be overlapped on to the existing concrete by 4'.

Cost for performing the aforementioned work including sawing, chipping and removing concrete, sandblasting, cleaning, furnishing and placing concrete and reinforcing steel, finishing and curing, replacing asphalt shoulders, labor and equipment shall be included in the contract unit price per square yard for Continuously Reinforced PCC Pavement Repair.

REINFORCING STEEL

After removal of the in place concrete and repair of the gravel cushion subgrade, new reinforcing steel shall be installed. Refer to the CRC Pavement Repair Area layouts for details.

1. New No. 6 longitudinal bars shall be lap spliced with the preserved in place longitudinal bars. The Contractor may elect to use a Mechanical Rebar Splice in lieu of the lap splice.
2. Additional No. 6 longitudinal bars shall be centered between every other set of two spliced longitudinal bars throughout the width of the repair area. The additional longitudinal bars shall overlap into the existing concrete 9" on both sides of the repair area. Drilled holes will be required and the additional longitudinal bars shall be inserted in accordance with the notes for Steel Bar Insertion. The additional longitudinal bars shall then be lap spliced or be mechanically spliced in accordance with the notes for Mechanical Rebar Splice.
3. Additional No. 4 transverse bars shall be centered between the in place transverse bars throughout the length of the repair area. The spacing of transverse bars in the completed repair area shall be half the spacing of the in place transverse reinforcing steel (2').
    - For half roadway width repair areas, the additional transverse bars shall overlap into the existing concrete 9" at centerline. Drilled holes will be required and the additional transverse bars shall be inserted according to the notes for Steel Bar Insertion.
    - For full roadway width repair areas, a keyway with factory bent No. 4 or 5 lap spliced transverse bars shall be constructed in the longitudinal joint to tie the additional transverse bars. The Contractor may elect to use a Mechanical Rebar Splice in lieu of the keyway.

Cost for this work, including reinforcing steel, ties, labor and equipment shall be incidental to the contract unit price per square yard for Continuously Reinforced PCC Pavement Repair.

MECHANICAL REBAR SPLICES

Mechanical rebar splices shall conform to Section 480.3.D of the Standard Specifications.

Mechanical rebar splices may be used in lieu of the splicing methods detailed in the Reinforcing Steel notes. However, mechanical rebar splices must be staggered such that no mechanical rebar splice is within 12" of another mechanical rebar splice.

Cost for furnishing and installing mechanical rebar splices shall be incidental to the contract unit price per square yard for Continuously Reinforced PCC Pavement Repair.

STEEL BAR INSERTION - CONTINUOUSLY REINFORCED PCC PAVEMENT

The Contractor shall insert steel bars into drilled holes in the joints as specified. An epoxy resin adhesive must be used to anchor the steel bar in the drilled hole.

The steel bars shall be cut to the specified length by sawing and shall be free from burring or other deformations. Shearing will not be permitted.

Epoxy resin adhesive shall be of the type intended for horizontal applications, and shall conform to the requirements of ASTM C 881, Type IV, Grade 3 (equivalent to AASHTO M235, Type IV, Grade 3).

The diameter of the drilled holes in the existing concrete pavement for the steel bars shall not be less than 1/8 inch nor more than 3/8 inch greater than the overall diameter of the steel bar. Holes drilled into the existing concrete pavement shall be located at mid-depth of the slab and true and normal (Exceptions: In the centerline longitudinal joint, the drilled in transverse steel bar slope will be maintained 9" into the adjacent slab. In the transverse joints, the drilled in longitudinal steel bar angle will be slightly under 90° to allow for centering of the lap splice between existing longitudinal steel). The drilled holes shall be blown out with compressed air using a device that will reach to the back of the hole to ensure that all debris or loose material has been removed prior to epoxy injection.

A rigid frame or mechanical device will be required to guide the drill to ensure proper horizontal and vertical alignment of the steel bars in the drilled holes.

Mix the epoxy resin as recommended by the manufacturer and apply by an injection method approved by the Engineer. If an epoxy pump is utilized, it shall be capable of metering the components at the manufacturer's designated rate and be equipped with an automatic shut-off. The pump shall shut off when any of the components are not being metered at the designated rate.

Fill the drilled holes 1/3 to 1/2 full of epoxy, or as recommended by the manufacturer, prior to steel bar insertion. Care shall be taken to prevent epoxy from running out of the horizontal holes prior to steel bar insertion. Rotate the steel bar during insertion to eliminate voids and ensure complete bonding of the bar. Insertion of the bars by the dipping method will not be allowed.

Cost for steel bars shall be incidental to the contract unit price per square yard for Continuously Reinforced PCC Pavement Repair.

Cost for the epoxy resin adhesive, drilling of holes, applying the adhesive, inserting the steel bars into the drilled holes and all other items incidental to the insertion of the steel bars shall be incidental to the contract unit price per each for Insert Steel Bar in PCC Pavement.

STEEL BAR INSERTION – NONREINFORCED PCC PAVEMENT

Locations and quantities of concrete repair are subject to change in the field at the discretion of the Engineer. The Contractor will be responsible for ordering the actual quantity of steel bars necessary to complete the work.

On 8.5" concrete repair areas:

The Contractor shall insert the steel bars (1¼" x 18" epoxy coated plain round dowel bars and No. 9 x 18" epoxy coated deformed tie bars for transverse joints and No. 5 x 24" epoxy coated deformed tie bars for longitudinal joints) into drilled holes in the existing concrete pavement. An epoxy resin adhesive must be used to anchor the steel bar in the drilled hole.

Steel bars shall be cut to the specified length by sawing and shall be free from burring or other deformations. Shearing will not be permitted.

STEEL BAR INSERTION – NONREINFORCED PCC PAVEMENT (CONTINUED)

Epoxy resin adhesive shall be of the type intended for horizontal applications, and shall conform to the requirements of ASTM C 881, Type IV, Grade 3 (equivalent to AASHTO M235, Type IV, Grade 3).

Steel bars shall be inserted in the transverse joint on 18" centers. The first steel bar in the transverse joint shall be placed 9" from the outside edge of the slab. Steel bars shall be inserted in the longitudinal joint on 30" centers and shall be a minimum of 15" from either transverse joint. A typical one-lane patch 12' wide and 6' long will require 18 steel bars (8 in each transverse joint and 2 in the longitudinal joint).

The diameter of the drilled holes in the existing concrete pavement for the steel bars shall not be less than 1/8 inch nor more than 3/8 inch greater than the overall diameter of the steel bar. Holes drilled into the existing concrete pavement shall be located at mid-depth of the slab and true and normal. The drilled holes shall be blown out with compressed air using a device that will reach to the back of the hole to ensure that all debris or loose material has been removed prior to epoxy injection.

A rigid frame or mechanical device will be required to guide the drill to ensure proper horizontal and vertical alignment of the steel bars in the drilled holes.

Mix the epoxy resin as recommended by the manufacturer and apply by an injection method approved by the Engineer. If an epoxy pump is utilized, it shall be capable of metering the components at the manufacturer's designated rate and be equipped with an automatic shut-off. The pump shall shut off when any of the components are not being metered at the designated rate.

Fill the drilled holes 1/3 to 1/2 full of epoxy, or as recommended by the manufacturer, prior to insertion of the steel bar. Care shall be taken to prevent epoxy from running out of the horizontal holes prior to steel bar insertion. Rotate the steel bar during insertion to eliminate voids and ensure complete bonding of the bar. Insertion by the dipping method will not be allowed.

Cost for the epoxy resin adhesive, steel bars, drilling of holes, inserting the steel bars into the drilled holes and all other items incidental to the insertion of the steel bars shall be included in the contract unit price per each for Insert Steel Bar In PCC Pavement.

SAW AND SEAL JOINTS

All longitudinal and transverse joints at concrete repair areas shall be sawed and sealed.

Joints shall not be sealed unless they are thoroughly clean and dry. Cleaning shall be accomplished by sand blasting and other tools as necessary. Just prior to sealing, each joint shall be blown out using a jet of compressed air to remove all trace of dust.

Transverse joints shall be sealed with Low Modulus Silicone Sealant. Longitudinal joints may be sealed with either Low Modulus Silicone Sealant or Hot Poured Elastic Joint Sealer.

Acceptance of the Low Modulus Silicone Sealant and Hot Poured Elastic Joint Sealer will be based on visual inspection by the Engineer.

Cost for sawing and sealing of the longitudinal construction joint and both transverse joints shall be incidental to the contract unit prices per square yard for Nonreinforced PCC Pavement Repair, Fast Track Concrete for PCC Pavement Repair and Continuously Reinforced PCC Pavement Repair.

TIE BAR RETROFIT, STITCHING

Tie Bar Retrofit, Stitching shall be done by the Contractor on the longitudinal random crack located on 052-292 adjacent to and between repair areas in the WBPL at MRM 339.180 and 339.190. Also, additional Tie Bar Retrofit, Stitching may be ordered by the Engineer, at other locations and routes, at the contract unit price.

The Contractor shall insert No. 5 epoxy coated deformed tie bars into drilled holes in the existing concrete pavement. An epoxy resin adhesive must be used to anchor the steel bar in the drilled hole. The drill used shall be hydraulic percussive type and not a hand held.

The steel bars shall be cut to the specified length by sawing and shall be free from burring or other deformations. Shearing will not be permitted.

Epoxy resin adhesive shall be of the type intended for horizontal applications, and shall conform to the requirements of ASTM C 881, Type IV, Grade 3 (equivalent to AASHTO M235, Type IV, Grade 3).

TIE BAR RETROFIT, STITCHING (CONTINUED)

The diameter of the drilled holes in the existing concrete pavement for the steel bars shall not be less than 1/8 inch nor more than 3/8 inch greater than the overall diameter of the steel bar. The holes shall be drilled at an angle alternating from opposite sides of the joint to produce a cross-stitching pattern. The drilled holes shall be blown out with compressed air using a device that will reach to the back of the hole to ensure that all debris or loose material has been removed prior to epoxy injection. Damage to pavement shall be repaired to the satisfaction of the Engineer at the Contractor's expense.

A rigid frame or mechanical device will be required to guide the drill to ensure proper horizontal and vertical alignment of the steel bars in the drilled holes.

Mix the epoxy resin as recommended by the manufacturer and apply by an injection method approved by the Engineer. If an epoxy pump is utilized, it shall be capable of metering the components at the manufacturer's designated rate and be equipped with an automatic shut-off. The pump shall shut-off when any of the components are not being metered at the designated rate. Fill the drilled holes sufficiently with epoxy prior to the insertion of the tie bar such that the epoxy will be level with the top of the concrete pavement after insertion of the tie bar. Rotate the steel bar during insertion to eliminate voids and ensure complete bonding of the bar. Insertion of the bars by the dipping method will not be allowed. The top of the drilled hole shall be filled with epoxy or excess epoxy removed such that the epoxy is level with the existing pavement.

No bars shall be inserted within 9" of an existing transverse contraction joint. Any bars not functioning or damaged shall be repaired or replaced at the Contractor's expense.

Cost for the epoxy resin adhesive, tie bars, drilling of holes, debris or loose material removal, applying the adhesive, inserting the tie bars into the drilled holes and incidentals necessary for the insertion of the tie bars shall be included in the contract unit price per each for Tie Bar Retrofit, Stitching.

TEMPORARY PAVEMENT MARKING

Temporary pavement marking (except stop bars) shall consist of Temporary Road Markers and shall be included in the contract unit price per foot for Temporary Road Markers (one workspace with 900' taper on I 29, one workspace with 660' taper on US 81 four-lane divided, three workspace with a total of ten 600' tapers on US 81 four-lane undivided, eight workspaces with 600' tapers on SD 52 five-lane undivided equals 12,360').

GENERAL MAINTENANCE OF TRAFFIC

Removing, relocating, covering, salvaging and resetting of permanent traffic control devices, including delineation, shall be the responsibility of the Contractor. Cost for this work shall be incidental to the contract unit prices for the various items unless otherwise specified in the plans. Any delineators and signs damaged or lost shall be replaced by the Contractor at no cost to the State.

Storage of vehicles and equipment shall be outside the clear zone and as near as possible to the right-of-way line. Contractor's employees should mobilize at a location off the right-of-way and arrive at the work sites in a minimum number of vehicles necessary to perform the work.

Indiscriminate driving and parking of vehicles within the right-of-way will not be permitted. Any damage to the vegetation, surfacing, embankment, delineators and existing signs resulting from such indiscriminate use shall be repaired and/or restored by the Contractor, at no expense to the State, and to the satisfaction of the Engineer.

The Contractor shall provide documentation that all breakaway sign supports comply with FHWA NCHRP 350 crash-worthy requirements. The Contractor shall provide installation details at the preconstruction meeting for all breakaway sign support assemblies.

Sufficient traffic control devices have been included in these plans to sign one lane closure for I 29, one lane closure for a 4-lane and the 081 N-292/081 S-292 Traffic Control for MRM 3.256 as detailed later in these plans. If the Contractor elects to work on additional sites simultaneously, the cost for additional traffic control devices shall be incidental to the contract unit price per unit for Traffic Control.

MAINTENANCE OF TRAFFIC – PCC PAVEMENT REPAIR

A Type III Barricade shall be installed at the end of a lane closure taper as detailed in these plans. Additional Type III Barricades shall be installed facing traffic within the closed lane at a spacing of 1/4 mile. Each mainline concrete repair location from which the in place concrete has been removed shall be marked with a minimum of two drums. In areas containing numerous concrete repair locations, drums should be installed at a spacing of 660' alternating with the Type lll Barricades.

Signs may be mounted on portable supports.

Construction workspaces on four-lane divided or four-lane undivided roadways shall be limited to 3 miles in length, except that workspaces on SD 52 shall be limited to 1 mile in length. Construction workspaces on two-lane undivided roadways shall be limited to 300 feet in length. The distance between the closest points of any two construction workspaces, including channeling devices, shall not be less than 3 miles. Drivers in two-way traffic workspaces must be able to see approaching traffic through and beyond the work zone.

Holes adjacent to centerline in the lane open to traffic created during removal and replacement of PCC Pavement repair areas shall be filled with cold asphalt mix during the cure of concrete placed in a repair area, and until the lane open to traffic is closed. Cold asphalt mix can be obtained from the Department of Transportation Maintenance shops located at Beresford, Junction City or Yankton.

Holes in the gravel or asphalt concrete shoulders created during removal and replacement of PCC Pavement repair areas shall be filled with gravel or hot-mix asphalt concrete (to match the shoulder surfacing) prior to opening the lane to traffic. Gravel can be obtained from the Department of Transportation Maintenance shops located at Beresford, Junction City or Yankton. Hot-mix asphalt concrete shall be furnished by the Contractor.

Cost for furnishing asphalt concrete, hauling and placing gravel and asphalt concrete shall be incidental to the contract unit price per square yard for Nonreinforced PCC Pavement Repair, Fast Track Concrete for PCC Pavement Repair and Continuously Reinforced PCC Pavement Repair.

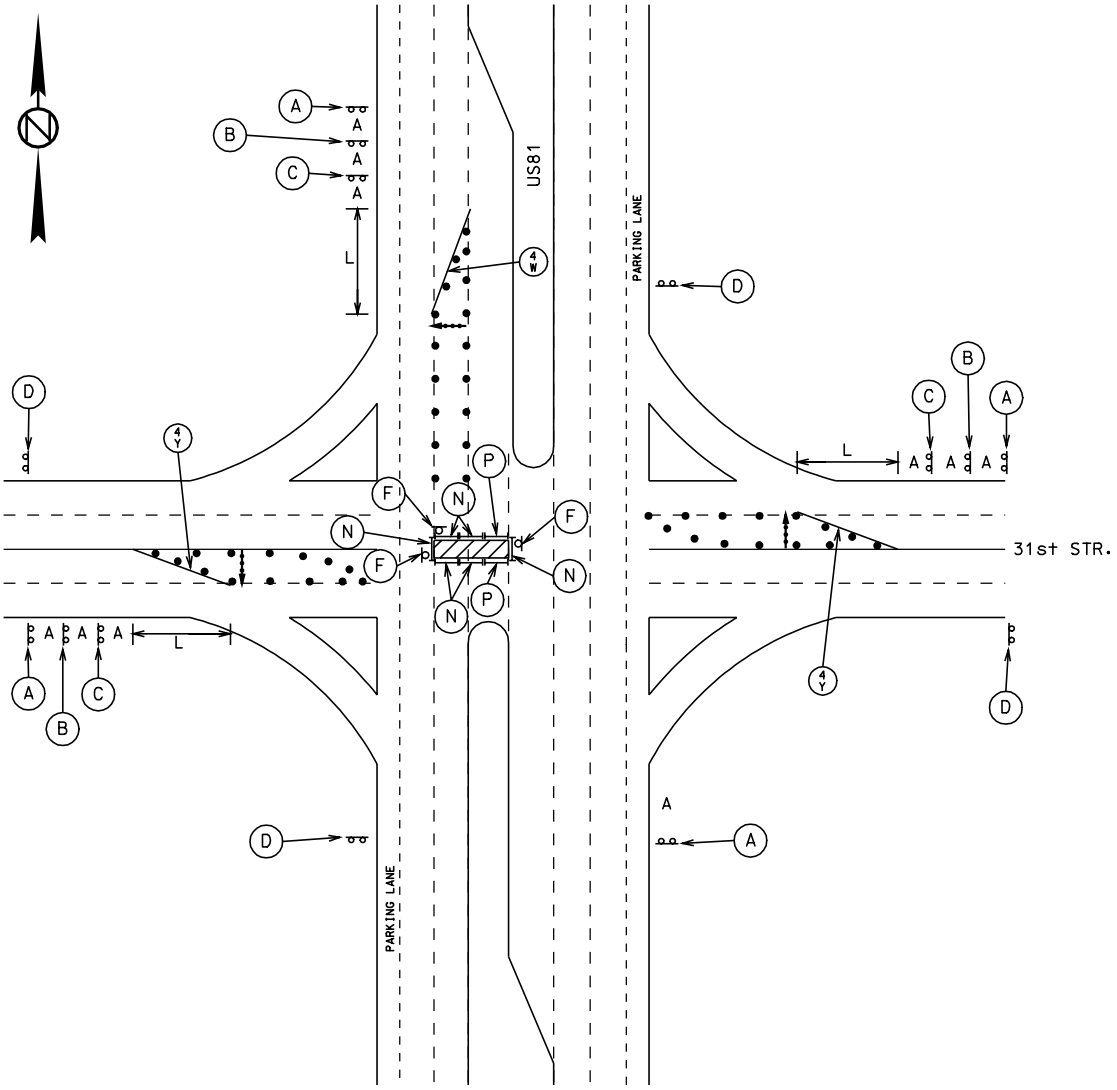
Routing traffic onto the asphalt or gravel shoulders during any phase of the construction will not be allowed.

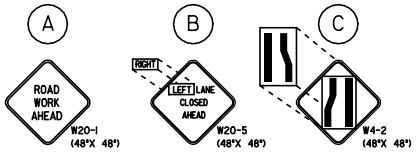
Damage to the shoulders, median or ditch due to the Contractor's operations shall be repaired by the Contractor, to the satisfaction of the Engineer, at no expense to the State. This includes the routing of traffic onto these shoulders around the work zones.

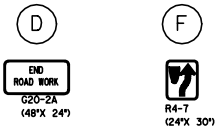
Extra care shall be taken to protect the in place asphalt shoulders on all routes of this project that have these type of shoulders. In all work zones in these areas, the same channelizing devices and spacing used on centerline will also be required on the shoulders. These channelizing devices shall be placed in locations to adequately keep traffic completely off these shoulders. Continuous maintenance of the shoulder devices will be required to keep them in place. Cost for these extra channelizing devices shall be incidental to the contract lump sum price for Traffic Control, Miscellaneous.

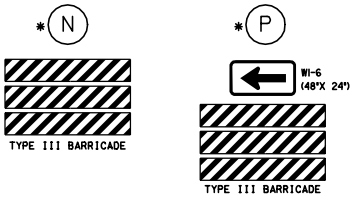
For projects 081 N-292 and 081 S-292, the Contractor shall notify the Engineer a minimum of one week prior to work at MRM 3.256 to allow for the retiming of the traffic signals at the intersection of US 81 and SD 50.

081 S-292 PCN I15A
TRAFFIC CONTROL
MRM 3.256: SBTL & SBPL REPAIR









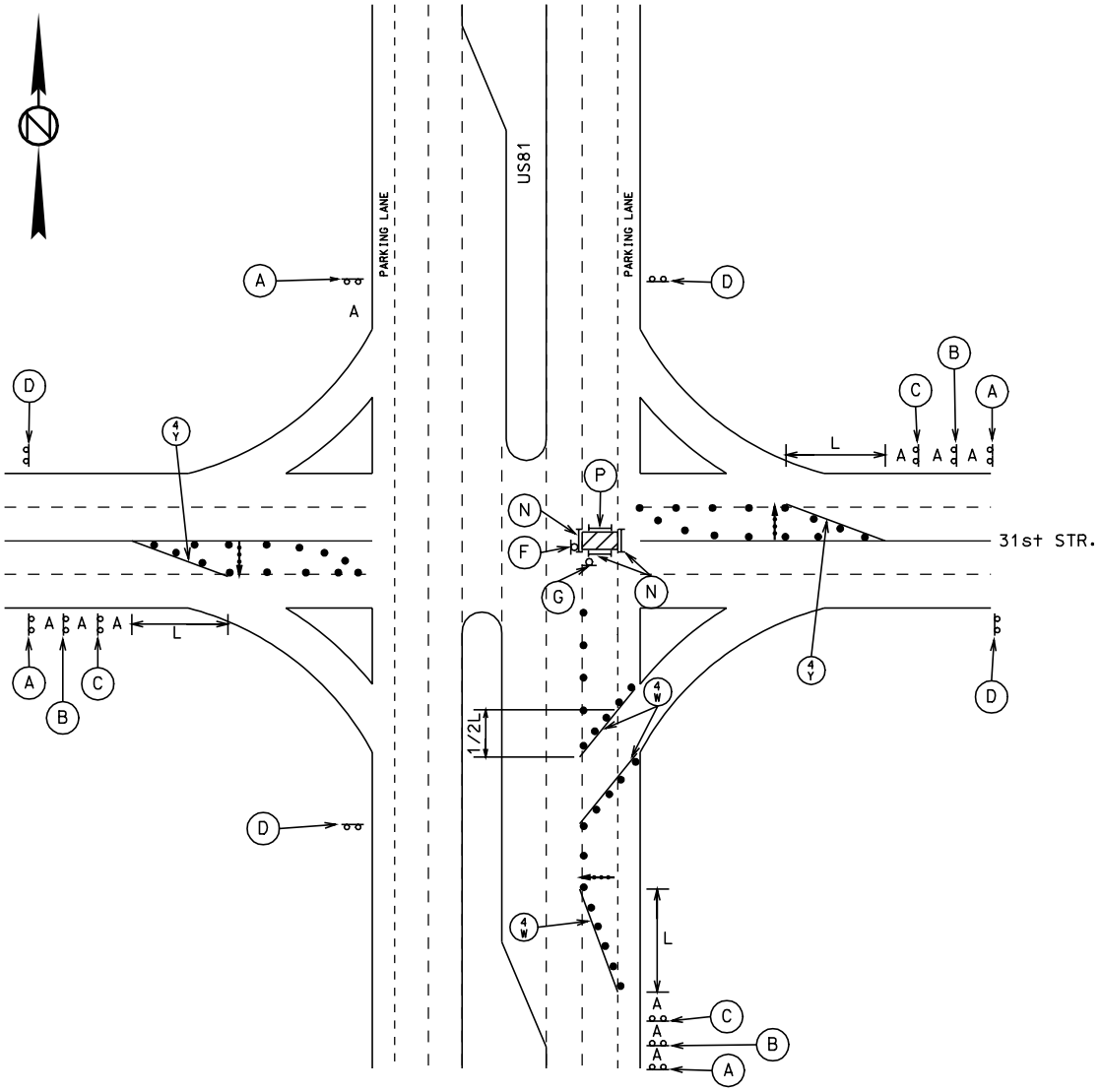
NOTES:

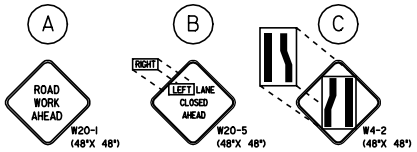
- REFLECTORIZED DRUMS - 25 ft. spacing on tapers & 50 ft maximum spacing on tangent, unless otherwise shown.
- 4Y - 4" YELLOW TEMPORARY PAVEMENT MARKING
- 4W - 4" WHITE TEMPORARY PAVEMENT MARKING
- ADVANCE WARNING ARROW PANEL
- * - Type III Barricades shall be setup so stripes are sloped downward to the side approaching traffic should pass.

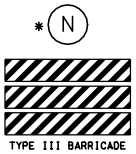
Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)	Taper Length (Feet) (L)
0 - 30	200	180
35 - 40	200	320
45 - 50	350	600
55	500	660
60 - 65	500	780

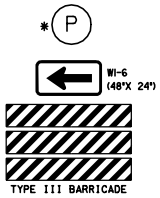
WORK ZONE

081 N-292 PCN 01G6
TRAFFIC CONTROL
MRM 3.256: NBDL REPAIR









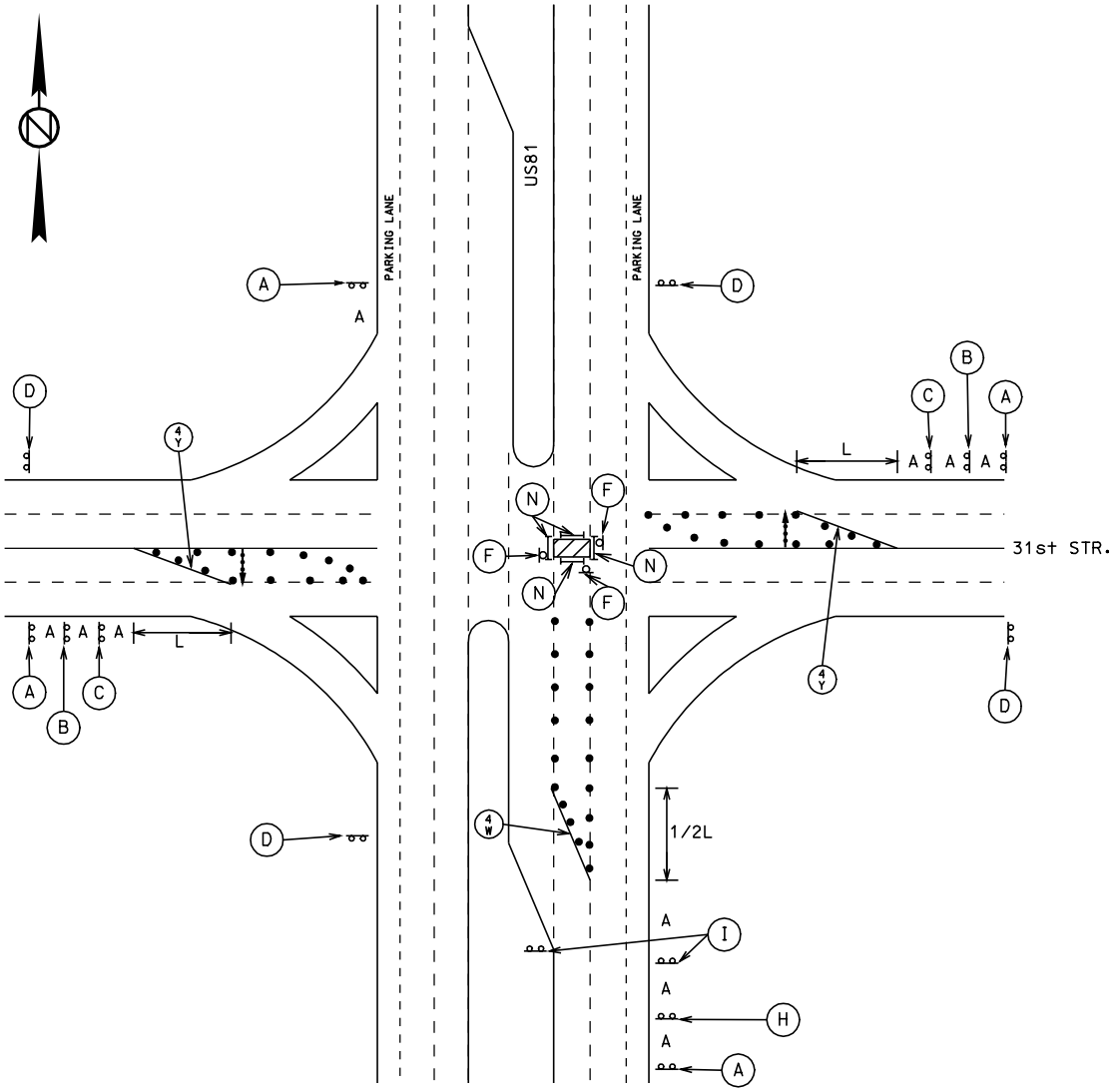
NOTES:

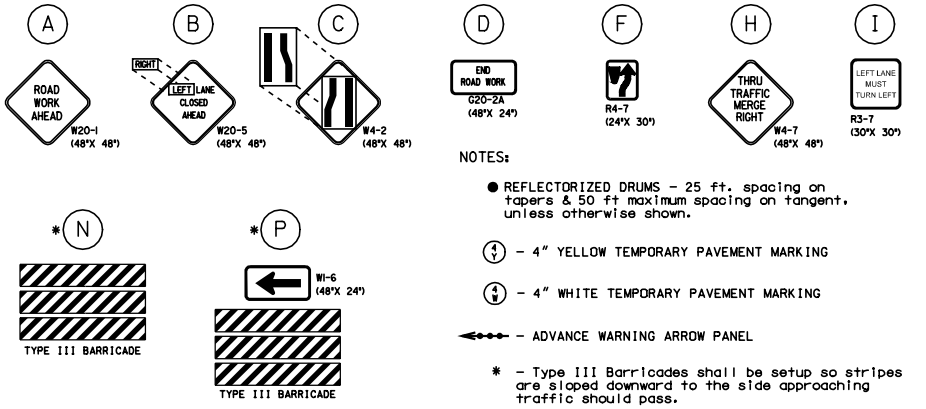
- REFLECTORIZED DRUMS - 25 ft. spacing on tapers & 50 ft maximum spacing on tangent, unless otherwise shown.
- (4Y) - 4" YELLOW TEMPORARY PAVEMENT MARKING
- (4W) - 4" WHITE TEMPORARY PAVEMENT MARKING
- ADVANCE WARNING ARROW PANEL
- * - Type III Barricades shall be setup so stripes are sloped downward to the side approaching traffic should pass.

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)	Taper Length (Feet) (L)
0 - 30	200	180
35 - 40	200	320
45 - 50	350	600
55	500	660
60 - 65	500	780

WORK ZONE

081 N-292 PCN 01G6
TRAFFIC CONTROL
MRM 3.256: NBPL REPAIR





NOTES:

- REFLECTORIZED DRUMS - 25 ft. spacing on tapers & 50 ft maximum spacing on tangent, unless otherwise shown.
- (4Y) - 4" YELLOW TEMPORARY PAVEMENT MARKING
- (4W) - 4" WHITE TEMPORARY PAVEMENT MARKING
- ◀●●●● - ADVANCE WARNING ARROW PANEL
- * - Type III Barricades shall be setup so stripes are sloped downward to the side approaching traffic should pass.

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)	Taper Length (Feet) (L)
0 - 30	200	180
35 - 40	200	320
45 - 50	350	600
55	500	660
60 - 65	500	780

WORK ZONE

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)	Spacing of Channelizing Devices (Feet) (G)
0 - 30	200	25
35 - 40	350	25
45 - 50	500	50
55	750	50
60 - 65	1000	50

Flagger

Channelizing Device

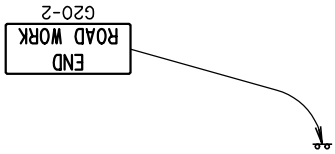
For low-volume traffic situations with short work zones on straight roadways where the flagger is visible to road users approaching from both directions, a single flagger may be used.

The ROAD WORK AHEAD and the END ROAD WORK signs may be omitted for short duration operations (1 hour or less).

For tack and/or flush seal operations, when flaggers are not being used, the FRESH OIL sign (W21-2) shall be displayed in advance of the liquid asphalt areas.

Flashing warning lights and/or flags may be used to call attention to the advance warning signs.

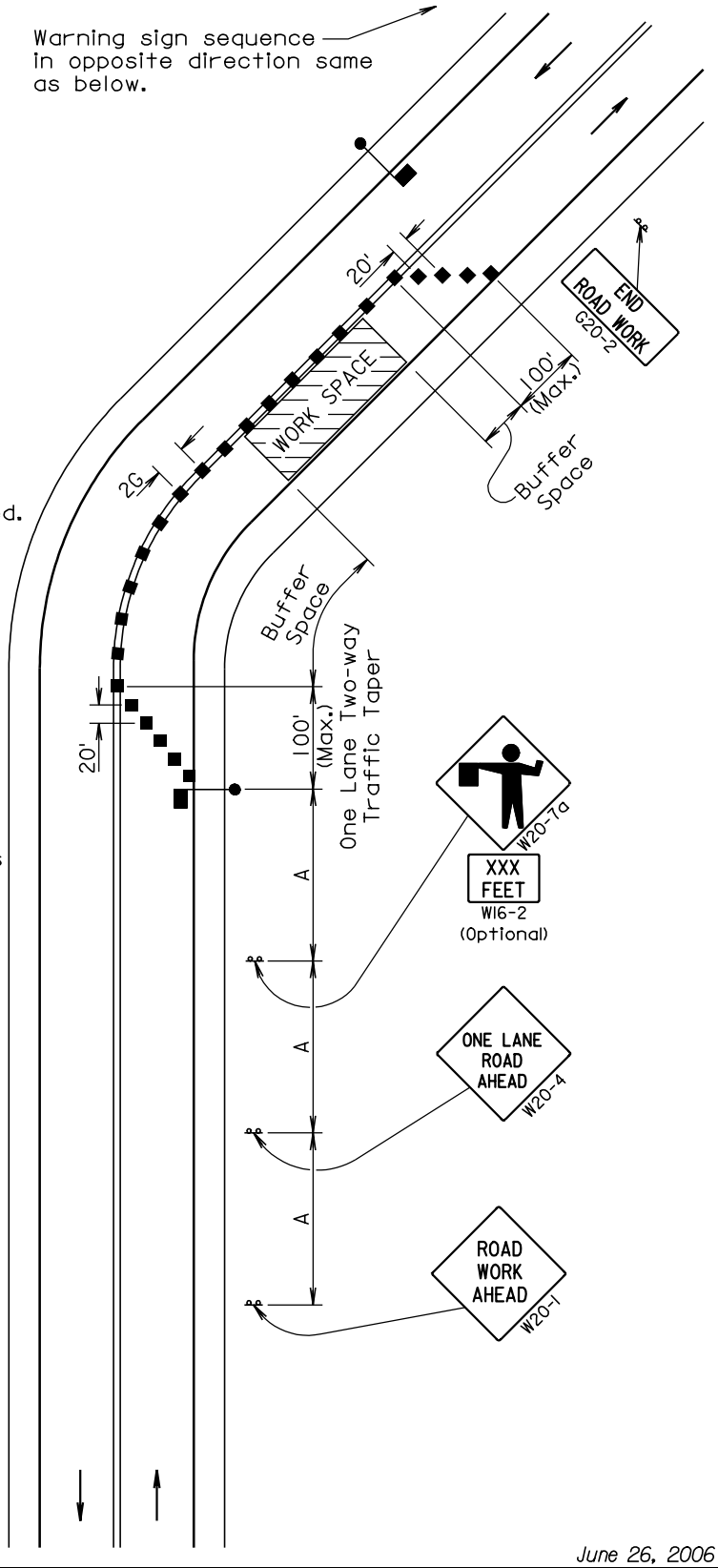
The channelizing devices shall be drums or type II barricades if traffic control must remain overnight or longer. During daylight hours, 42" cones may be used in lieu of drums or type II barricades along the centerline.



Channelizing devices are not required along the centerline adjacent to work area when pilot cars are utilized for escorting traffic through the work area.

Channelizing devices and flaggers shall be used at intersecting roads to control intersecting road traffic as required.

The buffer space shall be a sufficient length so that the channelizing devices are visible to approaching traffic.



June 26, 2006

Published Date: 4th Qtr. 2007

SDDOT

GUIDES FOR TRAFFIC CONTROL DEVICES
LANE CLOSURE WITH FLAGGER PROVIDED

PLATE NUMBER
634.23

Sheet 1 of 1

Plotting Date: 27-DEC-2007

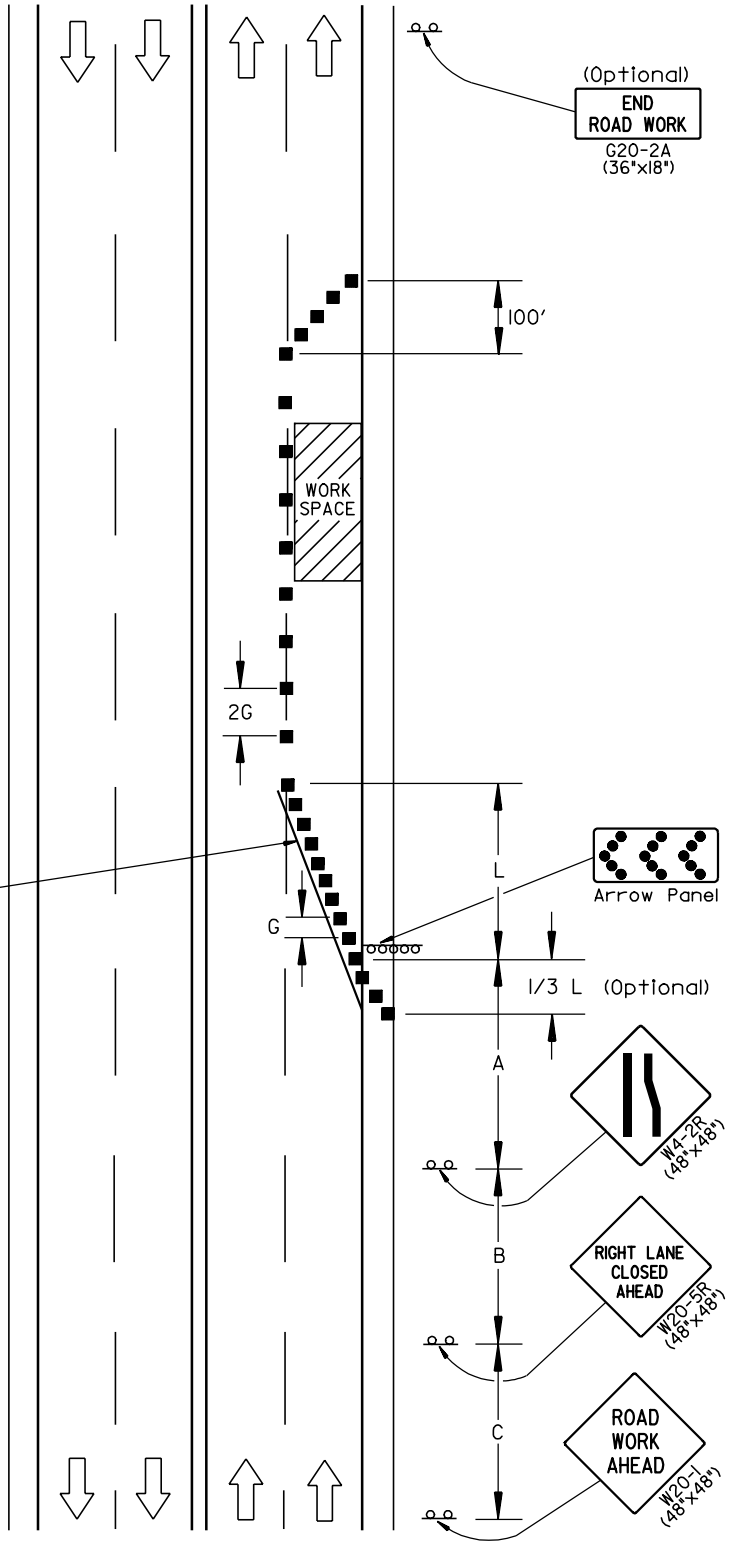
Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)(B)(C)	Taper Length (Feet) (L)	Spacing of Channelizing Devices (Feet) (G)
0 - 30	200	180	25
35 - 40	350	320	25
45 - 50	500	600	50
55	750	660	50
60 - 65	1000	780	50

■ Channelizing Device

The Channelizing Devices shall be drums or type II barricades if traffic control must remain overnight or longer, however, 42" cones may be used in lieu of drums or type II barricades only along the centerline.

Longitudinal dimensions may be adjusted to fit project conditions such as horizontal curves, vertical curves, and other site restrictions.

Four inch white temporary pavement marking shall be used if traffic control must remain overnight or longer.



December 23, 2003

Published Date: 4th Qtr. 2007

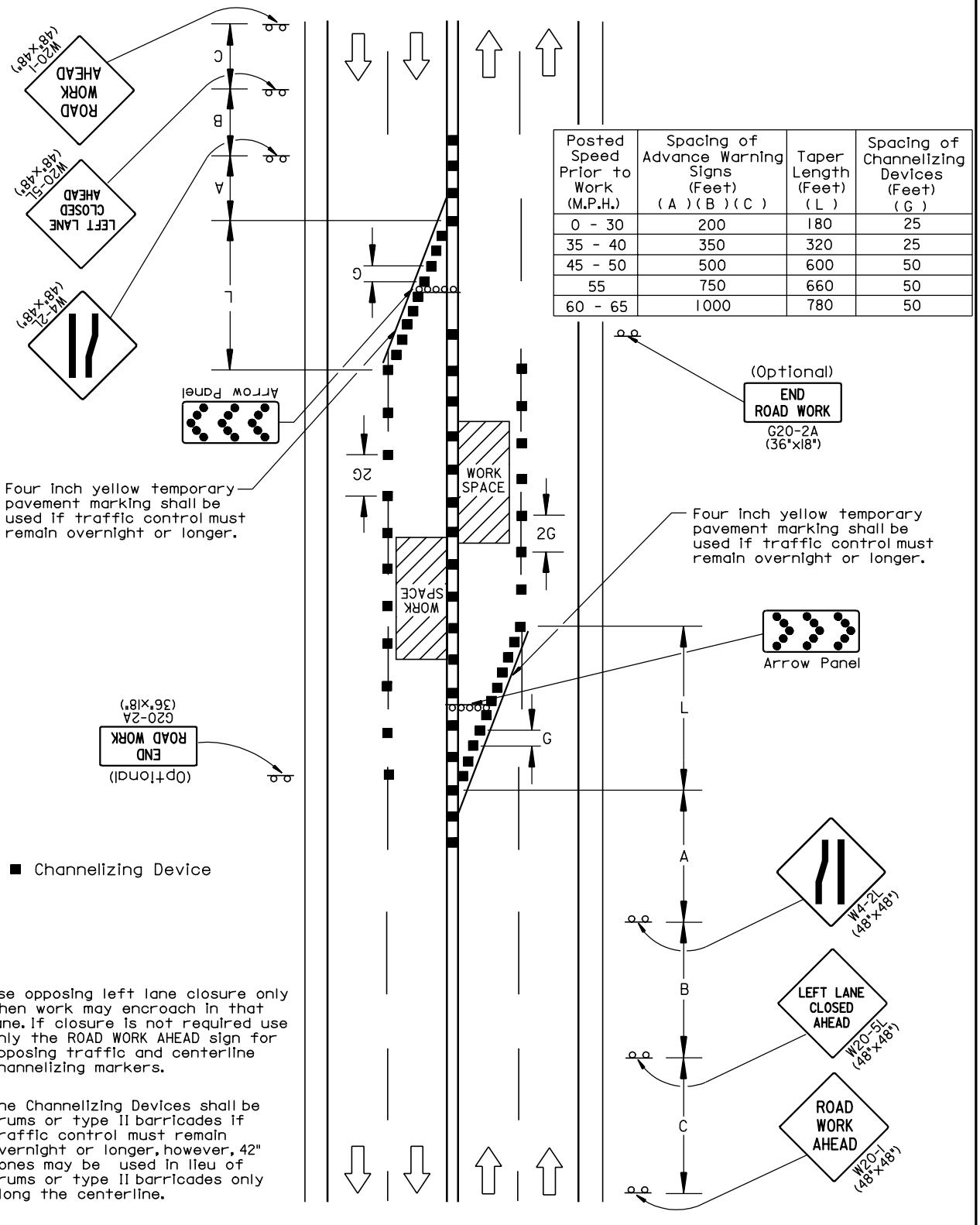
SDDOT

GUIDES FOR TRAFFIC CONTROL DEVICES
4-LANE UNDIVIDED, RIGHT LANE CLOSED

PLATE NUMBER
634.47

Sheet 1 of 1

Plotting Date: 27-DEC-2007



Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A) (B) (C)	Taper Length (Feet) (L)	Spacing of Channelizing Devices (Feet) (G)
0 - 30	200	180	25
35 - 40	350	320	25
45 - 50	500	600	50
55	750	660	50
60 - 65	1000	780	50

Use opposing left lane closure only when work may encroach in that lane. If closure is not required use only the ROAD WORK AHEAD sign for opposing traffic and centerline channelizing markers.

The Channelizing Devices shall be drums or type II barricades if traffic control must remain overnight or longer, however, 42" cones may be used in lieu of drums or type II barricades only along the centerline.

December 23, 2003

Published Date: 4th Qtr. 2007

SDDOT

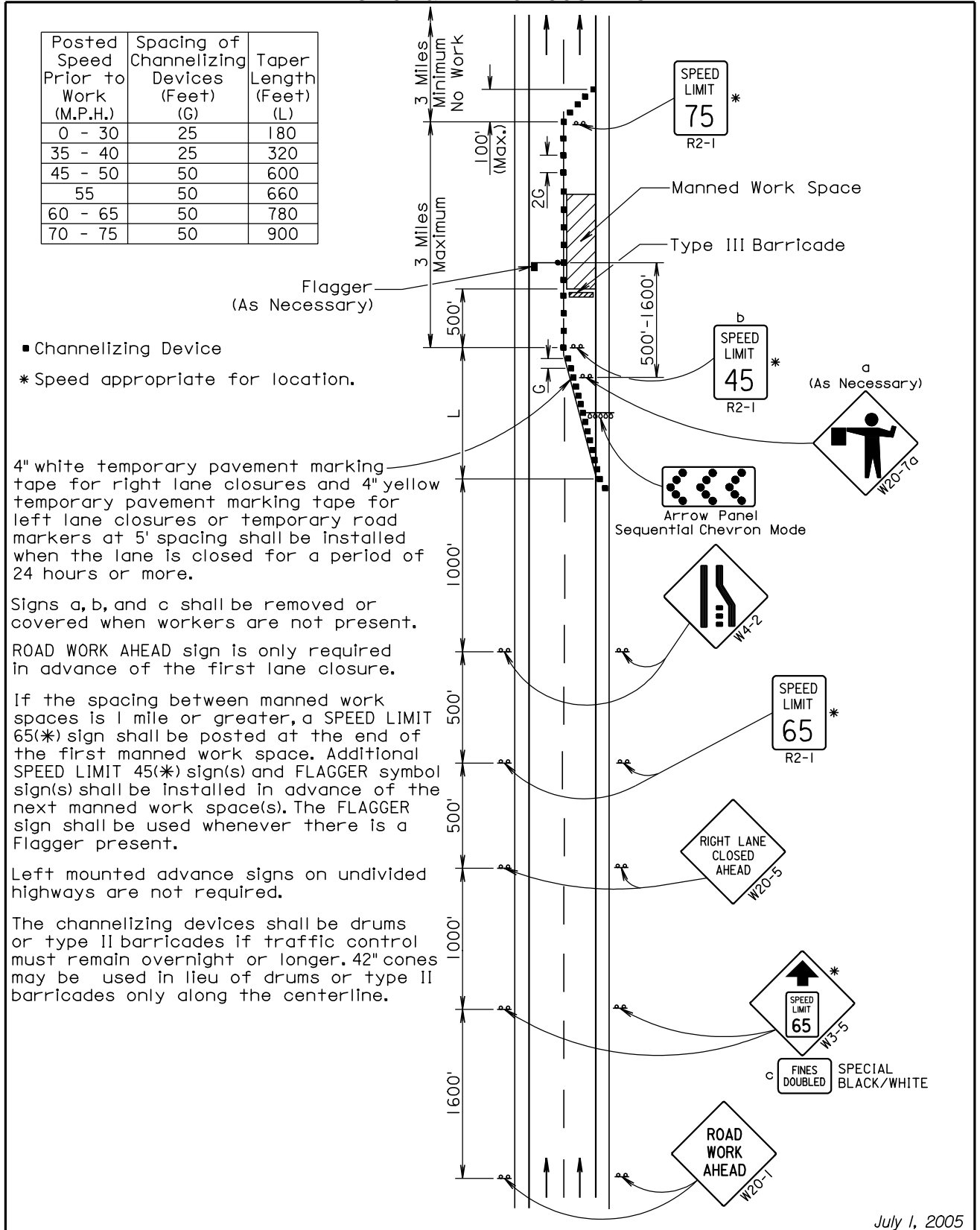
GUIDES FOR TRAFFIC CONTROL DEVICES
4-LANE UNDIVIDED, LEFT LANE CLOSED

PLATE NUMBER 634.48

Sheet 1 of 1

Plotting Date: 27-DEC-2007

Posted Speed Prior to Work (M.P.H.)	Spacing of Channelizing Devices (Feet) (G)	Taper Length (Feet) (L)
0 - 30	25	180
35 - 40	25	320
45 - 50	50	600
55	50	660
60 - 65	50	780
70 - 75	50	900



- Channelizing Device

* Speed appropriate for location.

4" white temporary pavement marking tape for right lane closures and 4" yellow temporary pavement marking tape for left lane closures or temporary road markers at 5' spacing shall be installed when the lane is closed for a period of 24 hours or more.

Signs a, b, and c shall be removed or covered when workers are not present.

ROAD WORK AHEAD sign is only required in advance of the first lane closure.

If the spacing between manned work spaces is 1 mile or greater, a SPEED LIMIT 65(*) sign shall be posted at the end of the first manned work space. Additional SPEED LIMIT 45(*) sign(s) and FLAGGER symbol sign(s) shall be installed in advance of the next manned work space(s). The FLAGGER sign shall be used whenever there is a Flagger present.

Left mounted advance signs on undivided highways are not required.

The channelizing devices shall be drums or type II barricades if traffic control must remain overnight or longer. 42" cones may be used in lieu of drums or type II barricades only along the centerline.

July 1, 2005

Published Date: 4th Qtr. 2007

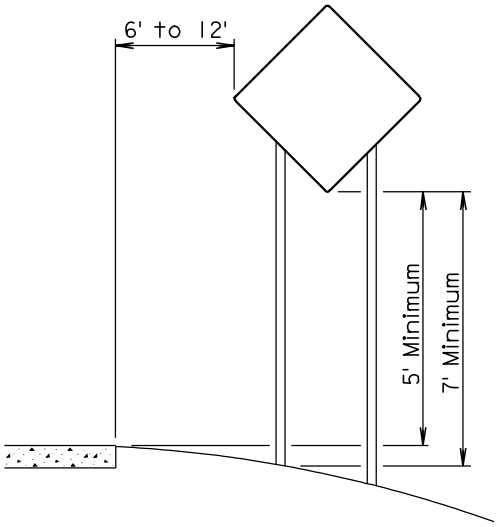
SDDOT

MANNED WORK SPACE SIGNING FOR DIVIDED AND UNDIVIDED HIGHWAYS

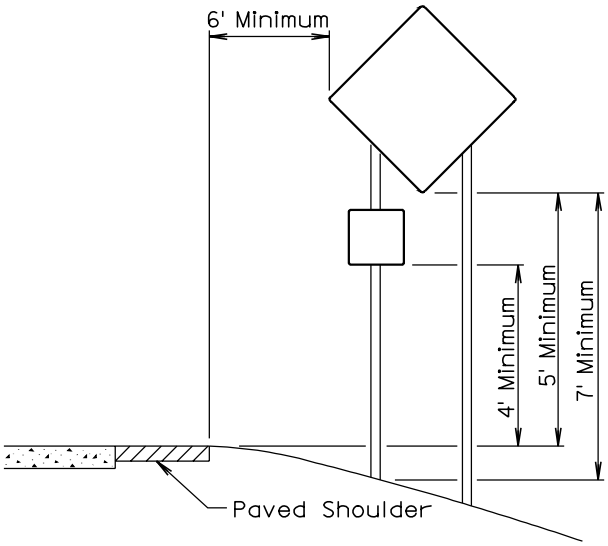
PLATE NUMBER 634.63

Sheet 1 of 1

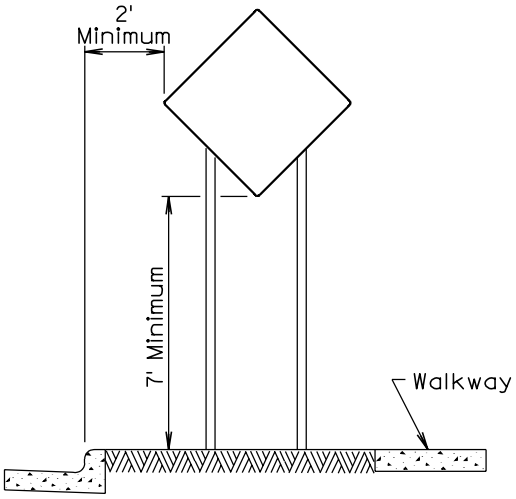
Plotting Date: 27-DEC-2007



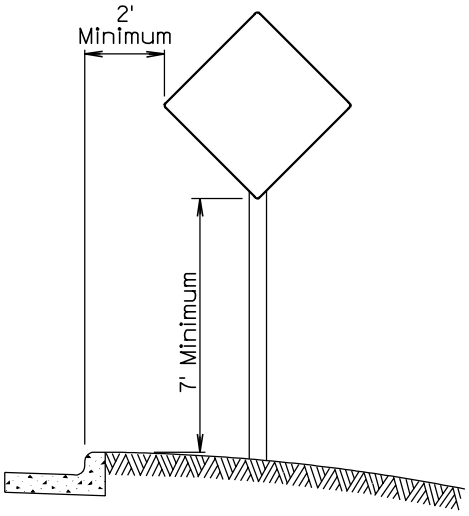
RURAL DISTRICT



RURAL DISTRICT WITH
SUPPLEMENTAL PLATE



URBAN DISTRICT



URBAN DISTRICT

December 23, 2003

Published Date: 4th Qtr. 2007

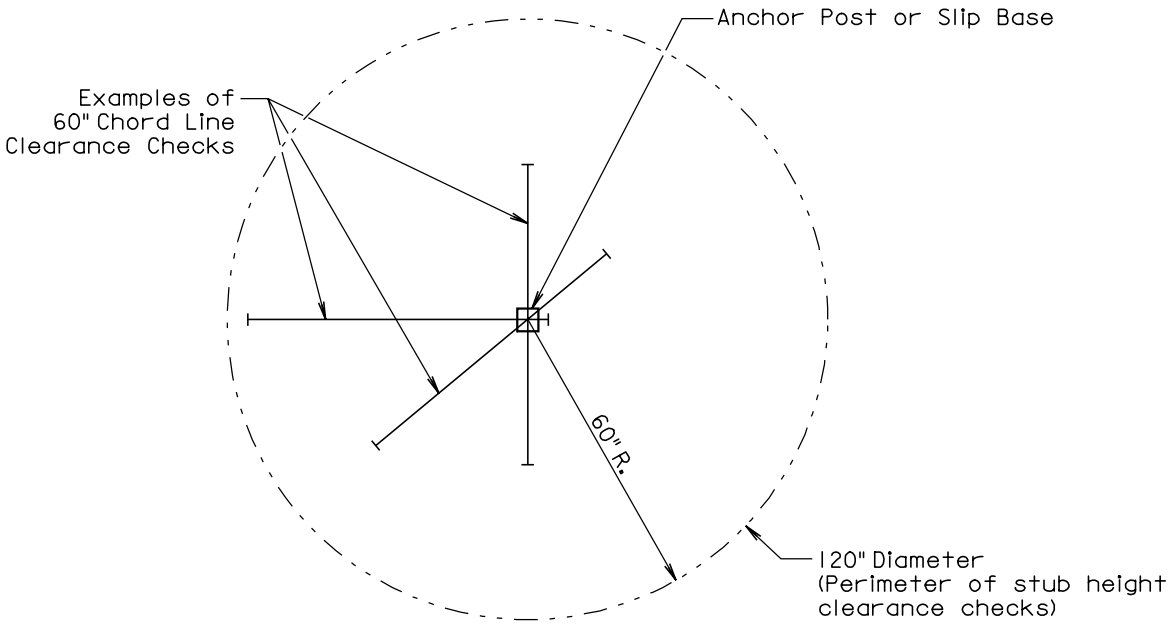
SDDOT

BREAKAWAY SIGN SUPPORTS
(Typical Construction Signing)

PLATE NUMBER
634.85

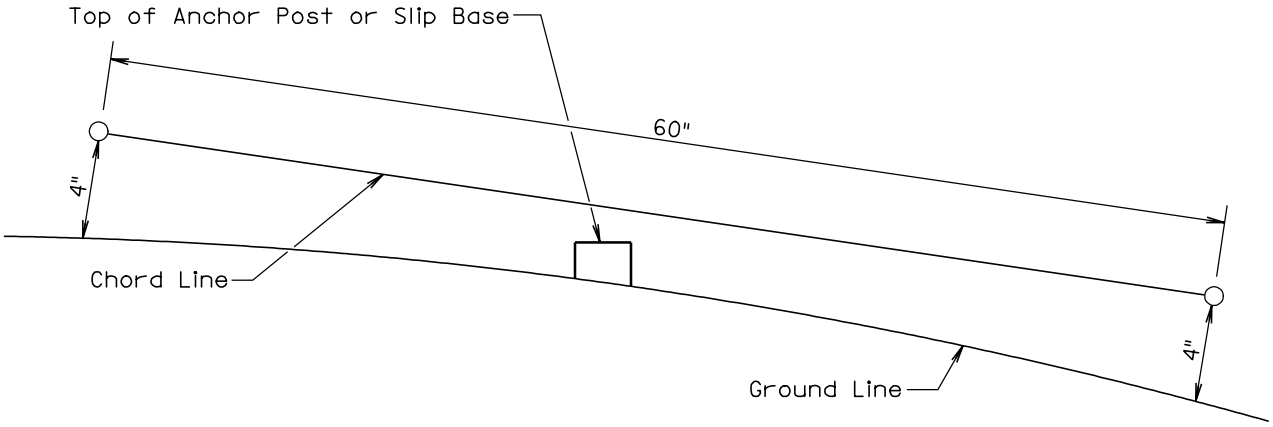
Sheet 1 of 1

Plotting Date: 27-DEC-2007



PLAN VIEW

(Examples of stub height clearance checks)



ELEVATION VIEW

GENERAL NOTES:

The top of anchor posts and slip bases SHALL NOT extend above a 60" chord line within a 120" diameter circle around the post with ends 4" above the ground.

At locations where there is curb and gutter adjacent to the breakaway sign support, the stub height shall be a maximum of 4" above the ground line at the localized area adjacent to the breakaway support stub.

The 4" stub height clearance is not necessary for U-channel lap splices where the support is designed to yield (bend) at the base.

July 1, 2005

Published Date: 4th Qtr. 2007	SDDOT	**BREAKAWAY SUPPORT STUB CLEARANCE**	*PLATE NUMBER* 634.99 *Sheet 1 of 1*

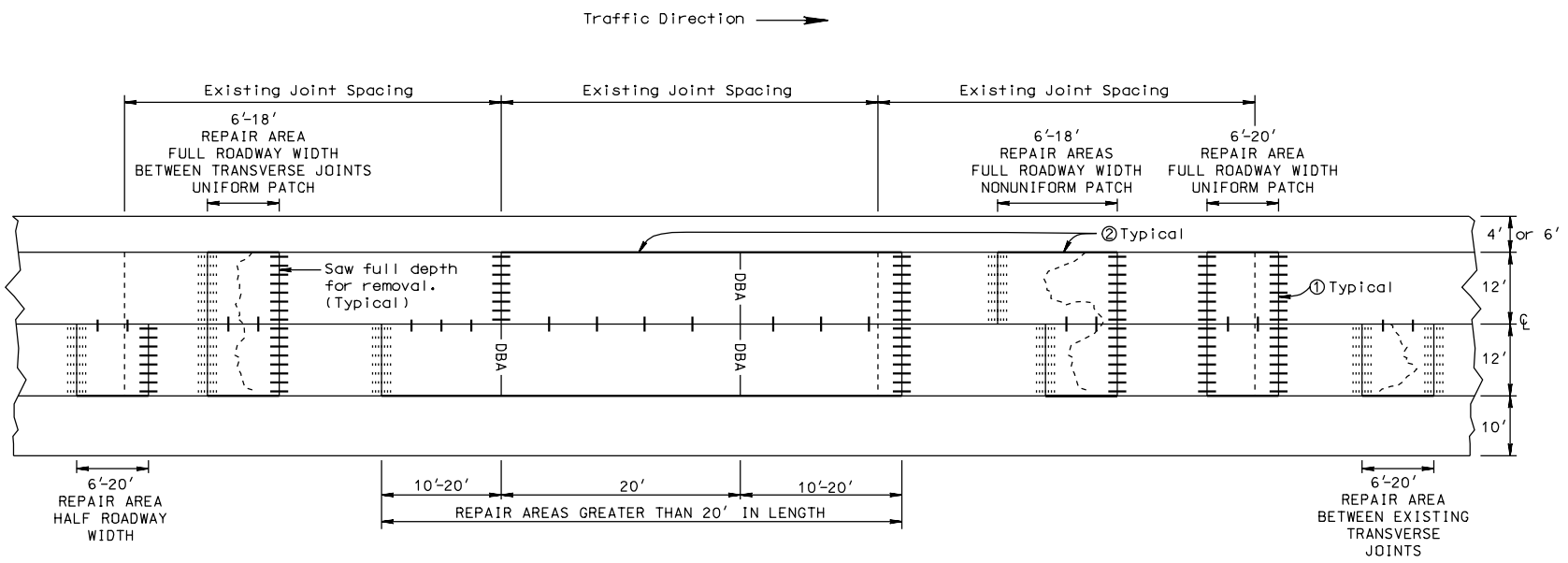
Plotting Date: 27-DEC-2007

ITEMIZED LIST FOR TRAFFIC CONTROL

SIGN CODE	SIGN SIZE	DESCRIPTION	NUMBER REQUIRED	UNITS PER SIGN	UNITS
E5-1	36" x 32"	EXIT GORE SIGN		24	
G20-2a	36" x 18"	END ROAD WORK	5	17	85
R1-1	48" x 48"	STOP		34	
R1-2	48" x 48"	YIELD		34	
R2-1	30" x 36"	SPEED LIMIT	5	23	115
R2-5a	30" x 36"	REDUCED SPEED AHEAD		23	
R4-7	24" x 30"	KEEP RIGHT (SYMBOL)	3	18	54
R4-8	24" x 30"	KEEP LEFT (SYMBOL)	1	18	18
R5-1	48" x 48"	DO NOT ENTER		34	
R5-1a	48" x 36"	WRONG WAY		29	
R10-6	24" x 36"	STOP HERE ON RED		20	
R11-2	48" x 30"	ROAD CLOSED		27	
R11-3a	60" x 30"	ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		30	
R11-4	60" x 30"	ROAD CLOSED TO THRU TRAFFIC		30	
SW12-1b	120" x 60"	HIGHWAY WORKERS GIVE'EM A BRAKE		80	
W1-1	48" x 48"	LEFT OR RIGHT TURN ARROW		34	
W1-2	48" x 48"	LEFT OR RIGHT CURVE ARROW		34	
W1-3	48" x 48"	REVERSE TURN SIGN (LEFT OR RIGHT)		34	
W1-4a	48" x 48"	REVERSE CURVE SIGN (LEFT OR RIGHT)		34	
W1-6	48" x 24"	LARGE ARROW	2	24	48
W3-1a	48" x 48"	STOP AHEAD (SYMBOL)		34	
W3-2a	48" x 48"	YIELD AHEAD (SYMBOL)		34	
W3-3	48" x 48"	SIGNAL AHEAD (SYMBOL)		34	
W3-5	48" x 48"	SPEED LIMIT __ AHEAD (SYMBOL)	2	34	68
W4-1	48" x 48"	MERGE (SYMBOL)		34	
W4-2	48" x 48"	LEFT OR RIGHT LANE ENDS (SYMBOL)	6	34	204
W5-2	48" x 48"	NARROW BRIDGE		34	
W5-3	48" x 48"	ONE LANE BRIDGE		34	
W7-3a	30" x 24"	NEXT __ MILES		18	
W8-1	36" x 36"	BUMP		27	
W8-6	48" x 48"	TRUCK CROSSING		34	
W8-7	36" x 36"	LOOSE GRAVEL		27	
W8-9a	48" x 48"	SHOULDER DROP-OFF		34	
W8-11	48" x 48"	UNEVEN LANES		34	
W13-1	24" x 24"	ADVISORY SPEED PLATE		16	
W20-1	48" x 48"	ROAD WORK AHEAD	7	34	238
W20-2	48" x 48"	DETOUR AHEAD		34	
W20-3	48" x 48"	ROAD CLOSED AHEAD		34	
W20-4	48" x 48"	ONE LANE ROAD AHEAD		34	
W20-5	48" x 48"	LT. OR RT. LANE CLOSED AHEAD	6	34	204
W20-7a	48" x 48"	FLAGGER	1	34	34
W20-7b	48" x 48"	BE PREPARED TO STOP		34	
W21-1a	48" x 48"	WORKERS (SYMBOL)		34	
W21-2	36" x 36"	FRESH OIL		27	
W21-3	48" x 48"	ROAD MACHINERY AHEAD		34	
W21-5	48" x 48"	SHOULDER WORK		34	
W21-5a	48" x 48"	RIGHT SHOULDER CLOSED		34	
W21-5b	48" x 48"	RIGHT SHOULDER CLOSED AHEAD		34	
SPECIAL	30" x 24"	FINES DOUBLED	2	18	36
W4-7	48" x 48"	THRU TRAFFIC MERGE RIGHT	1	34	34
R3-7	30" x 30"	LEFT LANE MUST TURN LEFT	2	21	42
*****	*****	TYPE III BARRICADE - 8 FT. SINGLE SIDED	10	40	400
*****	*****	TYPE III BARRICADE - 8 FT. DOUBLE SIDED		56	
				TOTAL UNITS	**1,580**

NONREINFORCED PCC PAVEMENT REPAIR

FOUR LANE DIVIDED - TYPICAL REPAIR AREAS



NOTES:

① Where possible, transverse joints shall be constructed full roadway width.

② All edges of repair areas that are adjacent to asphalt concrete shall be formed to match the width of the existing concrete pavement.

KEY:

Steel Bars for Longitudinal Joints

| No. 5 x 30" epoxy coated deformed tie bars.
Sawed Joint - spaced 48" center to center.
Construction Joint - spaced 48" center to center.

| No. 5 x 24" epoxy coated deformed tie bars.
Drilled In - spaced 30" center to center.

Steel Bars for Transverse Joints

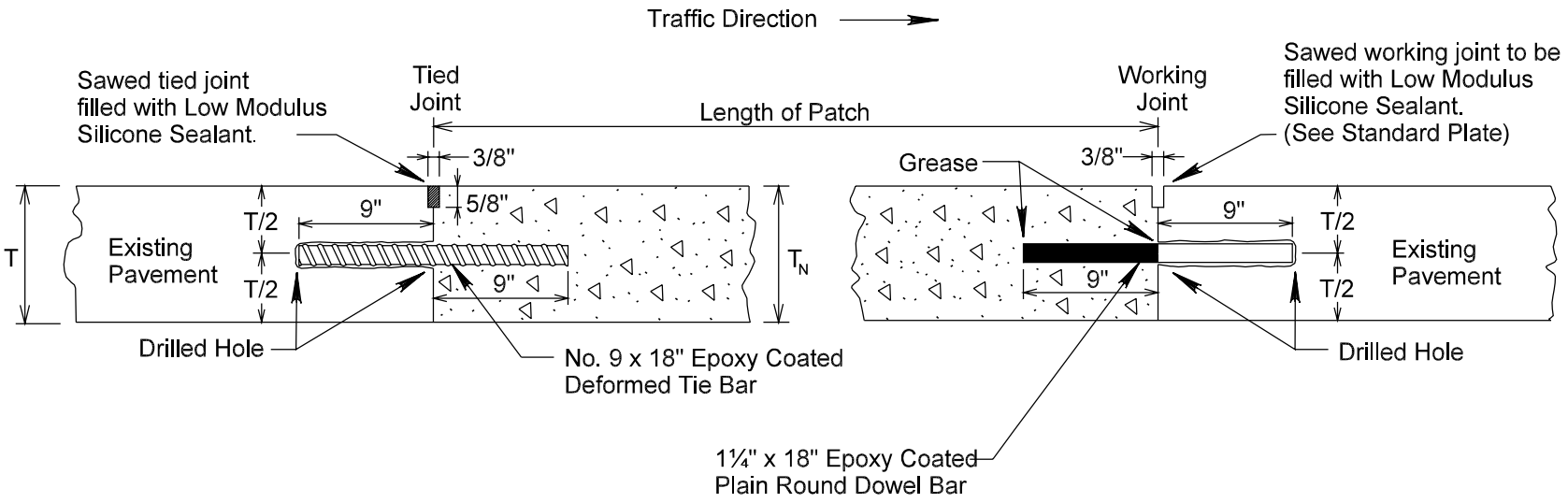
— Drilled in 1¼" x 18" epoxy coated plain round dowel bars spaced 18" center to center.

..... Drilled in No. 9 x 18" epoxy coated deformed tie bars spaced 18" center to center.

DBA Dowel Bar Assembly (for repair areas greater than 20' in length)

NONREINFORCED PCC PAVEMENT REPAIR

STEEL BAR INSERTION
(ONE TIED JOINT AND ONE WORKING JOINT)



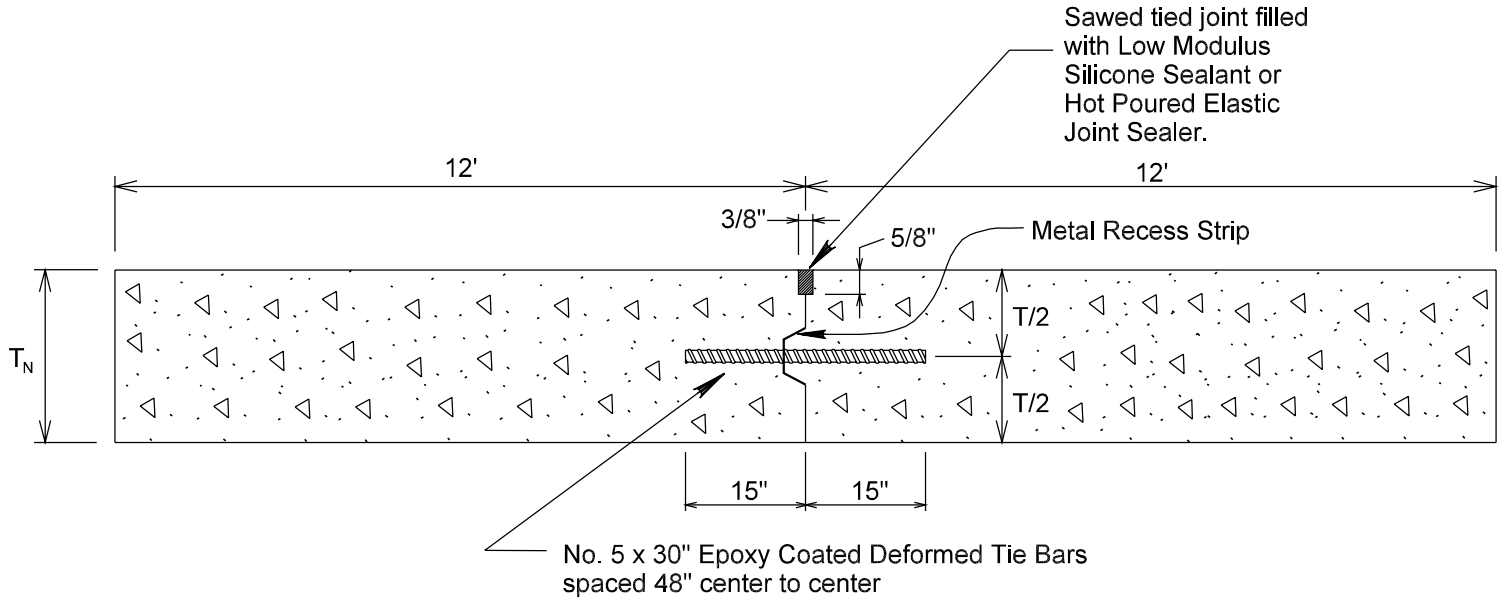
T = Existing pavement thickness (8.5").
T_N= New pavement thickness (8.5").

Bar embedded to a minimum depth of 9 inches into the existing pavement by utilizing an epoxy resin adhesive.

Cost for furnishing and inserting steel bars (deformed tie and plain round dowel) shall be included in the contract unit price per each for Insert Steel Bar in Concrete Pavement.

NONREINFORCED PCC PAVEMENT REPAIR

LONGITUDINAL CONSTRUCTION JOINT WITH TIE BARS & KEYWAY



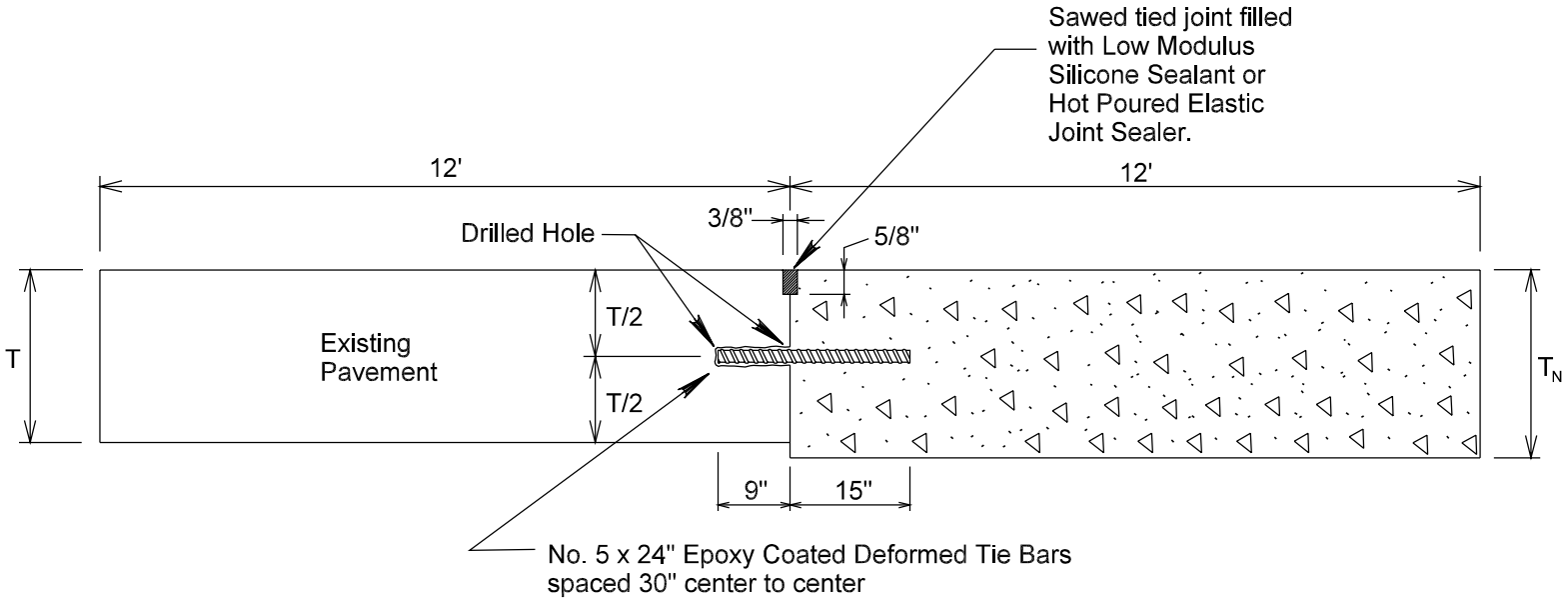
T_N= New pavement thickness.

Deformed tie bars will only be inserted on centerline when there is full width pavement removal.

Cost for furnishing and inserting centerline tie bars shall be incidental to the contract unit price per square yard for Nonreinforced PCC Pavement Repair.

NONREINFORCED PCC PAVEMENT REPAIR

LONGITUDINAL CONSTRUCTION JOINT WITH DRILLED IN TIE BARS



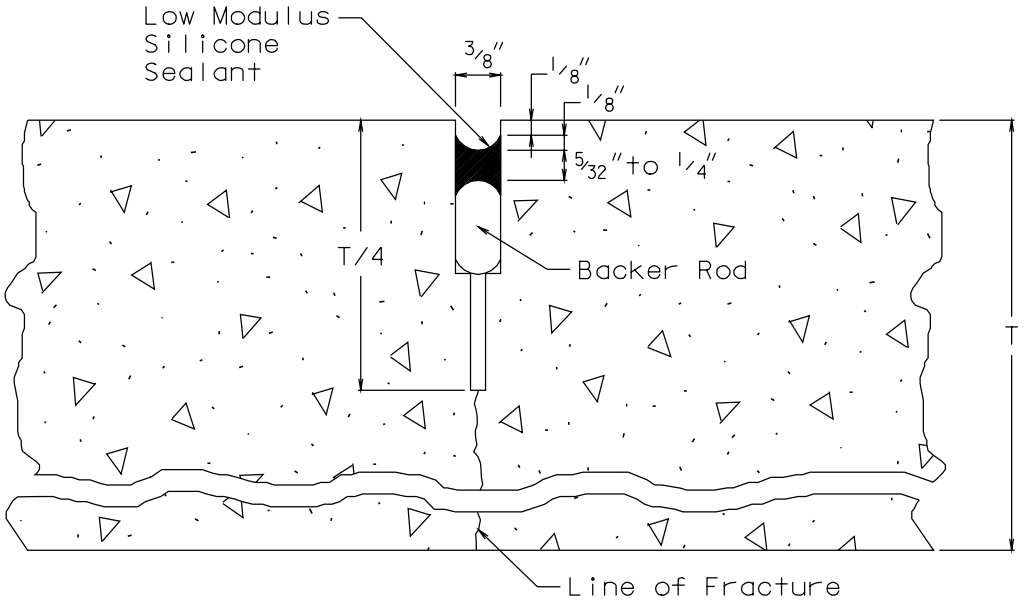
T = Existing pavement thickness.
T_N= New pavement thickness.

Bar embedded a minimum depth of 9 inches into the existing pavement by utilizing an epoxy resin adhesive.

Bars shall be placed a minimum of 15 inches from existing transverse contraction joints.

Cost for furnishing and inserting drilled in centerline tie bars shall be included in the contract unit price per each for Insert Steel Bar in Concrete Pavement.

DETAILS FOR PCCP TRANSVERSE CONTRACTION JOINT



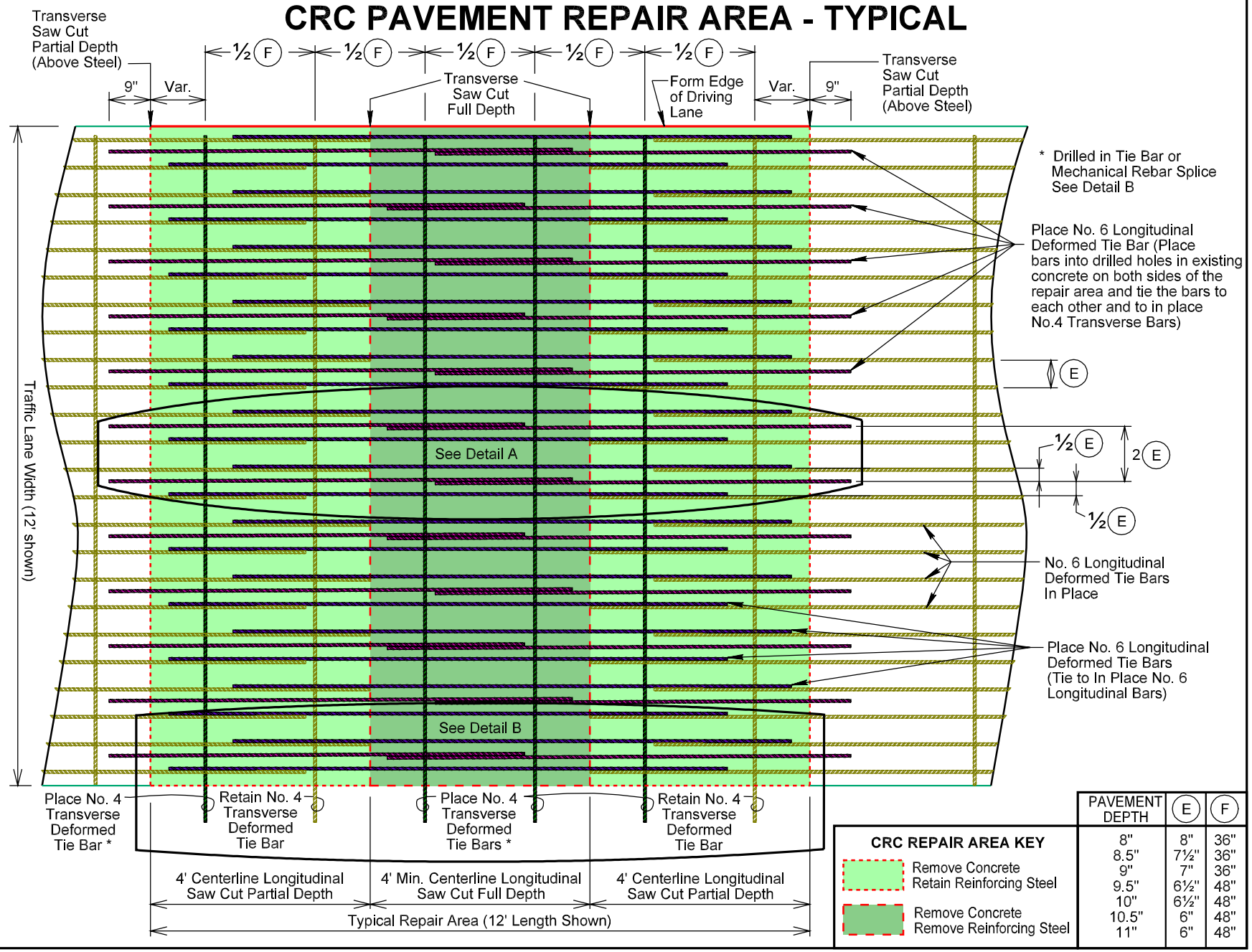
T = Pavement Thickness

GENERAL NOTES:

The first saw cut to control cracking shall be a minimum of 1/4 the depth of the pavement. Additional sawing for widening the saw cut to provide the width for the installation of the Low Modulus Silicone Joint Sealant will be necessary.

Backer Rod shall be of nonmoisture absorbing resilient material approximately 25% larger in diameter than the width of the joint to be sealed.

CRC PAVEMENT REPAIR AREA - TYPICAL



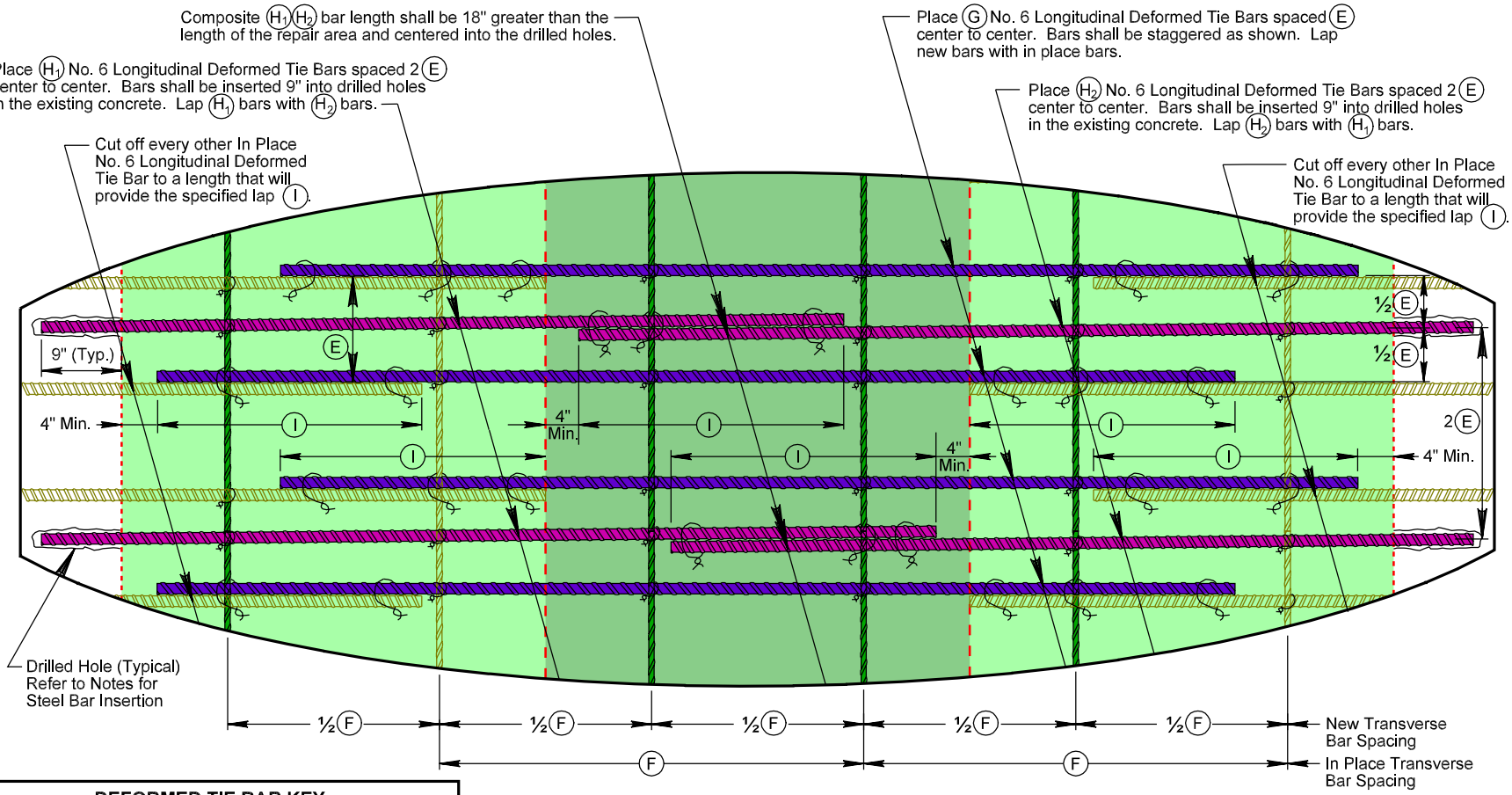
CRC REPAIR AREA KEY

- Remove Concrete Retain Reinforcing Steel
- Remove Concrete Remove Reinforcing Steel

PAVEMENT DEPTH	E	F
8"	8"	36"
8.5"	7½"	36"
9"	7"	36"
9.5"	6½"	48"
10"	6½"	48"
10.5"	6"	48"
11"	6"	48"

CRC PAVEMENT REPAIR AREA

Detail A (Scaled vertically for clarity)



DEFORMED TIE BAR KEY

- No. 4 Transverse Deformed Tie Bar In Place (Retain)
- Place No. 4 Transverse Deformed Tie Bar (Tie to In Place No. 6 Longitudinal Bars)
- No. 6 Longitudinal Deformed Tie Bar In Place (Retain)
- Place No. 6 Longitudinal Deformed Tie Bar (Tie to In Place No. 6 Longitudinal Bars)
- Place No. 6 Longitudinal Deformed Tie Bar (Place bars into drilled holes in existing concrete on both sides of the repair area and tie the bars to each other and to in place No.4 Transverse Bars)

CRC REPAIR AREA KEY

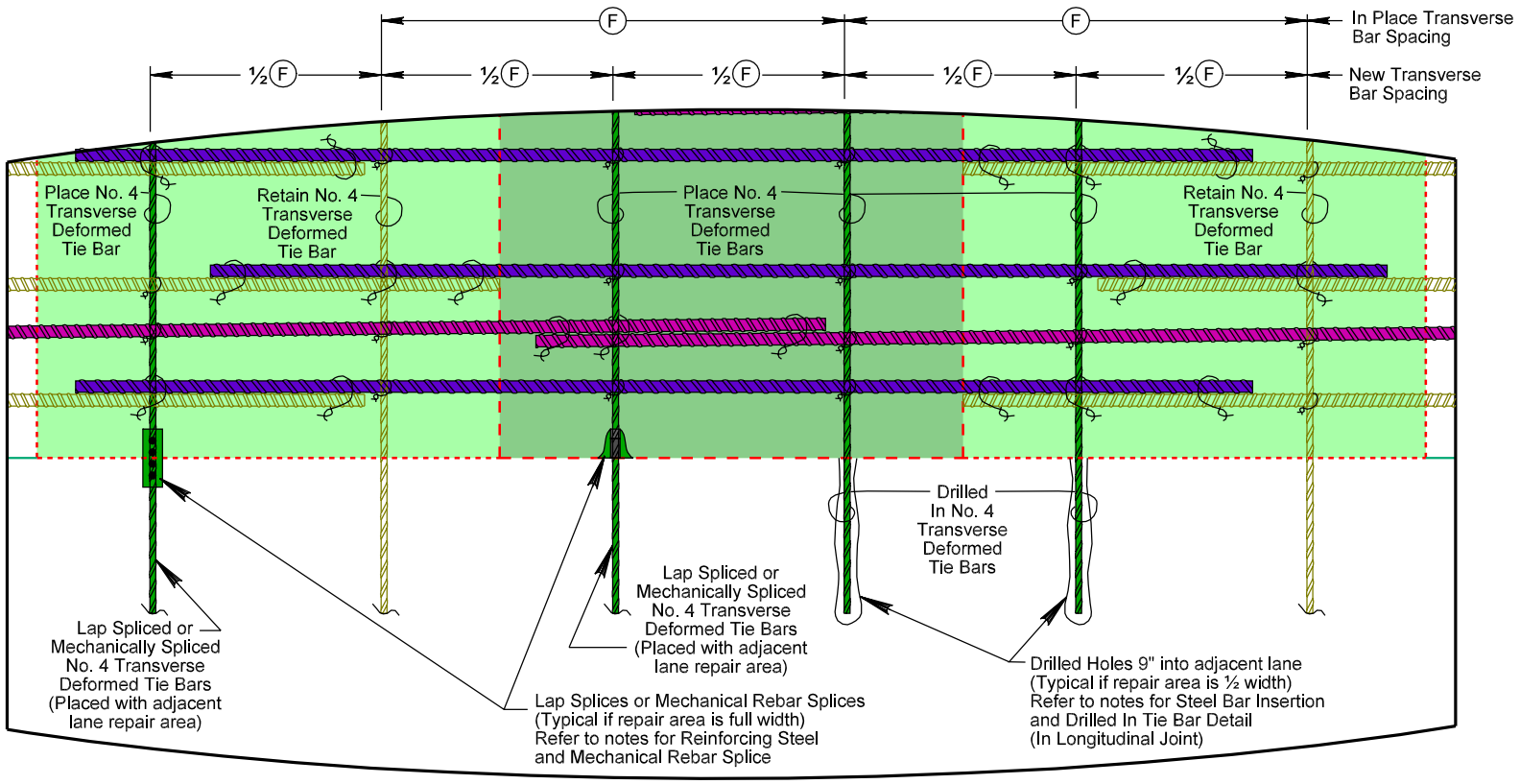
- Remove Concrete Retain Reinforcing Steel
- Remove Concrete Remove Reinforcing Steel

Note: All lapped bars shall have two ties per lap.

PAVEMENT DEPTH	(E)	(F)	(G)	(H_1)	(H_2)	(I)
8"	8"	36"	18	9	9	25"
8.5"	7½"	36"	19	10	10	25"
9"	7"	36"	20	10	10	25"
9.5"	6½"	48"	22	11	11	25"
10"	6½"	48"	22	11	11	25"
10.5"	6"	48"	24	12	12	25"
11"	6"	48"	24	12	12	30"

CRC PAVEMENT REPAIR AREA

Detail B (Scaled vertically for clarity)

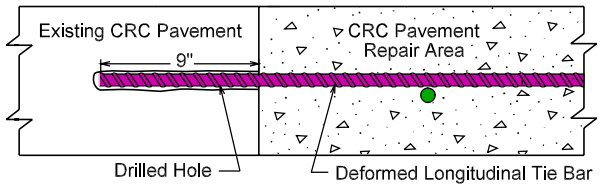


DEFORMED TIE BAR KEY

- No. 4 Transverse Deformed Tie Bar In Place (Retain)
- Place No. 4 Transverse Deformed Tie Bar (Tie to In Place No. 6 Longitudinal Bars)
- No. 6 Longitudinal Deformed Tie Bar In Place (Retain)
- Place No. 6 Longitudinal Deformed Tie Bar (Tie to In Place No. 6 Longitudinal Bars)
- Place No. 6 Longitudinal Deformed Tie Bar (Place bars into drilled holes in existing concrete on both sides of the repair area and tie the bars to each other and to in place No.4 Transverse Bars)

DRILLED IN TIE BAR DETAIL

(In Transverse Joint)



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Note: All lapped bars shall have two ties per lap.

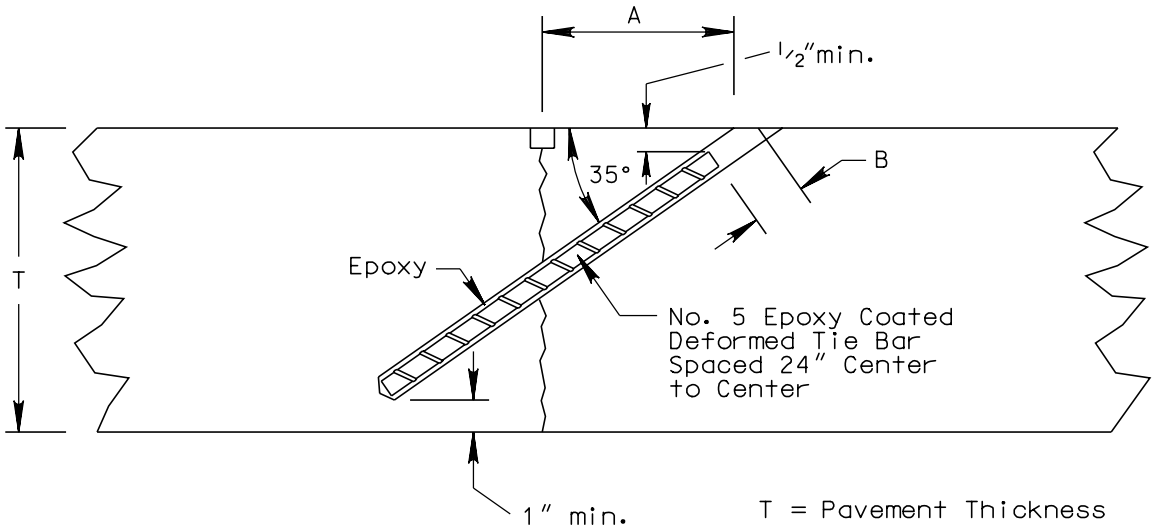
CRC REPAIR AREA KEY

- Remove Concrete Retain Reinforcing Steel
- Remove Concrete Remove Reinforcing Steel

PAVEMENT DEPTH	E	F
8"	8"	36"
8.5"	7½"	36"
9"	7"	36"
9.5"	6½"	48"
10"	6½"	48"
10.5"	6"	48"
11"	6"	48"

TIE BAR RETROFIT, STITCHING

STITCHING DETAIL



T	A	B	Length of Tie Bar
8"	5"	1 1/2" +/-	10"
8 1/2"	5 1/4"	1 3/8" +/-	11"
9"	5 5/8"	1 1/4" +/-	12"
9 1/2"	6"	1 5/8" +/-	12 1/2"
10"	6 3/8"	1 1/2" +/-	13 1/2"
10 1/2"	6 3/4"	1 3/8" +/-	14 1/2"
11"	7"	1 1/4" +/-	15 1/2"

GENERAL NOTES:

The tie bars shall alternate from opposite sides of the joint to produce a cross-stitching pattern