STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
N.D.	CH1505	1	26

CASS COUNTY HIGHWAY DEPARTMENT

PLANS

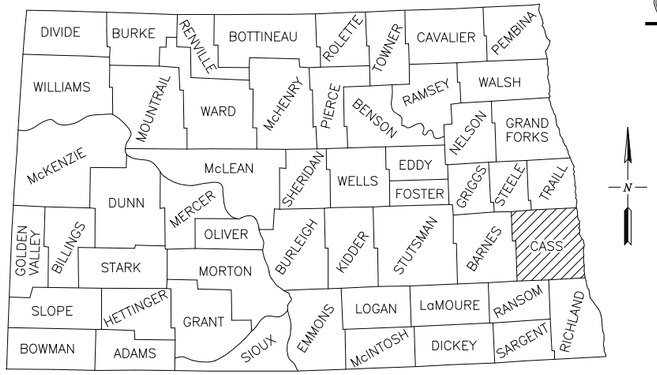
FOR THE PROPOSED IMPROVEMENT OF A

COUNTY HIGHWAY

PROJECT NO. CH1505

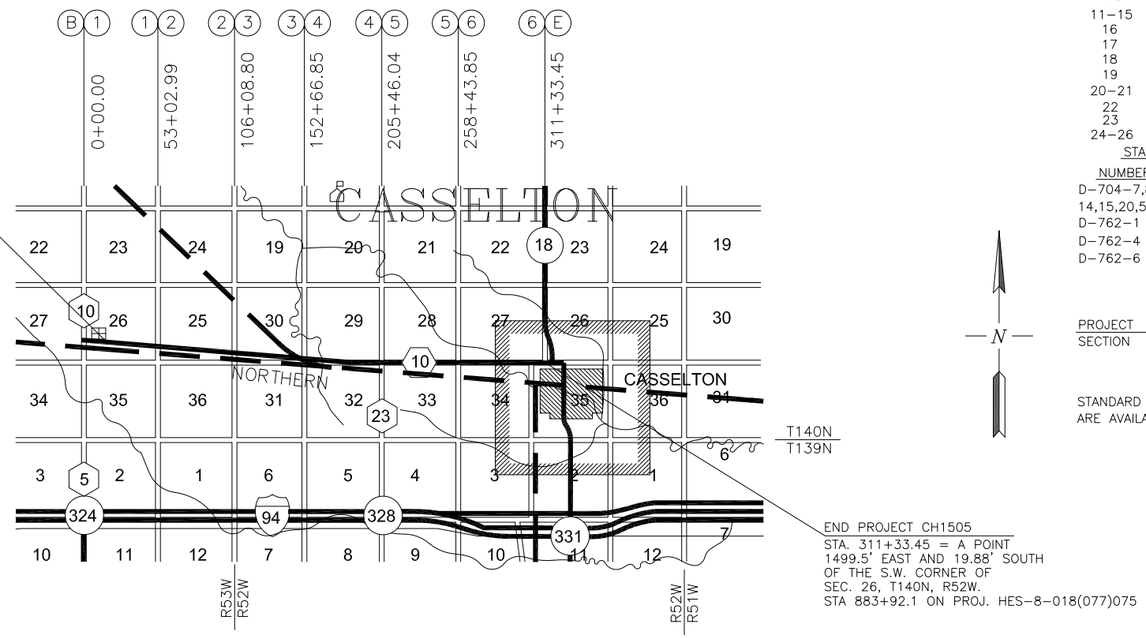
PCC BREAKING & SEATING, BITUMINOUS OVERLAY, STRUCTURE REPLACEMENT & INCIDENTALS

CASS CO. HWY 10; FROM CASS CO. HWY 5 TO STATE HWY 18



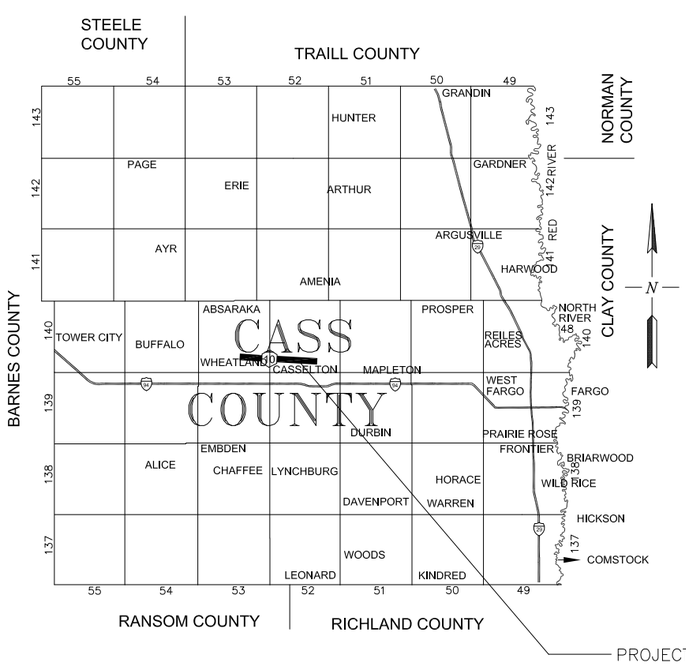
SKETCH MAP OF NORTH DAKOTA SHOWING COUNTIES

DESIGN SPEED	55 MPH
MINIMUM SIGHT DISTANCE (STOPPING)	495 FEET
SUPERELEVATION	.05 FT/FT
HIGHWAY CROSS SLOPE	2.1%



BEGIN PROJECT CH1505
STA. 0+00.00 = A POINT 1158.7' NORTH AND 860' EAST OF THE S.W. CORNER OF SEC. 26, T140N, R53W.

END PROJECT CH1505
STA. 311+33.45 = A POINT 1499.5' EAST AND 19.88' SOUTH OF THE S.W. CORNER OF SEC. 26, T140N, R52W.
STA 883+92.1 ON PROJ. HES-8-018(077)075



GOVERNING SPECIFICATIONS:
2014 STANDARD SPECIFICATIONS ADOPTED BY THE NORTH DAKOTA DEPARTMENT OF TRANSPORTATION AND THE SUPPLEMENTAL SPECIFICATIONS EFFECTIVE ON THE DATE THE PROJECT IS ADVERTISED.

INDEX OF DRAWINGS

SHEET NO.	TITLE
1	COVER SHEET
2	SCOPE OF WORK
3–6	CONSTRUCTION NOTES
7–9	BASIS OF ESTIMATE
10	ESTIMATED QUANTITIES
11–15	TYPICAL SECTIONS
16	BYPASS DETAILS
17	TRANSITION DETAILS
18	APPROACH DETAILS
19	RUMBLE STRIP DETAILS
20–21	CONSTRUCTION SIGN LAYOUT
22	CONSTRUCTION SIGN LIST
23	BOX CULVERT PLAN AND PROFILE
24–26	BOX CULVERT DETAILS

STANDARD DRAWINGS

NUMBER	TITLE
D-704-7,8,9,11	CONSTRUCTION SIGNING
14,15,20,56	& BARRICADE DETAILS
D-762-1	PAVEMENT MARKING MESSAGE DETAILS
D-762-4	PAVEMENT MARKING
D-762-6	SHORT TERM PVMT. MARKING

LENGTH OF PROJECT

PROJECT SECTION	MILES GROSS	MILES NET
	5.896	5.896

STANDARD DRAWINGS ARE INCLUDED IN PLANS BUT ARE AVAILABLE AT THE COUNTY ENGINEERS OFFICE

THIS DOCUMENT WAS ORIGINALLY ISSUED AND SEALED BY
JASON P. BENSON
N.D. REG. NO. 7490
ON 02/27/2015 AND THE ORIGINAL DOCUMENT IS STORED AT THE CASS COUNTY HIGHWAY DEPARTMENT, WEST FARGO, ND

CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. CH1505

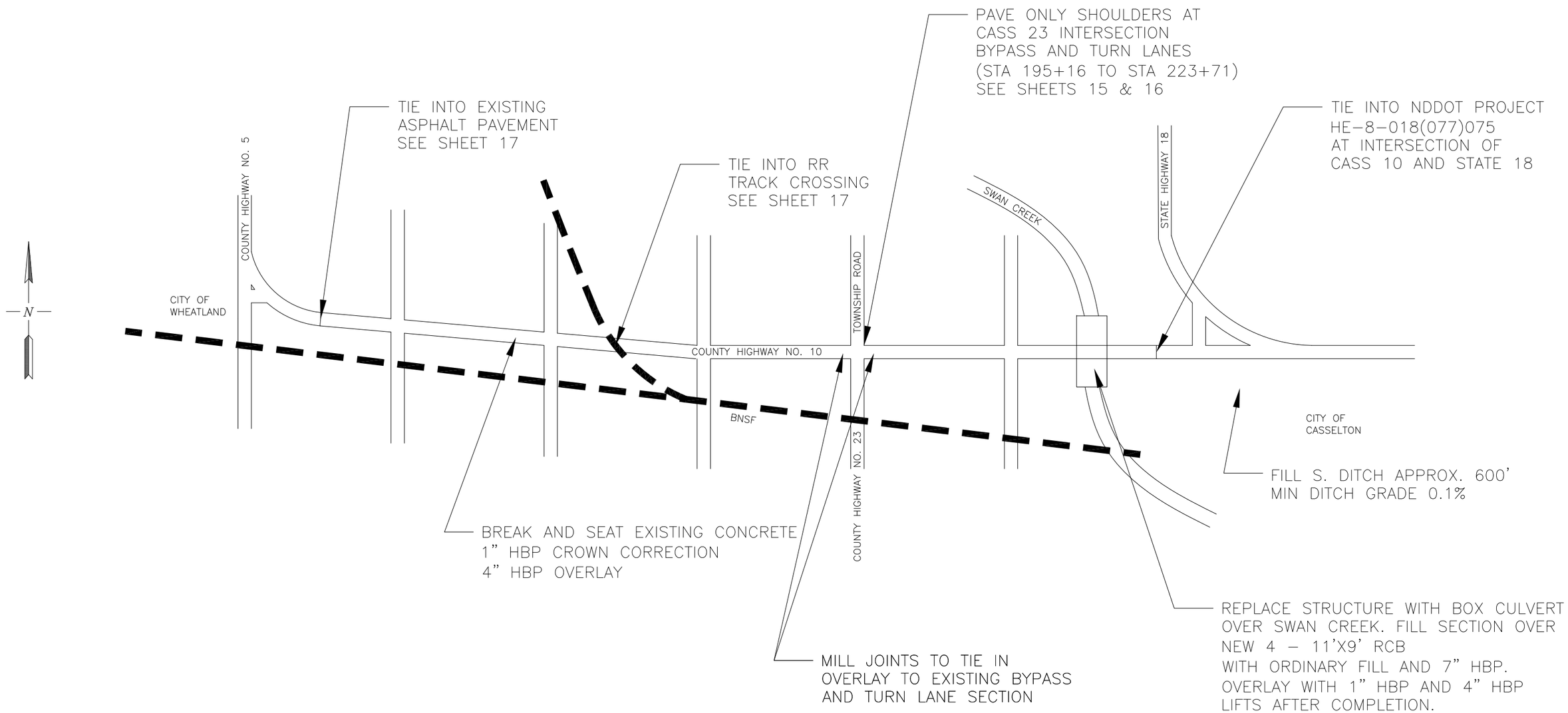
I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION.

JASON P. BENSON /s/ DATE: 02/27/15

JASON P. BENSON N.D. REG. NO. 7490

J:\Admin-Eng\PROJECTS\C-10 Overlay - Casselton to Wheatland\CH1505 Plan Set.dwg

STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
N.D.	CH1505	2	26



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PROJECT NO. CH1505
SCOPE OF WORK

J:\Admin-Eng\PROJECTS\C-10 Overlay - Casselton to Wheatland\CH1505 Plan Set.dwg

GENERAL PROVISIONS:
Thicknesses shown on the typical sections for surfacing are approximate. It is intended that the plan tonnages provided for by the basis of estimate will be used uniformly throughout the project unless otherwise authorized by the Engineer.

The attention of the bidders is directed to M.S. 298.75 (Aggregate Material Tax), pursuant to the removal of aggregates from any deposit in Minnesota.

RAILROAD PROTECTIVE LIABILITY INSURANCE:
This project crosses the Burlington Northern Santa Fe Railway at crossing number 10–2936G. This type of work that will be performed within the railroad right of way is Hot Bituminous Paving. Inquiries for protective liability insurance should be directed to:

David Johnson
BNSF Railway Company
80 – 44th Ave NE
Minneapolis, MN 55421
(763)–782–3495

RAILWAY NOTIFICATION:
The contractor shall notify Burlington Northern Santa Fe Railway a minimum of 10 days prior to performing work on or adjacent to the railroad right–of–way for possible flagging.

HOT BITUMINOUS PAVEMENT:
The hot bituminous pavement shall be placed and accepted according to NDDOT Standard Specifications Section 430. **OUTSIDE EDGE OF SLOUGH MUST REMAIN 1.5" OR THINNER OR BE RAKED OUT OR REPAIRED BY CONTRACTOR AT THEIR EXPENSE.**

All compaction equipment shall meet the NDDOT Standard Specification 151.01.

All hot bituminous mix and asphalt cement required shall be measured and paid for by the ton of "RAP – SUPERPAVE FAA 42" and "PG 58–28 ASPHALT CEMENT". This shall be considered full payment for performing this work.

WARM MIX ASPHALT (WMA):
Warm Mix Asphalt (WMA) may be substituted for Hot Mix Asphalt (HMA) at the Contractor's choosing. The WMA additive or technology is at the Contractor's choosing, and to be approved by the Engineer. All costs and savings associated with WMA shall be included in the unit cost for "RAP – SUPERPAVE FAA 42."

HAUL ROADS:
The Contractor's attention is directed to Section 107.08 of the Standard Specifications regarding the use of public roads for hauling materials to the project. Haul roads that will not be allowed for this project are as follows: Barnes County Highway 6 from State Highway 32, East to the Cass County line. Cass County Highway 26, from the Barnes County line East to State Highway 38, and Cass County Highway 10 from Tower City East to State Highway 38. No Township roads anywhere in Cass County will be allowed for haul road usage. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO INVESTIGATE THE SUITABILITY OF ROUTES WITH THE AGENCY HAVING CONTROL OF THE ROAD PRIOR TO SUBMITTING A BID.

PRIME OR TACK COAT:
This item shall be included in the unit cost for "RAP – SUPERPAVE FAA 42." The approximate quantity required for this project is listed on sheet 6.

The emulsified asphalt must be applied in accordance with Section 401.04 of the Standard Specifications.

FOG COAT:
The pavement shall receive a fog coat in the driving lanes and shoulders with CSS–1H, SS–1H or MS–1 emulsified asphalt (diluted 50/50) at a rate of 0.10 gallons per square yard. The fog coat shall be placed after the rumble strips are cut. Rumble strips fogged first @ 2' wide in one direction, then fog the pavement surface the opposite direction, staying 1' from the centerline stripe and re–shooting the 2' rumble strip.

PLACEMENT OF CLASS 5 AGGREGATE:
The Contractor shall be responsible for the direction, placement (Dumpman) and coordination of aggregate trucks.

CULTURAL RESOURCE PRESERVATION AND CLEARANCES OF GRAVEL PITS:
In accordance with section 107.05 of the standard specifications, the contractor is required to ensure that applicable cultural resource laws and regulations have been followed for all material sources. Below is the NDDOT website of pits that been certified.

http://www.dot.nd.gov/dotnet2/materialsource/certificatesofapproval.aspx

All material source locations, even those opened prior to the current project, must have been subjected to class III cultural resources inventory prior to use. Inventory results will determine recommendations regarding use of a particular source. The contractor's attention is directed to section 107.06 of the standard specifications for the treatment of any cultural resources that may be uncovered within the right of way.

WEED CONTROL:
Successful bidders as part of their supply contract will be required as part of the bid acceptance to comply with the following:

1. All noxious weeds must be controlled within the pit and extraction area each year in compliance with North Dakota State Agriculture Department recommendations for noxious weed control.
2. The county weed officer shall inspect the pit and extraction area before any materials shall be removed and shall by written letter certify operator's compliance with the North Dakota Department of Agriculture's recommendations for noxious weed control.
3. Any questions concerning the certifications of compliance for noxious weed control and the requirements thereunder is available from the County Weed Officer at (701) 298–2388.

This request is made pursuant to section 4.1–47 of the North Dakota Century Code.

TRAFFIC CONTROL FOR RUMBLE STRIPS:
The contractor shall use Standard Drawing D–704–15 layout A or Standard Drawing D–704–56 for shoulder rumble strips.

Any other method of traffic control must be requested by the Contractor and approved by the Engineer prior to use in the field. All costs for this work shall be included in the price bid for "RUMBLE STRIPS – ASPHALT SHOULDER".

PREFORMED PATTERENED PVT MK–MESSAGE (GROOVED):
Railroad crossing messages as detailed on Standard Drawing D–762–1 shall be installed each way from the railroad crossings at STA. 139+25. The messages shall be white and shall include a railroad cross, 2–R's, and 3–bands at each location. All messages shall be grooved tape 3M Series 380IES or approved equal.

RECYCLED ASPHALT PAVEMENT (RAP):
Contractor may add up to 15% recycled asphalt pavement (RAP), with a tolerance of ±5% in the Superpave FAA 42 mixture. Contractor may add millings from own stockpile or alternate source to achieve 15% RAP mixture. All additional millings shall be approved by the Engineer prior to use. All costs and savings of using the recycled material shall be included in the unit cost for "RAP – SUPERPAVE FAA 42."

RAP must be utilized in accordance with Section 430.03 E of the Standard Specification.

FLAP GATE 24IN (CAST IRON):
This gate shall be a Waterman F–10 drainage gate or approved equal. Gate shall be placed in proper operation condition in full conformity with the Drawings, Specifications and Recommendations of the equipment manufacturer unless exceptions are noted by the Engineer.

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CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. CH1505
CONSTRUCTION NOTES

TRAFFIC CONTROL:
Lump sum "TRAFFIC CONTROL" bid item shall include all signage required for construction (See sheet 22 for device listing), flagging and pilot car. Flagging hours are estimated at 502 hours for the project, Pilot Car hours are estimated at 251 hours for the project.

Traffic control to be set up in two stages: box culvert replacement and repair sections (See sheet 21) and bituminous overlay (See sheet 20). All post mounted signs and barricades may be placed simultaneously and covered as necessary. Contractor shall coordinate signs with NDDOT project HES-8-018(077)075 on Cass Highway 10 and State Highway 18 to ensure traffic safety. All costs to for coordination and staging to be included in "TRAFFIC CONTROL" bid item.

STRIPING:
All striping must be 4" wide (both temporary or permanent). If striping is measured at a thinner width, the prorated amount of width will be paid for the quantity placed.

REMOVAL OF STRUCTURE:
This bid item shall include all costs associated with the removal of the existing structure. The structure shall be removed in its entirety. Remove all existing piling to 2' below grade. All material shall be disposed of off-site at a location of the contractor's choosing and approved by the engineer. Burial of the removed material will not be permitted.

FLOWABLE FILL:
CDF may be used between the walls of the individual lines of precast RCB culverts. CDF shall have a compressive strength of 150-300 psi. Type AE-3 concrete may be substituted for CDF for entire volume between box culverts. If concrete is used, no concrete cap is required and hook bars tying CDF and concrete cap may be omitted.

RIPRAP AND GEOTEXTILE FABRIC TYPE RR:
Excavation quantities for placement of loose rock riprap and geotextile fabric type RR shall be included in the price bid for "RIPRAP GRADE I" and not paid for separately. This item shall be placed at the locations shown on the plans. Exact dimensions to be determined by the Engineer in the field, and quantities may vary. Materials shall meet the requirements of sections 709 and 858 of the standard specifications. Unit price will not be adjusted with increase or decrease in quantity.

GEOTEXTILE FABRIC - TYPE S1:
This item shall include all costs associated with the placement of the geotextile fabric - Type S1. Actual surface area will be the measurement used for payment, no allowances made for overlapping.

GEOTEXTILE FABRIC - TYPE R1:
This item shall include all costs associated with the placement of the geotextile fabric - Type R1. Actual surface area will be the measurement used for payment, no allowances made for overlapping.

FULL DEPTH REPAIR SECTIONS:
At selected locations, saw cut and remove existing concrete sections. In these locations, remove the existing subgrade (assumed depth of 12" of removal per section to be paid as "COMMON EXCAVATION-SUBCUT") and replace with 12" of Class 5 aggregate and 7" of asphalt to bring existing section to previous grade. Depth of removed subgrade may be deeper based on quality of underlying material. Removed subgrade can be used on project site at the box culvert replacement or hauled away to an approved disposal site off the project right of way. Overlay repair sections with 1" crown correction and 4" overlay. Locations and lengths of repair sections to be marked in the field by the Engineer.

PCC PAVEMENT BREAKING AND SEATING:
This work consists of removing any asphalt patching, cracking, and seating the Portland Cement Concrete Pavement prior to overlaying with Hot Bituminous Pavement. The existing concrete pavement is 6.5-inch pavement with a design compressive strength of 3,500 pounds per square inch.

Equipment used shall meet the following minimum requirements:

- The Pavement Breaker shall be a guillotine type. The breaking head of the guillotine hammer shall be such that it is capable of producing the desired cracking patter without displacing the concrete more than 2 inch vertically and without excessive spalling of the concrete
- The Roller shall consist of four heavy pneumatic tire wheels mounted on a rigid steel frame. The wheels shall be evenly spaced in one line across the width of the roller and shall be arranged so that all wheels will carry approximately equal loads when operated over an uneven surface. The maximum center-to-center spacing between adjacent wheels shall not exceed 32 inches. The compacting equipment shall have a suitable body for ballast loading with a capacity of 35 tons.

The work shall be performed in accordance with the applicable NDDOT Standard Specifications, the plans, and the following:

- Cracking and seating of the existing pavement shall be accomplished one lane at a time. Cracking and seating of adjacent lanes shall be completed before surfacing operations begin.
- Prior to cracking the pavement, bituminous patches shall be removed to the surface of the concrete pavement. Full depth patches shall be removed to the level of the concrete pavement surface. (Small traces of the bituminous material will be permitted to remain.) Joint and crack sealants shall be scraped off the pavement surface.
- Pavement cracking and seating shall be done only during daylight hours. All equipment and loose material shall be removed from the top of the roadway at the end of each working day.
- Before cracking operations begin, the Engineer will designate a 1,000 foot test section. The Contractor shall crack the test section with pavement breaker using vary energy and striking patterns. The various strike patterns will have transverse cracks spaced at 18 to 30 inches. The Contractor shall seat the cracked pavement as stated below. The Contractor shall take additional cores over the break sections at locations determined by the Engineer to ensure cracking is full depth. The intent is to find a cracking pattern that produces an effective modulus between the range of 700 ksi to 1,000 ksi. If the Engineer determines that conditions have changed and a satisfactory cracking pattern is no longer being produced adjustments will be made to the energy and /or striking pattern to reestablish a satisfactory cracking pattern.
- The Contractor shall create full-depth longitudinal and transverse cracks in the concrete pavement as determined by the results of the test section. Care should be taken to prevent the formation of a continuous longitudinal crack. The breaking hammer will not be dropped within a minimum of 2 feet of any transverse joint. The appropriate distance will be as determined in the test section. Care should be taken to avoid reducing the joint to rubble. The intent is to maintain a consistent modulus of elasticity in the cracked pavement. Pavement integrity should be consistent throughout the slab and joint areas. Joints that are reduce to rubble shall be removed and repaired as stated below. The Contractor shall exercise care during cracking to protect, and prevent damage to underground utilities, drainage facilities, bridge approach slabs and decks. Facilities damaged will be repaired at the Contractors expense.
- The cracked pavement shall be rolled with the 35-ton pneumatic roller to firmly seat the concrete. The roller shall make a minimum of two (2) round trips (4 passes) over all areas of the cracked concrete. If the Engineer determines that the amount of rolling has not firmly seated the concrete, the rolling shall continue until the Engineer is satisfied that further rolling will not be productive. Soft spots or rocking pieces detected by rolling shall be removed and subcut. The area shall be backfilled with hot bituminous pavement to the top of the existing concrete and compacted to the satisfaction of the Engineer. Payment for repairing the excavated areas will be made according to Section 430.06. Test roller will need to be loaded on trailer to cross over existing bridge.
- After the pavement is cracked and seated prior to placing the hot bituminous pavement, the loose materials shall be swept from the surface. All joints and cracks shall be cleaned with a power broom or compressed air. If the pavement is opened to traffic after the cracking and seating operation but before placing the bituminous surfacing, the Contractor shall maintain traffic by sweeping, patching, etc. to the satisfaction of the Engineer.
- While cracking and seating operations are underway in one lane, a safe flow of traffic shall be maintained in the adjacent lane. Care shall be taken to protect vehicles in the adjacent lane from damage from flying chips during the cracking process. Both lanes shall be opened to traffic during hours of darkness.

PCC Pavement Cracking and Seating will be measured by the square yard complete and accepted by the Engineer. The width will be the actual width of the existing PCC pavement, and the length will be measured along the centerline of the roadway.

"PCC PAVEMENT CRACKING AND SEATING" will be paid at the Contract Unit Price bid per square yard. This price shall be full payment for all labor, and equipment required to complete this item of work as specified.

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CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. CH1505
CONSTRUCTION NOTES

PRECAST REINFORCED CONCRETE BOX CULVERT:

A quad 11–foot x 9–foot (4 single lines) x 66–foot long (barrel length) precast reinforced concrete box culvert shall be installed at the existing centerline of the bridge. The concrete box culvert shall be designed for at least two feet of fill.

The installation of each precast RCB shall satisfy the applicable portions of "AASHTO standard specifications for highway bridges," Division II, Section 27, and Section 2 along with Section 210 of the "North Dakota standard specifications for road and bridge construction." The contractor shall provide a 6–inch minimum thickness of bedding (screedable granular material) for a leveling course, and a 1' minimum thickness of 1.5–inch crushed rock for foundation fill under the RCB. Geotextile fabric type S1 shall be placed between the foundation fill and the sand bedding.

The design and manufacture of each precast RCB shall satisfy the applicable portion of "AASHTO LRFD bridge design specifications," section 12, and "AASHTO materials specification M259." The design shall also meet or exceed the following criteria:

Design load: HL–93
Fill height: 2 feet

The precast RCBs shall be comprised of barrel sections and end sections. The concrete used to make the sections shall have a minimum compressive strength of 4,000 psi.

The barrel sections shall not be any shorter than 4 feet long. The minimum thickness of the barrel parts is 10 inches for the roof and floor, and 8 inches for the walls. Any haunch or fillet at the inside corners of the barrel shall not exceed a triangular shape with 12 inch horizontal and 12 inch vertical legs. The barrel section joints shall be tongue and groove.

The end sections shall include a reinforced concrete parapet on the top of the roof, and a pre–cast or cast in place reinforced concrete cutoff wall below the floor. The parapet shall be 1' x 1' and shall be as long as the barrel section is wide. The cutoff walls shall be placed under the end of the apron and shall be a minimum of 8 inches thick (2' thick if cast in place), 2.5 feet deep, and 3 feet longer that the barrel sections are wide. Holes shall be cast at 3' centers through the floor of each end section and into the cutoff walls to receive 3/4" diameter dowels. Then the voids shall be filled with grout. The slope of the end sections shall not be any steeper than 2 to 1, measured perpendicular to the centerline of the roadway. The end of the section shall not be higher than 2' – 4" above the floor. The end sections shall be connected to the main barrel by the use of galvanized U–bolts or galvanized steel–bolted plates in such a manner that the inside corner surface is smooth. All costs for precast cutoff wall or construction of cast in place cutoff wall to be included in price bid for end sections.

An acceptable method shall tie all the RCB sections together. The ties should adequately hold the sections together under construction load and service load conditions. The sections shall be tied together with prestressing strands or galvanized steel U–bolts. There shall be a minimum of four strands at each joint placed at each outside corner. If the U–bolts are used, the four U–bolts will be located at the third points of the outside walls. All hardware shall either be hot–dipped galvanized according to section 854 of the "North Dakota Standard Specifications for Road and Bridge Construction" or mechanically galvanized according to ASTM B695. Prestressing cables shall be corrosion protected and their ends grouted.

The top and two outside surfaces of each barrel section joint shall be wrapped with a geotextile fabric that prevents soil from leaking through the joint. The geotextile fabric shall be a minimum of 24 inches wide and shall meet the requirements of geotextile fabric type S1. Geotextile fabric shall also be required at the outside of each cutoff wall vertical joint, if more than one unit is used. A groove should be made in the bedding 1" deep and 2" – 3" wide in front of each joint to prevent sand from being pushed into the joint during installation. Each joint shall also be sealed with 1 ¼" cord preformed plastic joint sealant (ASTM C–990) on the bottom and up 1/3 of the sides.

The costs of providing and installing the ties, the geotextile fabric, and joint sealant shall be included in the price bid for the precast RCBs.

The contractor shall submit shop drawings to the construction engineer for approval before the manufacture of the RCB sections. These shop drawings shall show a minimum of the following:

- Layout showing RCB placement and clearances.
- Type and strength of concrete and reinforcing steel.
- All concrete and reinforcing dimensions.
- Reinforcing steel clearances.
- Method of tying sections together.
- Method of covering and sealing the joints.
- Installation and handling instructions.

End sections are required on each end of both lines. Barrels shall be spaced 6 inches apart, and flowable fill or Type AE–3 concrete shall be used between the box culverts (including end sections). At each end, the flowable fill shall be capped with 6" of 3,000 psi concrete. The concrete cap, and any other additional items required for the installation of flowable fill shall be included in the price bid for flowable fill. Mix design for flowable fill shall be approved by engineer prior to placement.

MULTIPLE SPAN SUBSTITUTION:

The Contractor may substitute double span precast box culvert sections for the single precast box culvert sections shown in the plans. The contractor will omit the grout between the double cell sections if double precast box culvert sections are used.

CLASS 2 EXCAVATION–BOX CULVERT:

All box culvert excavation, foundation fill excavation, channel excavation, riprap excavation, placement of ordinary backfill, compaction, water, and shaping of roadway inslopes and channel slopes shall be included in the unit price bid for "CLASS 2 EXCAVATION–BOX CULVERT" (Approximately 1,988 C.Y.). Extend excavation 50' beyond end sections to transition back to existing channel. Class 2 Excavation–Box Culvert shall be performed according to Section 210 of the standard specifications.

The suitability of material from on–site excavations for use as backfill will be determined by the engineer. The contractor shall remove and replace approximately 4" of topsoil over the excavation and embankment areas, except the 44' roadbed. Backfill shall be placed and compacted in accordance with Section 203.04 E.3 of the Standard Specifications. If the excavated material is deemed not suitable for ordinary backfill, it shall become property of the contractor and disposed of outside of the road right–of–way, not adjacent to the construction site, and at a site approved by the engineer. All costs associated with excavation, hauling, depositing and leveling the waste material shall be included in the unit price bid for "CLASS 2 EXCAVATION–BOX CULVERT".

FOUNDATION FILL:

The quantity for foundation fill was computed to a depth of 1.5' below the box culvert (Minimum amount required); however, this may vary depending on the soil conditions. Larger rock is required to stabilize the foundation it will be paid for as "FOUNDATION FILL." The bed for the pre–cast sections shall consist of fine graded material approximately 6" in depth below the culvert. Geosynthetic material Type S1 shall be placed above larger rock to separate from fine graded material. All aggregate described above shall be included in the price bid for "FOUNDATION FILL." Material will be accepted by Engineers Statement. No aggregate testing shall be required unless deemed necessary by the Engineer.

FOUNDATION PREPARATION:

The bidders shall be aware of the possible inundated conditions at this site before the bid opening. The cost of any cofferdams, dewatering the excavation, and channel bypass shall be included in the bid for "Foundation Preparation."

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CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. CH1505
CONSTRUCTION NOTES

ROADBED DRAIN TILE:
Payment shall be made at the Contract Unit Prices per lineal foot of drain tile used, and shall be full compensation for labor, equipment, materials, traffic control, required insurance and bonds necessary to complete the work as specified. No adjustment to the contract unit price for "Drain Tile Installation" shall be made regardless of changes in the contract quantity.

The existing aggregate surfacing shall be windrowed to one side of the road top by the contractor prior to any trenching operations. All costs associated with this item to be included in the price bid for drain tile installation. See the basis of estimate for the approximate existing material.

Four inch roadbed tile drain shall be corrugated Polyethylene Tubing. To prevent infiltration of filter aggregate into the perforated pipe it shall be wrapped with Geotextile.

Upgrade ends of drain runs shall be capped.

It shall be the responsibility of the Contractor to keep the outlets open at all times during the construction operations so as to prevent trapping of the water in the subgrade.

Discharge pipe to the drain outlet shall be constructed concurrently with the drains and laid at roughly right angles to the roadway centerline. The trench shall be constructed similar to the centerline drain tile section and be backfilled and compacted to the subgrade surface with filter aggregate. Compaction equipment shall be similar to that required for the drain trench. Care shall be taken not to crush or deform the discharge pipe. Discharge pipe grades shall be no less than the drain pipe and at least one (1) percent whenever possible.

Discharge outlets shall be kept one (1) foot above ditch grades whenever possible.

The Contractor shall not be permitted to set the tiling machine onto the inslope of the road and begin the trenching operations and maintaining the grade as set.

The maximum length of pipe run approximately 750 feet shall be based on the shoulder ditch bottom separation distance.

End caps shall be performed incidental (4" Perforated Corrugated Pipe Drain).

Roadbed tile drains shall be placed by the machine trencher capable of cutting a seven (7) inch to ten (10) inch wide trench, cutting a shaped flow line cradle to support the lower 1/3 portion of the tile and laying the tile in a continuous operation. (Plowing will not be permitted). The trenching equipment shall be so designed and operated that excavated material does not fall back into the trench. The Engineer may direct that any soil not excavated, be removed prior to placing any filter aggregate and all at the contractor's expense. The excavated material shall be windrowed on the roadway in a method that does not contaminate the filter aggregate. The excavated material shall be spread on the outer edges of the roadbed and covered with aggregate surfacing.

Compaction Equipment shall be restricted from the above subsurface drain until the filter aggregate and subgrade backfill provide at least 18" of cover measured from the top of the pipe. The compaction operation shall be monitored to prevent deformation of the subsurface drain.

Placing and compacting filter aggregate; furnishing and installing outlet rock and finishing shall be considered incidental to (4" Perforated Corrugated P.E. Pipe Drain) and no direct compensation shall be made. If the pipe and filter aggregate are not placed simultaneously by the trenching machine, the Contractor shall insure that the pipe is properly aligned in the shaped cradle before placing the enclosing filter aggregate. Filter aggregate shall be free–flowing.

The minimum grade of the tile shall not be less than 0.20%. Grade control shall be the responsibility of the Contractor. Whenever pipe grades do not follow surface grades, it shall be the contractor's responsibility to set and maintain the minimum 0.20% grade.

The filter aggregate backfill may be placed simultaneously with the pipe or in a separate operation which shall immediately follow the trench activity. If the Contractor's operations lead to significant sloughing or caving from either side of the trench, the Engineer may direct that a shield be used and that the filter aggregate be placed within the shield.

If the Contractor chooses to windrow filter aggregate on any inplace roadway, contamination with excavated trench material shall not be permitted.

The filter aggregate shall be a free draining mineral product, excluding crushed carbonate quarry rock, crushed concrete, or salvaged bituminous mixture, and meeting the following gradation requirements:

Sieve Size	Percent Passing
1"	100
No. 200	0 – 10

The Contractor shall construct lateral tile line with blind outlets into the road ditches. These outlet trenches may be excavated to maximum width of 12 inches. The Contractor shall furnish and install 1 ½ inch rock for constructing the blind outlets as shown on the Typical Outlet Details of the Plan.

Filter aggregate shall be compacted with a vibratory plate compactor to the satisfaction of the Engineer and with the equipment meeting the following specifications:

The width of the plate shall be less than the width of the trench, but not more than two (2) inches less than the width of the trench.

The length of the plate shall be 20 inches + or – two (2) inches.

The compactor shall vibrate at a minimum 2,000 cylces per minute.

When the total depth of aggregate to be compacted (measured to the bottom of the pipe) is 16 inches or less, the compactor shall deliver a minimum impact force of 4,000 lbs*. When the aggregate to be compacted is greater than 16 inches and less or equal to 28 inches, the compactor must deliver a minimum impact force of 6,000 lbs*. (*Based on manufacturer's published specifications.)

If the depth of the filter aggregate is 28 inches or more, it shall be compacted in two (2) approximately equal lifts with a compactor meeting the appropriate specifications for the lift thickness.

If the compactor is not attached to the trenching machine, it shall travel at a rate not greater than the equivalent speed of the trenching operation. The entire energy/weight of the compactor shall be transmitted via the plate to the trench. The plate shall extend below the bottom of the compactor a sufficient distance so that even after compaction, no portion of the energy will be dissipated in material adjacent to the trench.

All excess material from the tiling operations shall be disposed of on the inslope, ditch bottoms and/or the backslope by the contractor within the project limits to be approved the the engineer.

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CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. CH1505
CONSTRUCTION NOTES

STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
N.D.	CH1505	7	26

EMULSIFIED ASPHALT FOR TACK COAT

LOCATION	LENGTH (FT)	WIDTH (FT)	AREA (SY)	GAL
MAINLINE - TOP LIFT	28,278	36	113,112	5,656
MAINLINE - 1ST LIFT	28,278	24	75,408	3,770
REPAIR SECTIONS			1,520	76
APPROACHES/INTERSECTIONS				54
TOTAL =			190,040	9,556

EMULSIFIED ASPHALT FOR FOGGING

LOCATION	LENGTH (FT)	WIDTH (FT)	AREA (SY)	GAL
RUMBLE STRIPS	28,278	4	12,568	628
MAINLINE	28,278	36	113,112	5,656
APPROACHES/INTERSECTIONS				0
TOTAL =			125,680	6,284

MILLING PAVEMENT SURFACE

STATION/LANE	SURFACE	WIDTH (FT)	LENGTH (FT)	AREA (SY)
0+00 TIE IN	CONCRETE	24	150	400
138+75 RR	CONCRETE	24	150	400
140+75 RR	CONCRETE	24	150	400
154+10 RT	ASPHALT PATCH	12	20	27
156+25 RT	ASPHALT PATCH	12	25	33
195+16 TIE IN	CONCRETE	24	150	400
219+35 TIE IN	CONCRETE	24	150	400
217+62 LT	ASPHALT PATCH	12	35	47
218+18 LT/RT	ASPHALT PATCH	24	10	27
222+80 LT	ASPHALT PATCH	12	10	13
227+03 LT	ASPHALT PATCH	12	12	16
238+22 LT	ASPHALT PATCH	12	32	43
240+50 LT	ASPHALT PATCH	12	35	47
241+40 LT	ASPHALT PATCH	12	15	20
245+82 LT	ASPHALT PATCH	12	30	40
250+08 LT	ASPHALT PATCH	12	20	27
251+86 LT	ASPHALT PATCH	12	20	27
253+70 LT	ASPHALT PATCH	12	95	127
259+58 LT	ASPHALT PATCH	12	90	120
261+70 LT	ASPHALT PATCH	12	30	40
			TOTAL	**2,654**

BASIS OF ESTIMATE (SURFACING APPROACHES)

DESCRIPTION	PRIVATE DRIVE		SECTION LINE		FIELD APPROACH		TOTAL	
AMOUNT	7		10		7			
RECYCLED ASPHALT PAVEMENT - FAA 42	60	TON	20	TON	8	TON	676	TON
ASPHALT CEMENT	3	TON	1	TON	0.4	TON	33.8	TON
AGGREGATE BASE - CLASS 5	23	TON	23	TON	23	TON	552	TON
EMULS. ASPH. FOR TACK COAT	10	GAL.	15	GAL.	10	GAL.	290	GAL.

FULL DEPTH REPAIR SECTIONS CH1505

STA START	WIDTH (FT)	LENGTH (FT)	AREA (SY)	CL 5 (TON)	FAA 42 (TON)	SAW CUT (LF)	COMMON EX (CY)
154+10 LT & RT	24	30	80	50	32	48	25
156+25 LT & RT	24	30	80	50	32	48	25
217+62 LT & RT	24	45	120	75	47	48	25
218+18 LT & RT	24	15	40	25	16	48	25
222+80 LT & RT	24	15	40	25	16	48	25
227+03 LT & RT	24	15	40	25	16	48	25
238+22 LT & RT	24	45	120	75	47	48	25
240+50 LT & RT	24	45	120	75	47	48	25
241+40 LT & RT	24	15	40	25	16	48	25
245+82 LT & RT	24	30	80	50	32	48	25
250+08 LT & RT	24	30	80	50	32	48	25
251+86 LT & RT	24	30	80	50	32	48	25
253+70 LT & RT	24	105	280	175	109	48	25
259+58 LT & RT	24	90	240	150	94	48	25
261+70 LT & RT	24	30	80	50	32	48	25
	TOTAL	**570**	**1520**	**950**	**600**	**720**	**375**

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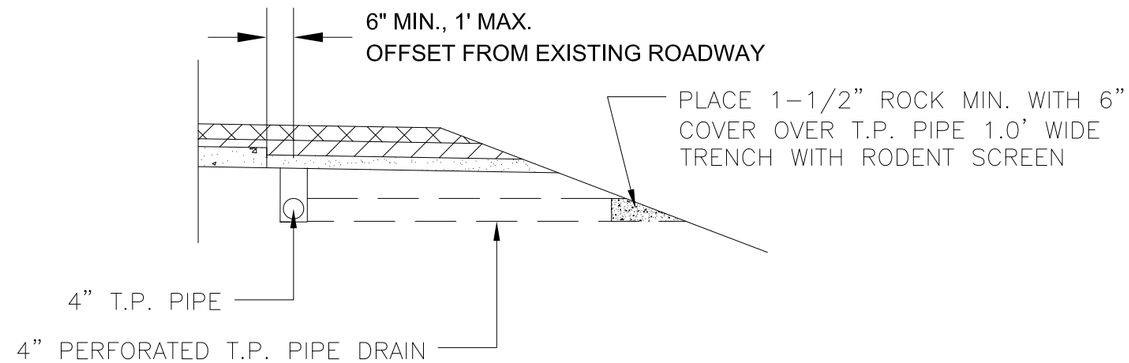
CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. CH1505
BASIS OF ESTIMATE

STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
N.D.	CH1505	8	26

PAVING TONNAGE ESTIMATE CH1505

TYPE	STA START	STA END	LENGTH (FT)	WIDTH (FT)	AREA (SF)	THICKNESS (IN)	TONS
MAINLINE	0+00	195+16	19,516	24	468,384	4	11,565
SHOULDER LT & RT	0+00	195+16	19,516	6	117,096	6	8,674
SLOUGH LT & RT	0+00	195+16	19,516	2.5	48,790	6	1,807
CROWN CORRECTION	0+00	195+16	19,516	24	468,384	1.25	3,614
LT SHOULDER	195+16	197+76	260	6	1,560	6	58
LT TAPER	197+76	202+96	520	VARIES	3,120	6	116
LT SHOULDER	202+96	215+46	1,250	2	2,500	6	93
LT TAPER	215+46	218+06	260	VARIES	1,560	6	58
LT SHOULDER	218+06	223+71	565	6	3,390	6	126
LT SLOUGH	195+16	223+71	2,855	2.5	7,138	6	132
RT SHOULDER	195+16	197+90	274	6	1,644	6	61
RT TAPER	197+90	199+70	180	VARIES	1,008	6	37
RT SHOULDER	199+70	204+70	500	2	1,000	6	37
RT SHOULDER	204+70	223+71	1,901	6	11,406	6	422
RT SLOUGH	195+16	223+71	2,855	2.5	7,138	6	132
MAINLINE	223+71	311+33	8,762	24	210,288	4	5,192
SHOULDER LT & RT	223+71	311+33	8,762	6	52,572	6	3,894
SLOUGH LT & RT	223+71	311+33	8,762	2.5	21,905	6	811
CROWN CORRECTION	223+71	311+33	8,762	24	210,288	1.25	1,623
RCB REPLACEMENT	283+50	285+50	200	24	4,800	7	207
						TOTAL	**38,659**
						5% OVERAGE	**1,933**
						APPROACHES/INT	**676**
						REPAIR	**600**
						GRAND TOTAL	**41,868**



DRAIN TILE INSTALLATION DETAIL

PERFORATED PIPE DRAIN INSTALLATION TRENCH TO BE:
WIDTH = 7" MIN. TO 10" MAX.
DEPTH = 3.0' OPTIMUM, 2.0' MIN. TO 4.0' MAX.
THE ENITRE CENTERLINE TRENCH & DISCHARGE TRENCH TO BE BACKFILLED WITH FILTER AGGREGATE
PLACE 4" CORRUGATED PERFORATED PE PIPE DRAIN WITH GEOTEXTILE FILTER WRAP.

CLASS 5 ESTIMATE CH1505

TYPE	STA START	STA END	LENGTH (FT)	WIDTH (FT)	AREA (SF)	THICKNESS (IN)	TONS
RT & LT SHOULDER	0+00	195+16	19,516	20	390,320	1	2,259
RT & LT SHOULDER	223+71	311+33	8,762	20	175,240	1	1,014
RT & LT SHOULDER	283+50	285+50	200	19.5	3,900	6	135
						TOTAL	**3,408**
						5% OVERAGE	**170**
						APPROACHES/INT	**552**
						REPAIR	**950**
						BOX CULVERT	**1,856**
						GRAND TOTAL	**6,936**

DRAIN TILE CH1505

STA START	STA END	LOCATION	LENGTH (FT)
0+00	195+16	LT & RT SHOULDER	39,032
0+00	195+16	OFFTAKE	416
223+71	311+33	LT & RT SHOULDER	17,524
223+71	311+33	OFFTAKE	187
		TOTAL	**57,159**

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CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. CH1505
BASIS OF ESTIMATE

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BASIS OF ESTIMATE

MATERIAL	BASIS OF ESTIMATE
AGGREGATE BASE COURSE - CLASS 5	1.875 TON/CY
SHRINKAGE FOR CLASS 5	COMPACTED VOLUME IN PLACE PLUS 25%
HOT BITUMINOUS PAVEMENT	2 TON/CY
ADDED ASPHALT CEMENT	5.0% OF HBP BY WEIGHT
EMULSIFIED ASPHALT FOR TACK COAT	0.05 GAL/SY
SHRINKAGE FOR TOPSOIL	50%
WATER	
AGGREGATE BASE CLASS 5 COMPACTION	30 GAL/TON
AS A DUST PALLATIVE ON HAUL ROADS	30 M GAL PER DAY OF HAULING
	(ESTIMATED TO BE 10 DAYS)

PREFORMED PATTERNED PVMT MK-MESSAGE (GROOVED)

STATION	TYPE	SF
139+25	RR CROSSING	265
	TOTAL	265

PCC PAVEMENT BREAKING & SEATING

STATION	WIDTH (FT)	LENGTH (FT)	AREA (SY)
0+00 TO 195+16	24	19,516	52,043
223+17 TO 311+33	24	8,816	23,509
REPAIR AREAS	24	570	-1,520
TOTAL			74,032

MAXIMUM SIZE OF AGGREGATES

DESCRIPTION	TYPE OF AGGR.	MAXIMUM SIZE
RAP - SUPERPAVE FAA 42	CRUSHED	5/8"
AGGREGATE BASE & SHOULDERS - CLASS 5	CRUSHED	1"

PAVEMENT MARKING QUANTITIES

START	END		4" YELLOW TEMPORARY (4 LIFTS)		4" PERMANENT MARKING				
STA	STA	LANE	SKIP (L.F.)	NPZ (L.F.)	4" SKIP (L.F.)	4" NPZ (L.F.)	4" WHITE (L.F.)	TOTAL 4" (L.F.)	4" WHITE TAPE (L.F.)
0+00	8+50	LT		1,700		1,700	1,700	3,400	
0+00	195+16		4,879		4,879		39,032	43,911	
125+90	139+10	RT		1,320		1,320		1,320	
139+40	151+75	LT		1,235		1,235		1,235	
187+30	195+16	RT		786		786		786	
195+16	223+71	LT/RT							5,615
223+71	277+30		1,340		1,340		10,718	12,058	
268+70	277+30	RT		860		860		860	
277+30	277+90	LT/RT		120		120	120	240	
277+90	286+00	RT		810		810		810	
277+90	311+33		836		836		6,686	7,522	
TOTAL =			28,220	27,324	7,055	6,831	58,256	72,142	5,615

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CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. CH1505
BASIS OF ESTIMATE

STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
N.D.	CH1505	10	26

CASS COUNTY HIGHWAY DEPARTMENT

PROJECT NO. CH1505
PCC BREAKING & SEATING, BITUMINOUS OVERLAY, STRUCTURE REPLACEMENT & INCIDENTALS ON CASS HIGHWAY 10 FROM CASS HIGHWAY 5 TO STATE HIGHWAY 18

ESTIMATED QUANTITIES

ITEM	SPEC NO.	CODE	DESCRIPTION	UNIT	APPROX. QUANTITY
1	103	0100	CONTRACT BOND	L SUM	1
2	107	0100	RAILWAY PROTECTION INSURANCE	L SUM	1
3	201	0300	CLEARING AND GRUBBING	L SUM	1
4	202	0105	REMOVAL OF STRUCTURE	L SUM	1
5	203	0109	TOPSOIL	CY	167
6	203	0119	TOPSOIL - IMPORTED	CY	251
7	203	0136	COMMON EXCAVATION-SUBCUT	CY	375
8	203	0140	BORROW-EXCAVATION	CY	500
9	210	0109	CLASS 2 EXCAVATION-BOX CULVERT (APPROX 2,000 C.Y.)	EA	1
10	210	0126	CHANNEL EXCAVATION	CY	1,852
11	210	0210	FOUNDATION FILL	CY	322
12	210	0212	FLOWABLE FILL	CY	60
13	210	0405	FOUNDATION PREPARATION-BOX CULVERT	EA	1
14	230	0303	SUBGRADE PREPARATION-TYPE A-SHOULDERS	MILE	12
15	251	0300	SEEDING CLASS III	ACRE	5.00
16	253	0101	STRAW MULCH	ACRE	5.00
17	256	0100	RIPRAP GRADE I	CY	155
18	261	0112	FIBER ROLLS 12 IN	LF	400
19	302	0120	AGGREGATE BASE COURSE CL 5	TON	6,936
20	401	0070	FOG SEAL	GAL	6,284
21	411	0105	MILLING PAVEMENT SURFACE	SY	1,654
22	430	0142	RAP - SUPERPAVE FAA 42	TON	42,022
23	430	1000	CORED SAMPLE	EA	36
24	430	5828	PG 58-28 ASPHALT CEMENT	TON	2,101
25	550	0970	PCC PAVEMENT BREAKING & SEATING	SY	74,032
26	570	0095	SAW CONCRETE	LF	720
27	606	1109	11FT X 9FT PRECAST RCB CULVERT	LF	264
28	606	5109	11FT X 9FT PRECAST RCB END SECTION	EA	8
29	702	0100	MOBILIZATION	L SUM	1
30	704		PORTABLE CHANGEABLE MESSAGE SIGN	DAY	42
31	704	1100	TRAFFIC CONTROL	L SUM	1
32	706	0301	FIELD LABORATORY-TYPE C	L SUM	1
33	709	0401	GEOTEXTILE FABRIC - TYPE S1	SY	644
34	709	0701	GEOTEXTILE FABRIC - TYPE R1	SY	807
35	714	5035	PIPE CORR STEEL .064IN 24IN	LF	68
36	714	5370	PIPE CORR STEEL ARCH .064IN 49IN X 33IN	LF	56
37	714	5820	END SECT CORR STEEL .064IN 24IN	EA	1
38	714	5890	END SECT CORR STEEL .109IN ARCH 49IN X 33IN	EA	2
39	714	6589	PIPE PVC 4 IN DRAIN TILE	LF	57,159
40	714	9912	FLAP GATE 24IN (CAST IRON)	EA	1
41	760	0005	RUMBLE STRIPS-ASPHALT SHOULDER	MILE	11.8
42	762	0122	PREFORMED PATTERNED PVMT MK-MESSAGE(GROOVED)	SF	265
43	762	0405	SHORT TERM 4 IN BROKEN LINE-PNT TAPE OR RSD MRK	LF	28,220
44	762	0410	SHORT TERM 4 IN LINE NPZ - PN TP OR RS MRK	LF	27,324
45	762	1104	PVMT MK PAINTED 4IN LINE	LF	72,142
46	762	1305	PREFORMED PATTERNED PVMT MK 4IN LINE-GROOVED	LF	5,615

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PROJECT NO. CH1505
ESTIMATED QUANTITIES

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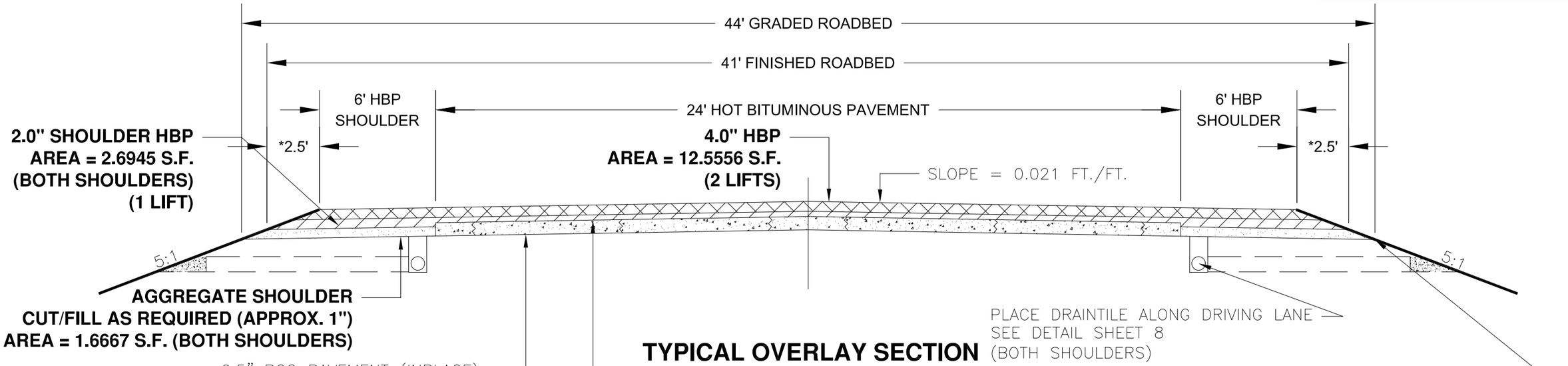
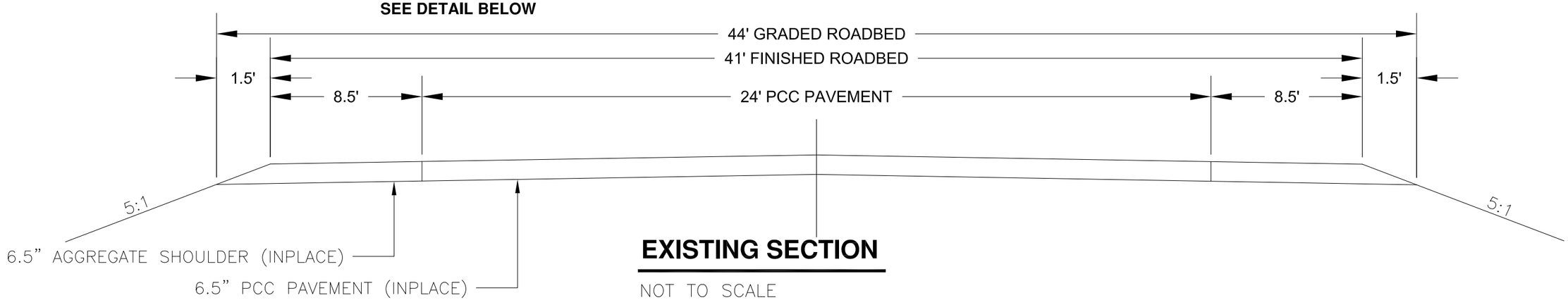
STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
N.D.	CH1505	11	26



TYPICAL OVERLAY SECTION

NOT TO SCALE
STA 0+00.00 TO 195+16.04
STA 223+71.04 TO 311+33.45



EXISTING SECTION

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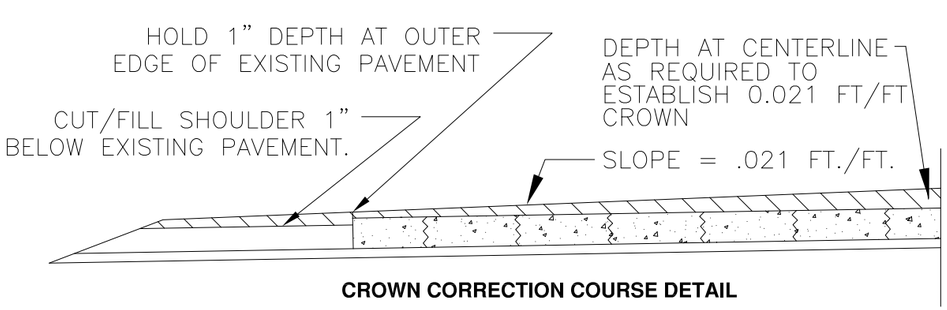
STA 223+71.04 TO 311+33.45



CROWN CORRECTION COURSE DETAIL

***THE ENGINEER IN THE FIELD WILL DETERMINE THE DIMENSIONS OF THE SHOULDER AND SLOUGH TO BEST FIT THE FIELD CONDITIONS**

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PROJECT NO. CH1505
TYPICAL SECTIONS

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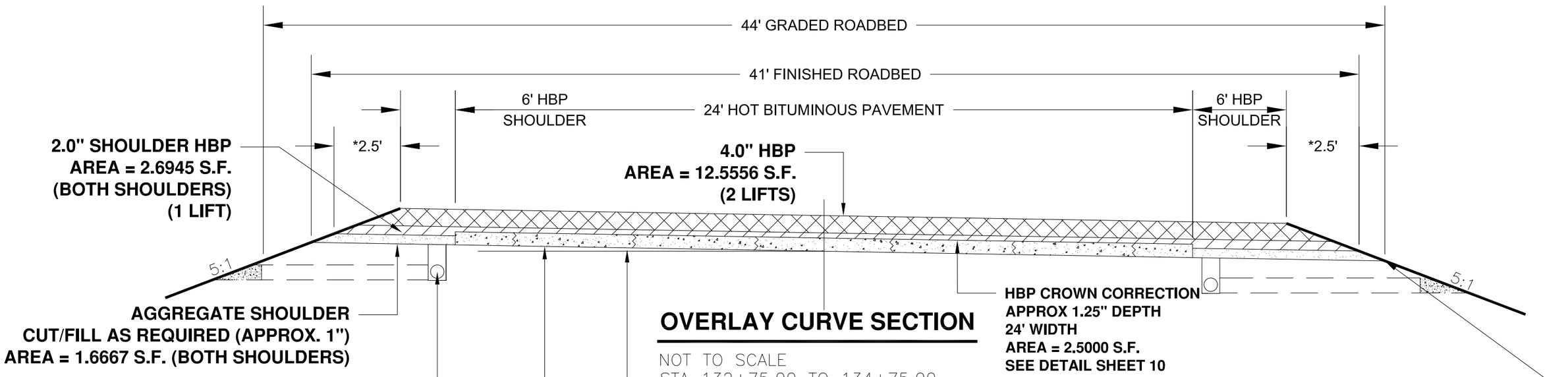
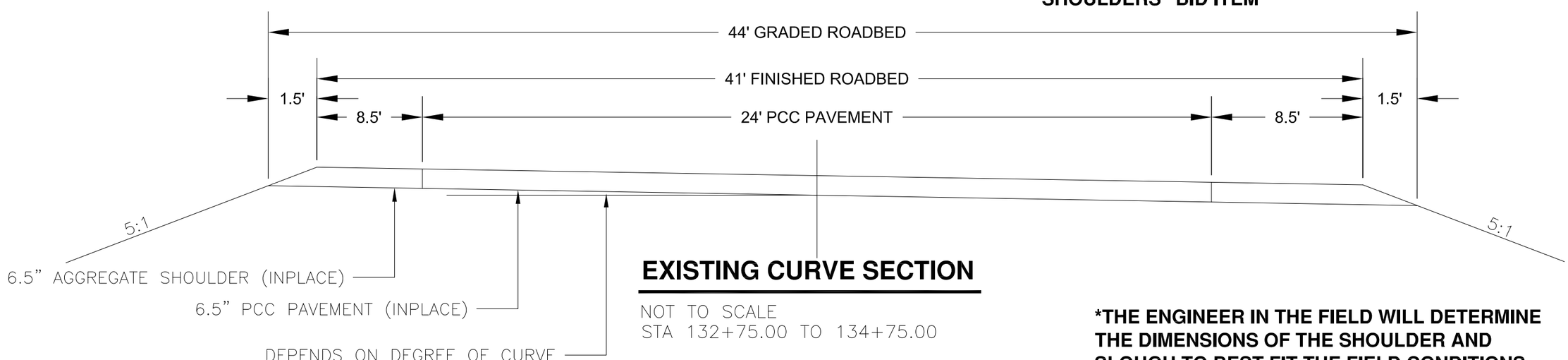
STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
N.D.	CH1505	12	26



OVERLAY CURVE SECTION

NOT TO SCALE
STA 132+75.00 TO 134+75.00



EXISTING CURVE SECTION

NOT TO SCALE
STA 132+75.00 TO 134+75.00

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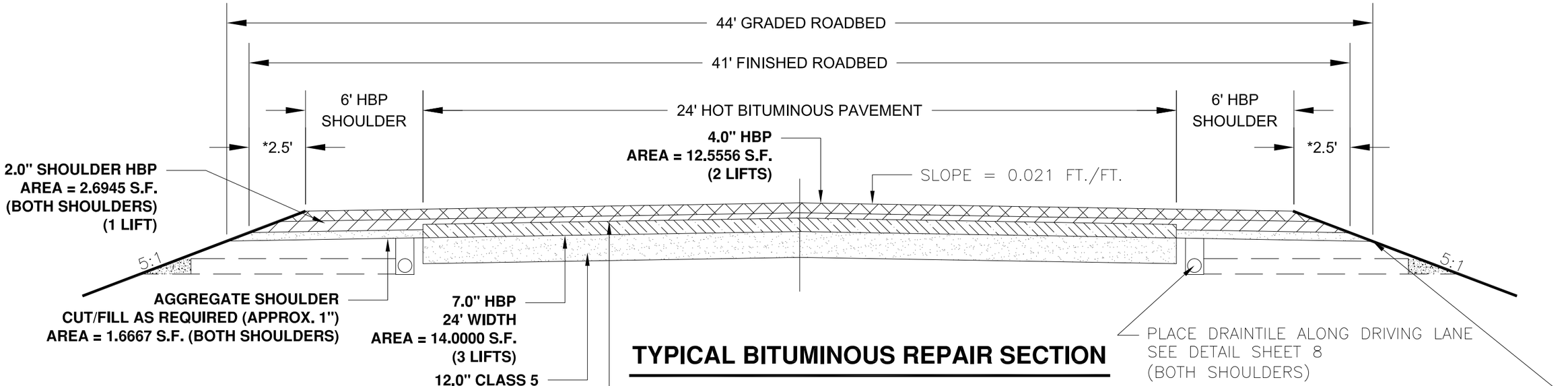
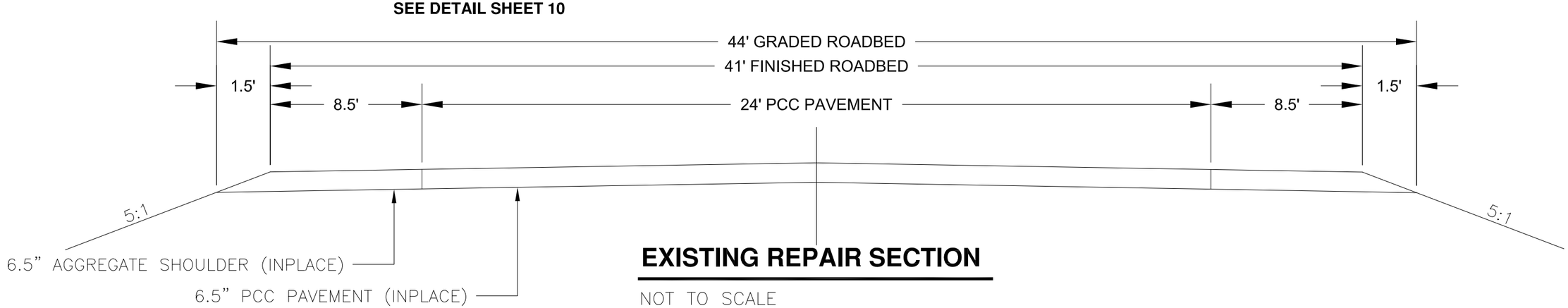
STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
N.D.	CH1505	13	26



TYPICAL BITUMINOUS REPAIR SECTION

NOT TO SCALE

CONSTRUCT AGGREGATE SHOULDERS 10.0' WIDE, THEN BLEND EXCESS CLASS 5 AGAINST COMPLETED SLOUGH AND INSLOPE. ALL COSTS FOR THIS WORK TO BE INCLUDED IN "SUBGRADE PREPARATION - TYPE A - SHOULDERS" BID ITEM



EXISTING REPAIR SECTION

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TYPICAL SECTIONS

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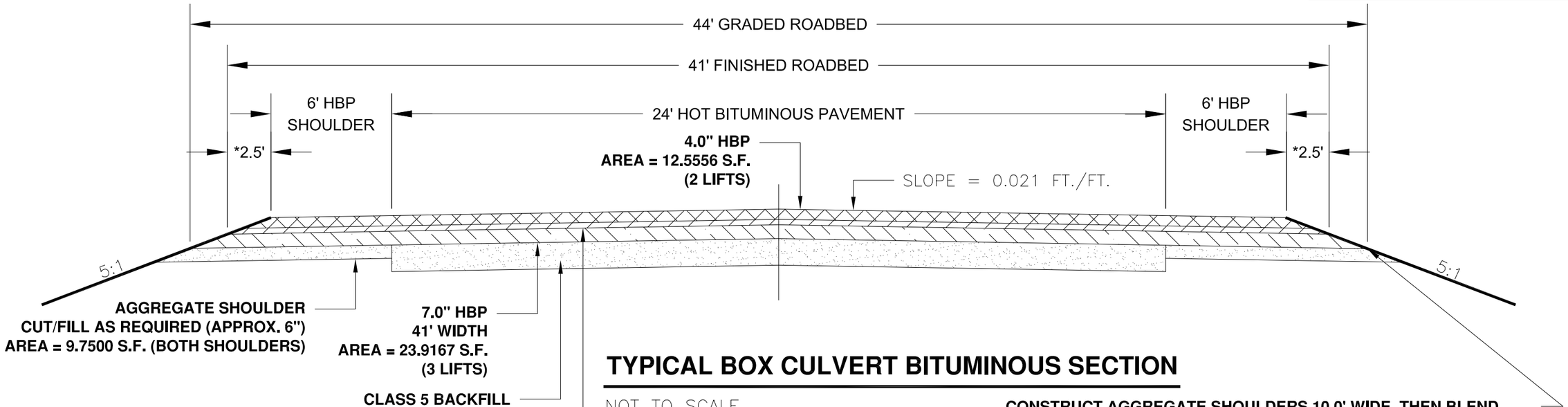
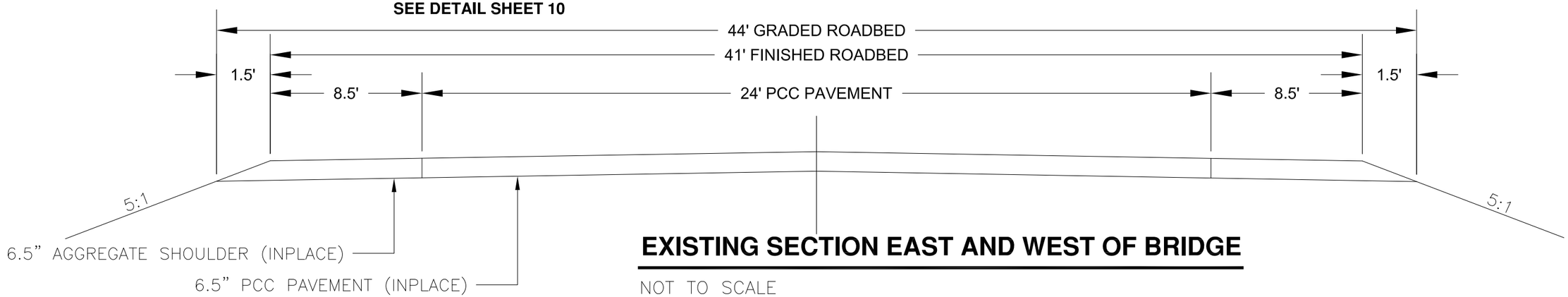
STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
N.D.	CH1505	14	26



TYPICAL BOX CULVERT BITUMINOUS SECTION

NOT TO SCALE
STA 283+50.00 TO 285+50.00

CONSTRUCT AGGREGATE SHOULDERS 10.0' WIDE, THEN BLEND EXCESS CLASS 5 AGAINST COMPLETED SLOUGH AND INSLOPE. ALL COSTS FOR THIS WORK TO BE INCLUDED IN "SUBGRADE PREPARATION - TYPE A - SHOULDERS" BID ITEM



EXISTING SECTION EAST AND WEST OF BRIDGE

NOT TO SCALE
STA 283+50.00 TO 284+31.00
STA 284+92.00 TO 285+50.00

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ON 02/27/2015 AND THE ORIGINAL DOCUMENT IS STORED AT THE CASS COUNTY HIGHWAY DEPARTMENT, WEST FARGO, ND

CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. CH1505
TYPICAL SECTIONS

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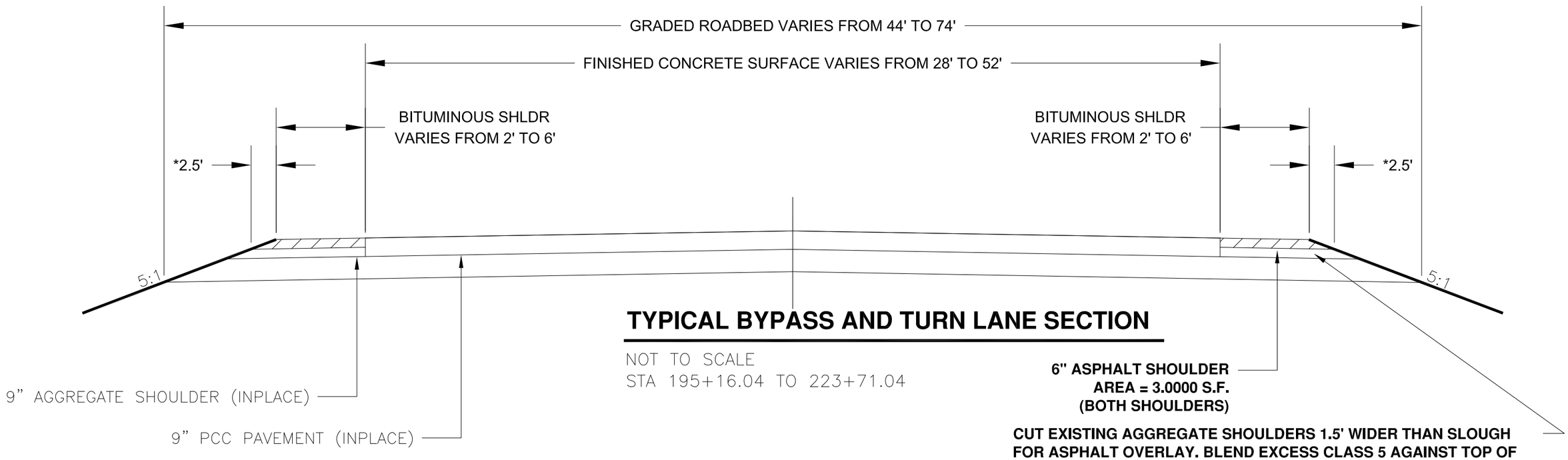
STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
N.D.	CH1505	15	26

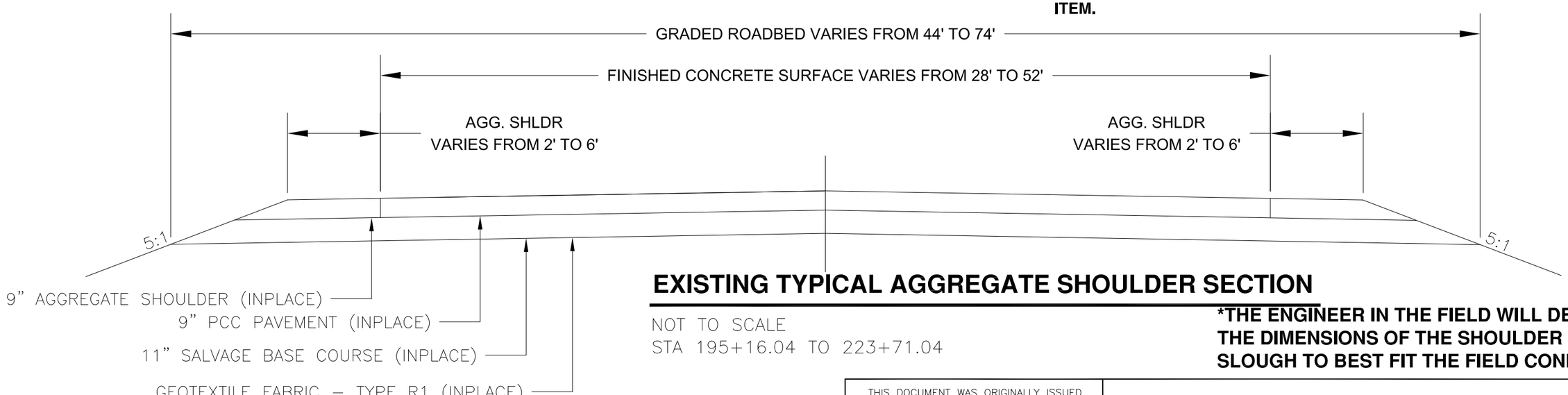


TYPICAL BYPASS AND TURN LANE SECTION

NOT TO SCALE
STA 195+16.04 TO 223+71.04

6" ASPHALT SHOULDER
AREA = 3.0000 S.F.
(BOTH SHOULDERS)

CUT EXISTING AGGREGATE SHOULDERS 1.5' WIDER THAN SLOUGH FOR ASPHALT OVERLAY. BLEND EXCESS CLASS 5 AGAINST TOP OF SLOUGH OF COMPLETED SHOULDER. ALL COSTS FOR THIS WORK TO BE INCLUDED "SUBGRADE PREPARATION - TYPE A - SHOULDERS" BID ITEM.



EXISTING TYPICAL AGGREGATE SHOULDER SECTION

NOT TO SCALE
STA 195+16.04 TO 223+71.04

***THE ENGINEER IN THE FIELD WILL DETERMINE THE DIMENSIONS OF THE SHOULDER AND SLOUGH TO BEST FIT THE FIELD CONDITIONS**

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CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. CH1505
TYPICAL SECTIONS

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STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
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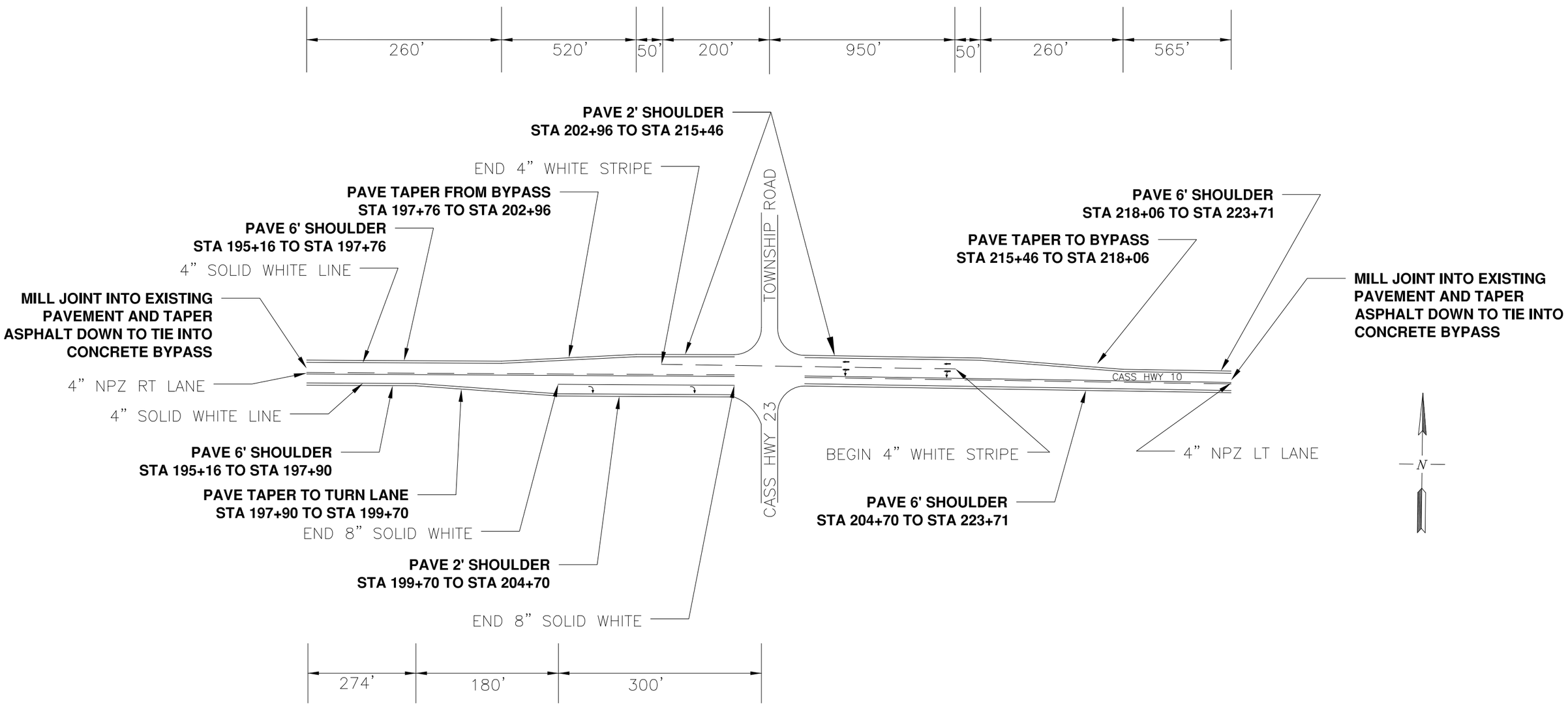

BYPASS AND RIGHT TURN LANES

NOT TO SCALE
STA 195+16.04 TO 223+71.04

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CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. CH1505
BYPASS DETAIL

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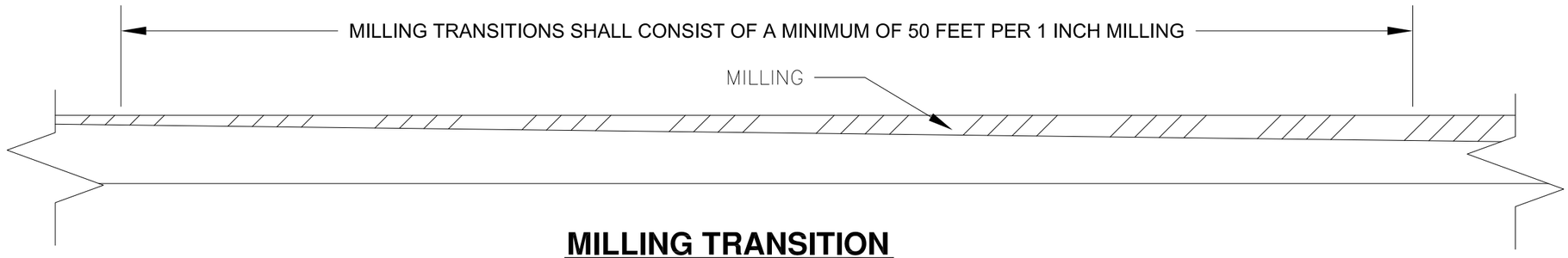
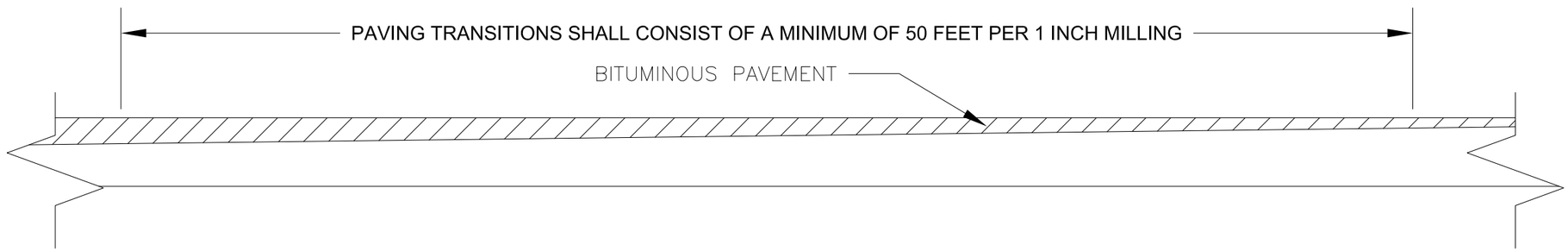
STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
N.D.	CH1505	17	26



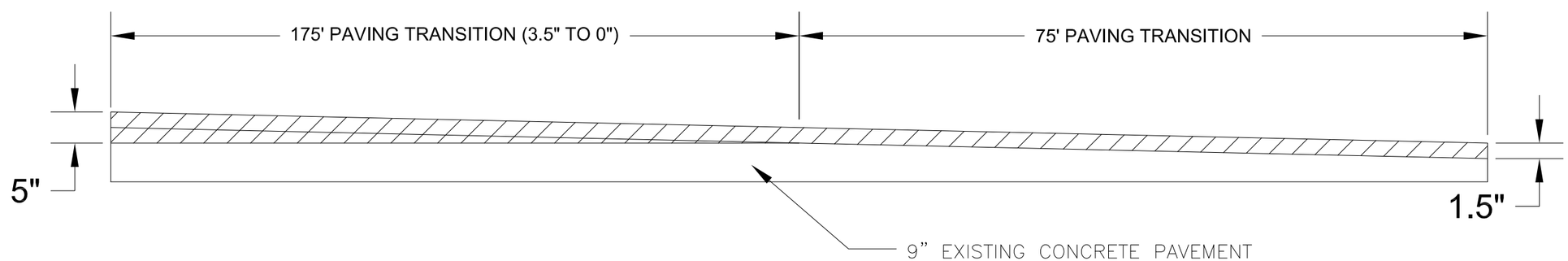
MILLING TRANSITION

NOT TO SCALE



PAVING TRANSITION

NOT TO SCALE



PAVING TIE-IN

NOT TO SCALE

*SEE SHEET 2 FOR PAVEMENT MILLING AND TIE-IN LOCATIONS

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CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. CH1505
TRANSITION DETAILS

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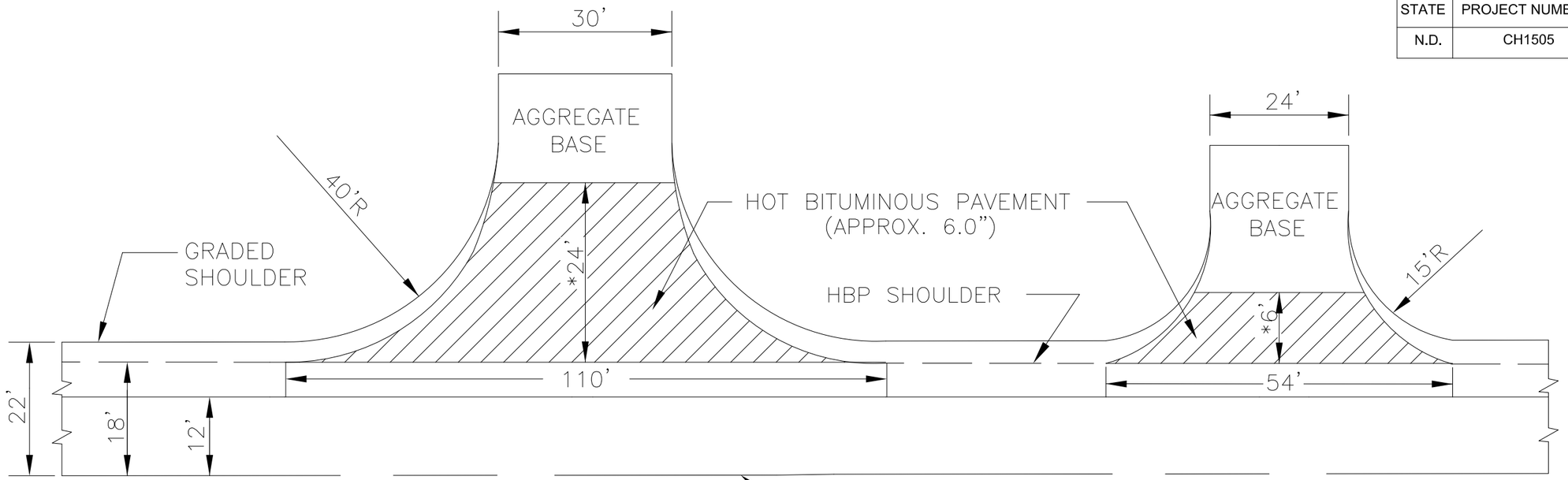
STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
N.D.	CH1505	18	26



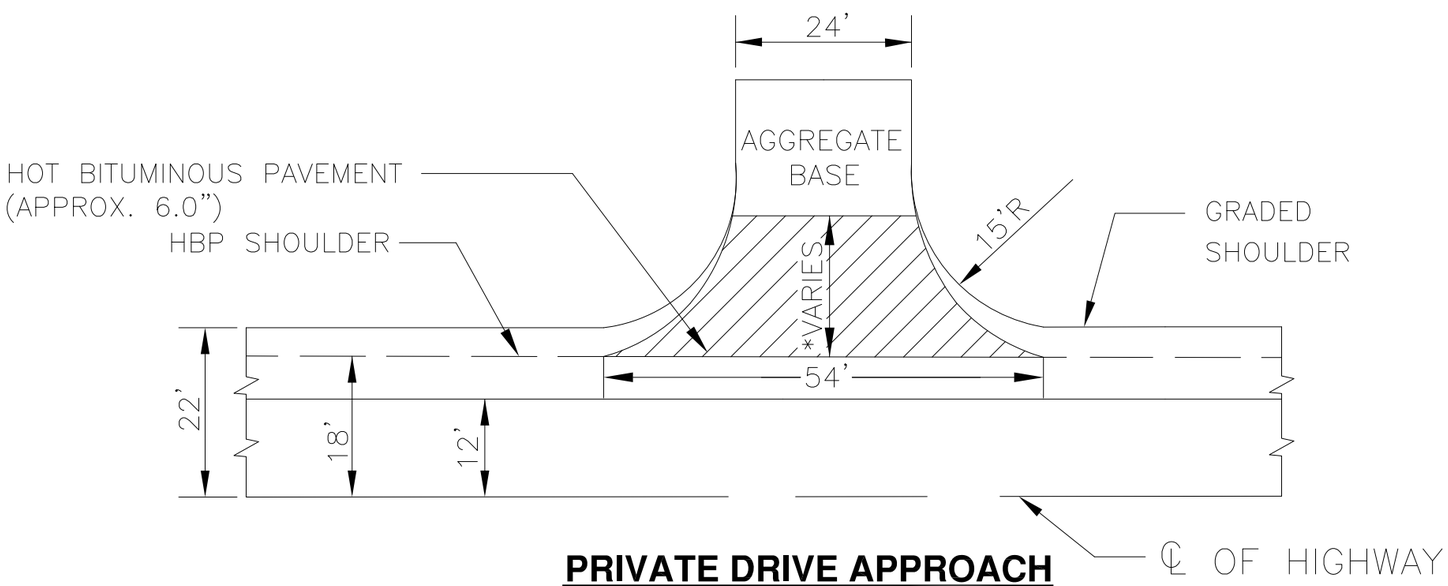
SECTION LINE APPROACH

NOT TO SCALE

℄ OF HIGHWAY

FIELD APPROACH

NOT TO SCALE



PRIVATE DRIVE APPROACH

NOT TO SCALE

℄ OF HIGHWAY

*** DIMENSIONS MAY VARY. ENGINEER IN FIELD SHALL DETERMINE EXACT LIMITS OF SURFACING AT ALL DRIVES AND APPROACHES.**

**** EXCAVATION COSTS REQUIRED TO EXTEND THE EXISTING APPROACHES SHALL BE INCLUDED IN THE SUBGRADE PREPARATION -TYPE A-SHOULDERS BID ITEM.**

PLACEMENT OF APPROACH PVMT:

PAVEMENT FOR APPROACHES SHALL BE PLACED AHEAD OF THE MAINLINE TOP LIFT PAVING OPERATION. NO COLD JOINT WILL BE ALLOWED BETWEEN THE MAINLINE AND APPROACHES.

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PROJECT NO. CH1505
APPROACH DETAILS

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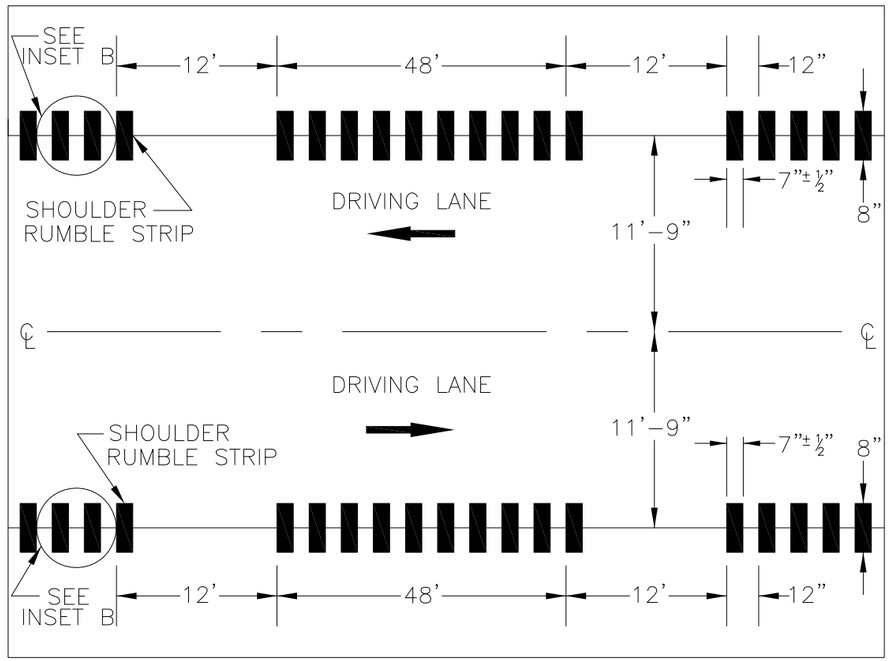
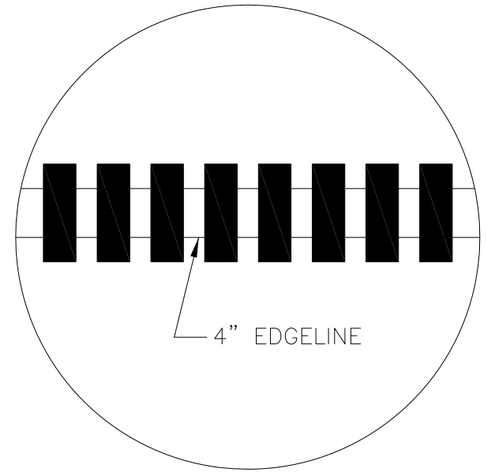
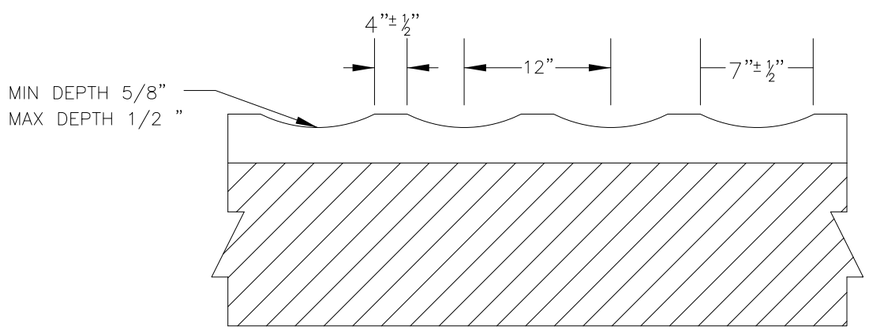
STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
N.D.	CH1505	19	26



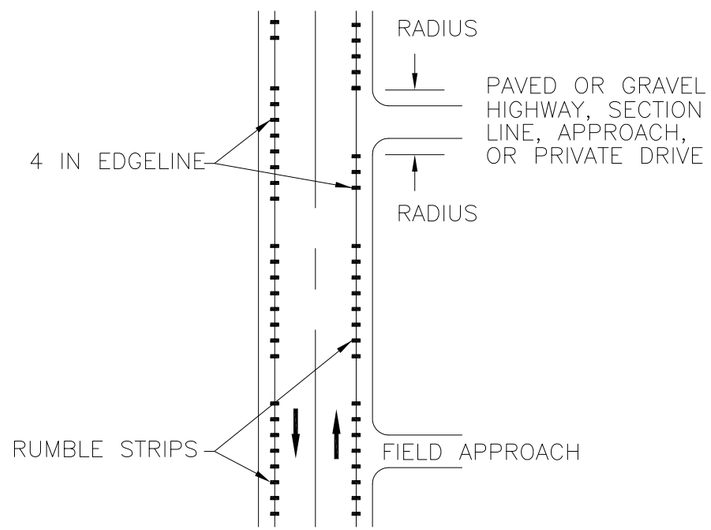
PLAN VIEW OF RUMBLE STRIPS



INSET B - SHOULDER RUMBLE STRIP



PROFILE VIEW OF RUMBLE STRIPS



ENTRANCE ROADWAYS

NOTES:

1) Rumble strips shall be milled into the bituminous paved shoulders. All milled materials shall be swept off of the driving lanes and paved shoulders using a mechanical sweeper. All costs for sweeping shall be included in the price bid for "RUMBLE STRIPS – ASPHALT SHOULDER."

2) Rumble strips milled into new or existing bituminous pavements shall be fog sealed across the full width of the milling with an application of SS–1h or CSS–1h emulsified asphalt at a rate of about 0.10 Gal/SY diluted 50/50 sprayed in both directions. All costs for fog sealing shall be included in the price bid for "RUMBLE STRIPS – ASPHALT SHOULDER."

3) Discontinue rumble strips across bridge decks and approach slabs, adjacent to guardrail, and 1/2 mile on either side of:
- highways with posted speeds 45 mph or less
- all urban areas
- areas with curb and gutter

4) Discontinue shoulder rumble strips through the entire length of right turn lanes, 100' before right turn lane tapers, and at the radius of a paved or gravel highway, section line, approach, or private drive.

5) All costs associated with the use of a paint dribble line for rumble strip alignment shall be included in the "RUMBLE STRIPS – ASPHALT SHOULDER" bid item.

RUMBLE STRIP DETAILS

NOT TO SCALE

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CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. CH1505
RUMBLE STRIP DETAILS

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STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
N.D.	CH1505	20	26

TRAFFIC CONTROL LEGEND

POST–MOUNTED SIGN

TYPE III BARR.

(A) ROAD WORK AHEAD
W20–1–48

(B) ROAD WORK 500 FT
W20–1–48

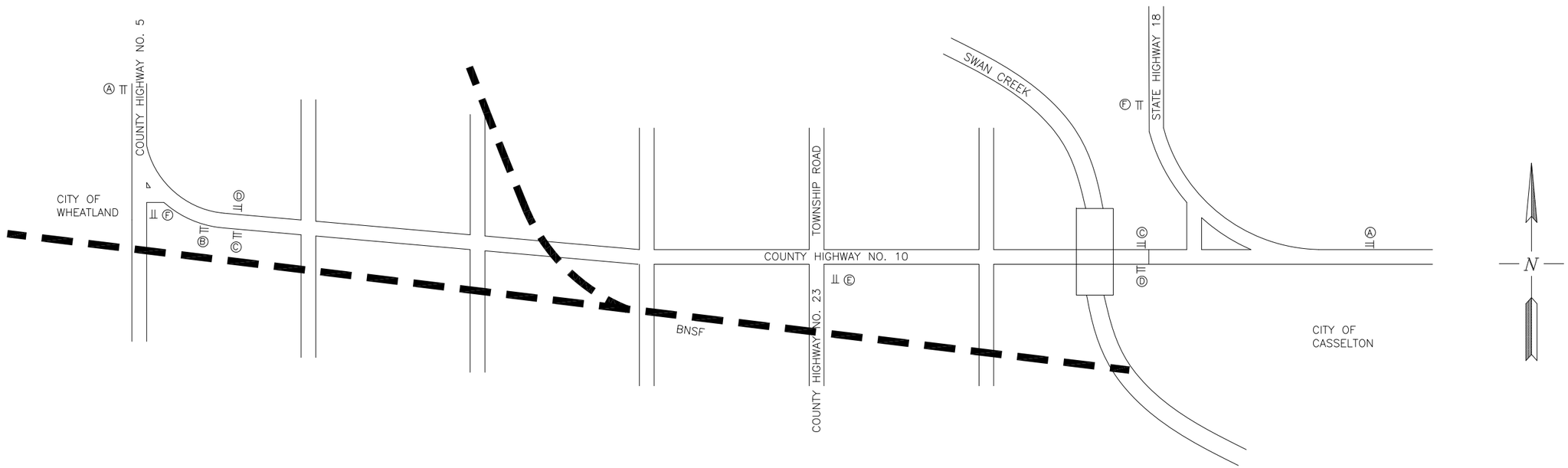
(C) ROAD WORK NEXT X MILES
G20–1a–60

(D) END ROAD WORK
G20–2a–48

(E) ROAD WORK ← NEXT X MILES NEXT X MILES →
G20–50a–72

(F) ROAD WORK NEXT X MILES →
G20–52a–72

(G) ROAD WORK ← NEXT X MILES
G20–52a–72



CONSTRUCTION SIGN LAYOUT

NOT TO SCALE
BITUMINOUS OVERLAY

*** NOTE: TRAFFIC CONTROL BID ITEM IS LUMP SUM AS PER NDDOT SPEC 704.06 B SEE SIGN LIST ON SHEET 22 FOR SIGN QUANTITIES.**

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CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. CH1505
CONSTRUCTION SIGN LAYOUT

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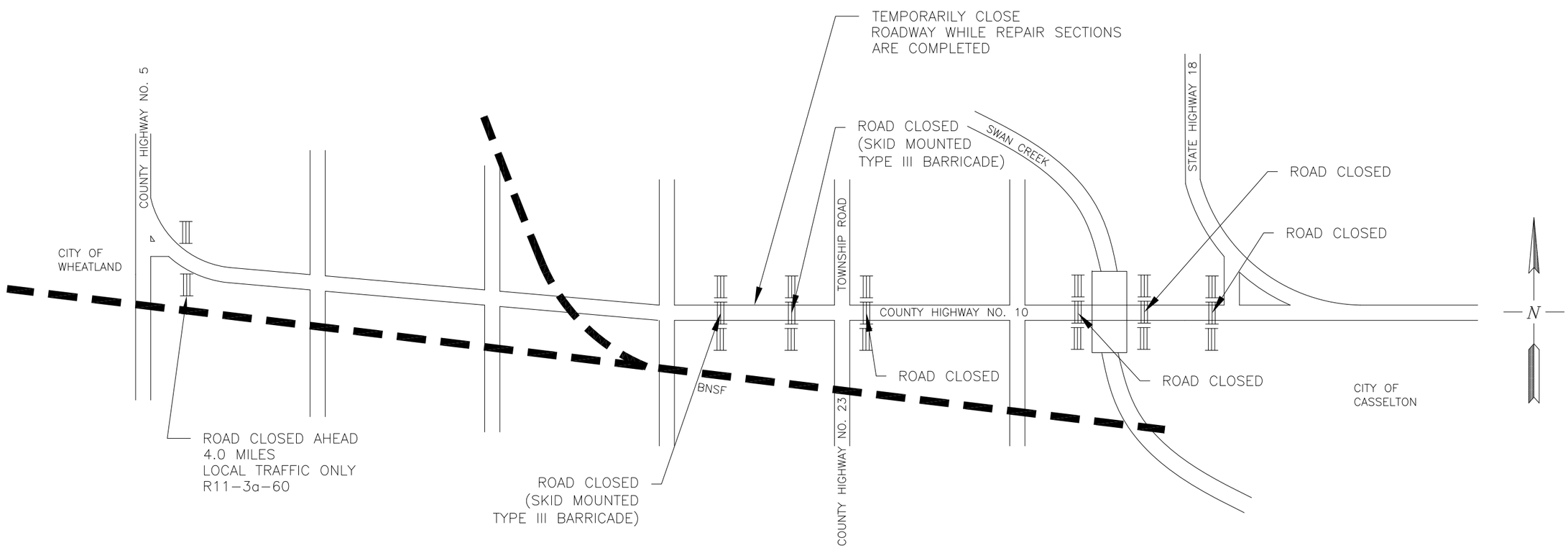
STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
N.D.	CH1505	21	26

TRAFFIC CONTROL LEGEND

POST–MOUNTED SIGN

TYPE III BARR.



CONSTRUCTION SIGN LAYOUT

NOT TO SCALE
BOX CULVERT REPLACEMENT
FULL DEPTH REPAIRS

*** NOTE: TRAFFIC CONTROL BID ITEM IS LUMP SUM AS PER NDDOT SPEC 704.06 B SEE SIGN LIST ON SHEET 22 FOR SIGN QUANTITIES.**

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CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. CH1505
CONSTRUCTION SIGN LAYOUT

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STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
N.D.	CH1505	22	26

PROJECT NO. CH1505

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQ'D	UNITS PER AMOUNT	UNITS SUB-TOTAL
G20-1a-60	**60" X 24"**	**ROAD WORK NEXT ___ MILES**	**2**	**34**	**68**
G20-2a-48	**48" X 24"**	**END ROAD WORK**	**2**	**19**	**38**
G20-4-36	**36" X 18"**	**PILOT CAR FOLLOW ME**	**1**	**18**	**18**
G20-50a-72	**72" X 36"**	**ROAD WORK NEXT ___ MILES RT & LT ARROWS**	**1**	**37**	**37**
G20-52a-72	**72" X 24"**	**ROAD WORK NEXT ___ MILES RT OR LT ARROWS**	**2**	**30**	**60**
G20-54-48	48" X 36"	OVERHEAD BRIDGE PAINTING		30	
G20-8-48	48" X 36"	TEMPORARY SURFACE NEXT ___ MILES		30	
M1-4-24	24" X 24"	ROUTE MARKER (POST AND INSTALLATION ONLY)		10	
M3-2-24	24" X 12"	EAST (MOUNTED ON ROUTE MARKER POST)		7	
M3-3-24	24" X 12"	SOUTH (MOUNTED ON ROUTE MARKER POST)		7	
M3-4-24	24" X 12"	WEST (MOUNTED ON ROUTE MARKER POST)		7	
M4-10-48	48" X 18"	DETOUR ARROW RIGHT or LEFT		23	
M4-8-24	24" X 12"	DETOUR (MOUNTED ON THE ROUTE MARKER POST)		7	
M5-1-21	21" X 15"	ARROW AHD AND RT or LT (MTD ON ROUTE MKR POST)		7	
M6-1-21	21" X 15"	ARROW RT or LT (MOUNTED ON ROUTE MARKER POST)		7	
R1-1-48	48" X 48"	STOP		32	
R1-1-30	30" X 30"	STOP		32	
R1-1a-18	**18" X 18"**	**STOP and SLOW PADDLE Back to Back**	**4**	**5**	**20**
R1-2-48	48" X 48"	YIELD TO ONCOMING TRAFFIC		29	
R2-1-48	48" X 60"	SPEED LIMIT		39	
R2-1a-24	24" X 24"	MINIMUM FEE $80		10	
R2-5a-48	48" X 60"	SPEED ZONE AHEAD		39	
R4-1-48	48" X 60"	DO NOT PASS		39	
R4-7-48	48" X 60"	KEEP RIGHT SYMBOL		39	
R4-8-48	48" X 60"	KEEP LEFT SYMBOL		39	
R10-6-48	48" X 72"	STOP HERE ON RED		16	
R11-2-48	**48" X 30"**	**ROAD CLOSED**	**6**	**28**	**168**
R11-2a-48	48" X 30"	STREET CLOSED		28	
R11-3a-60	**60" X 30"**	**ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY**	**1**	**31**	**31**
R11-3b-60	60" X 30"	BRIDGE OUT __ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-3c-48	60" X 30"	STREET CLOSED		31	
R11-4a-60	60" X 30"	STREET CLOSED TO THRU TRAFFIC		31	
W1-1-48	48" X 48"	RIGHT or LEFT SHARP CURVE ARROW		35	
W1-2-48	48" X 48"	RIGHT or LEFT CURVE ARROW		35	
W1-3-48	48" X 48"	RIGHT or LEFT SHARP REVERSE CURVE ARROW		35	
W1-4-48	48" X 48"	RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-6-48	48" X 24"	LARGE ARROW		26	
W3-1a-48	48" X 48"	STOP AHEAD SYMBOL		35	
W3-2a-48	48" X 48"	YIELD AHEAD SYMBOL		35	
W5-1-48	48" X 48"	ROAD NARROWS		35	

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQ'D	UNITS PER AMOUNT	UNITS SUB-TOTAL
W6-3-48	48" X 48"	TWO WAY TRAFFIC SYMBOL		35	
W8-11-48	**48" X 48"**	**UNEVEN LANES**	**10**	**35**	**350**
W8-1-48	**48" X 48"**	**BUMP**	**4**	**35**	**140**
W8-3a-48	48" X 48"	PAVEMENT ENDS SYMBOL		35	
W8-53-48	**48" X 48"**	**TRUCKS ENTERING HIGHWAY**	**4**	**35**	**140**
W8-54-48	48" X 48"	TRUCKS ENTERING AHEAD OR ___ FT.		35	
W8-55-48	48" X 48"	TRUCKS CROSSING AHEAD OR ___ FT.		35	
W8-9-48	48" X 48"	LOW SHOULDER		35	
W8-9a-48	**48" X 48"**	**SHOULDER DROP OFF**	**10**	**35**	**350**
W13-1-24	24" X 24"	___ MPH ADVISORY SPEED PLATE		11	
W13-4-48	48" X 60"	RAMP ARROW		39	
W20-1-48	**48" X 48"**	**ROAD WORK ___ FT.**	**3**	**35**	**105**
W20-1a-48	48" X 48"	MEN WORKING SYMBOL		35	
W20-2-48	48" X 48"	DETOUR ___ FT.		35	
W20-3-48	**48" X 48"**	**ROAD OR STREET CLOSED AHEAD or ___ FT.**	**4**	**35**	**140**
W20-4-48	48" X 48"	ONE LANE ROAD AHEAD or ___ FT.		35	
W20-51-48	48" X 48"	EQUIPMENT WORKING		35	
W20-52-54	54" X 12"	NEXT ___ MILES		12	
W20-5-48	48" X 48"	RIGHT or LEFT LANE CLOSED AHEAD or ___ FT.		35	
W20-7a-48	48" X 48"	FLAGGING SYMBOL		35	
W20-7b-48	48" X 48"	BE PREPARED TO STOP		35	
W20-7k-24	24" X 18"	___ FEET		10	
W20-8-48	48" X 48"	STREET CLOSED		35	
W21-2-48	48" X 48"	FRESH OIL		35	
W21-50-48	48" X 48"	BRIDGE PAINTING AHEAD OR ___ FT.		35	
W21-51-48	48" X 48"	MATERIAL ON ROADWAY		35	
W21-5-48	48" X 48"	SHOULDER WORK		35	
W22-7-48	48" X 48"	SINGLE LANE AHEAD or ___ FT.		35	
W22-8-48	48" X 48"	FRESH OIL LOOSE ROCK		35	
		TOTAL UNITS			**1,665**

				SPEC&CODE 704-1000	
TYPE III	**8' LONG**	**BARRICADES**	**EACH**	**704-1052**	**20**
TYPE II	2' MIN.	BARRICADES	EACH	704-1051	
TYPE I	6' TO 10'	BARRICADES	EACH	704-1050	
	18" X 36" MIN.	DELINEATOR DRUMS	EACH	704-1060	

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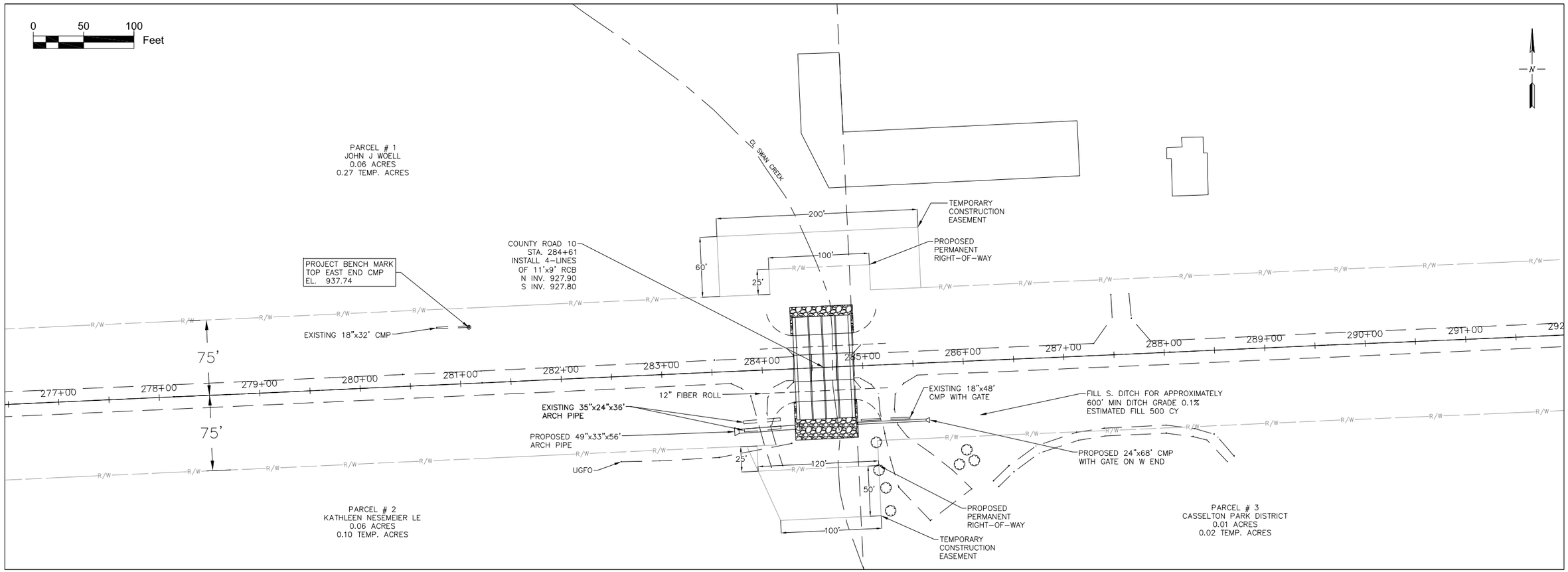

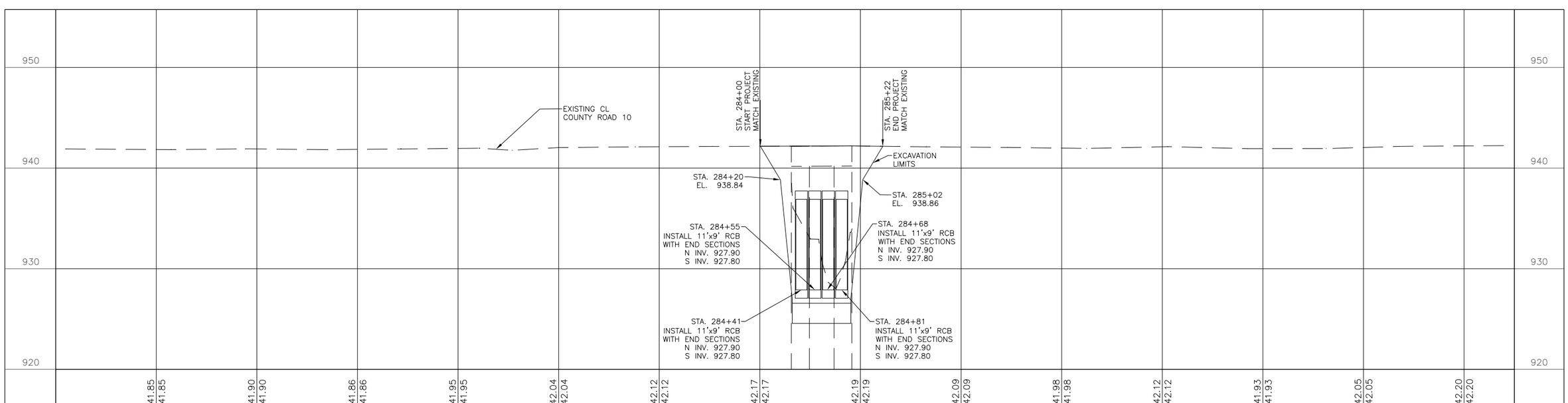

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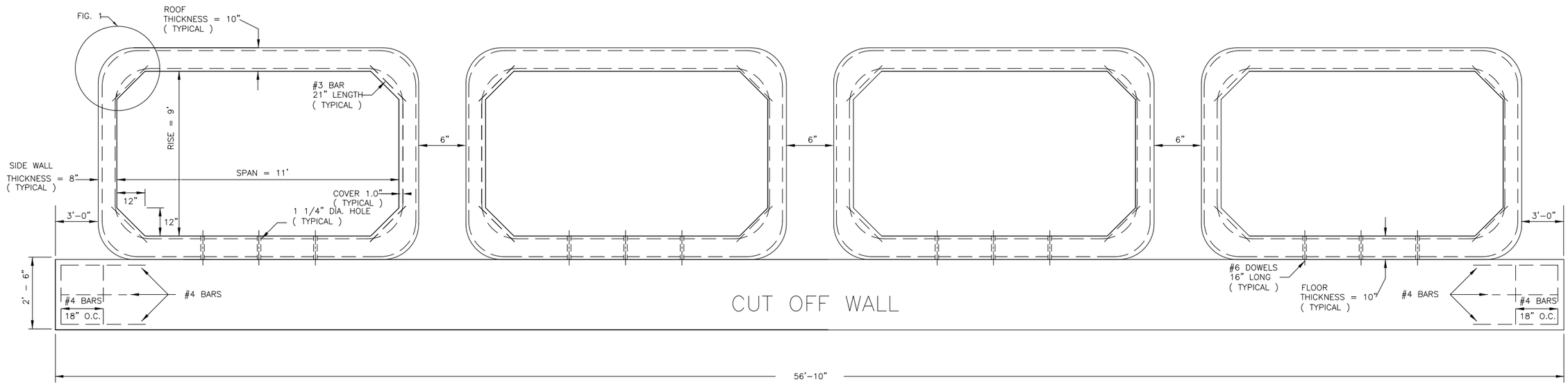
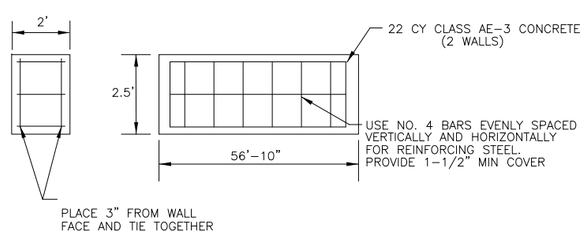
STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
N.D.	CH1505	24	26





CAST IN PLACE CUTOFF WALL DETAIL

NOT TO SCALE

LENGTH (FT)	AMOUNT
56.33	12
2.25	44
1.5	24
TOTAL LENGTH	811

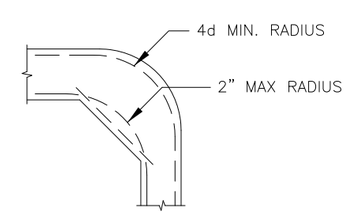
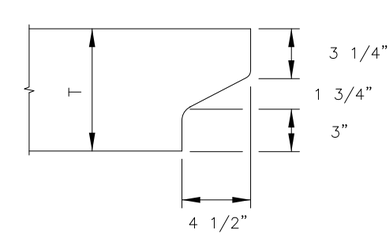


FIGURE 1



JOINT DETAIL

NOTES:
1. SECTIONS SHALL BE FASTENED USING TIE BARS.
2. AREA OF STEEL UNITS ARE IN SQ. IN. PER FT. ALL LAPS SHALL BE 14" UNLESS OTHERWISE STATED. REINFORCING SHALL MEET AASHTO M-55, AND SHALL BE GRADE 60. IF WELDED WIRE FABRIC IS USED , IT SHALL HAVE A YIELD STRENGTH OF 65,000 POUNDS PER SQUARE INCH.
3. THE TOP AND TWO OUTSIDE OF ALL JOINTS TO BE COVERED WITH A GEOTEXTILE FABRIC 24" WIDE. THE FABRIC IS TO BE HELD IN PLACE DURING BACK FILL PLACEMENT.
4. FLOOR HOLES ARE FOR ATTACHMENT TO CUT OFF WALL AND SHOULD BE USED AT END SECTIONS ONLY.

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CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. CH1505
BOX CULVERT DETAILS

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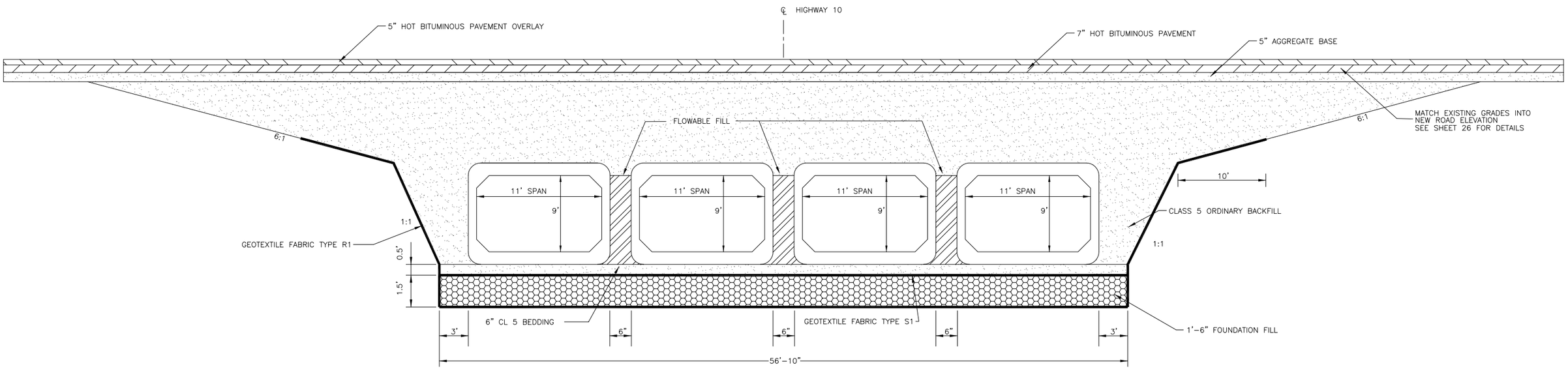
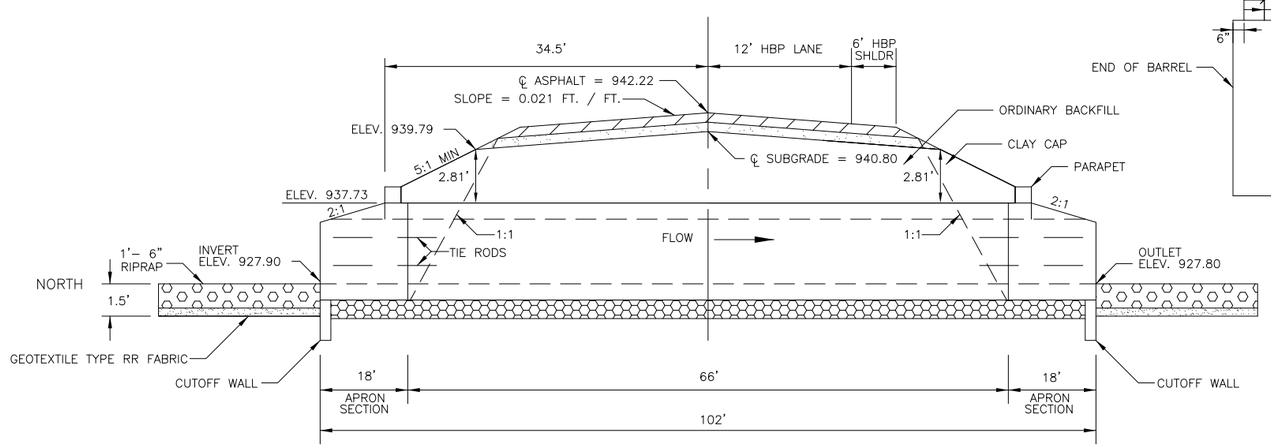
STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
N.D.	CH1505	25	26



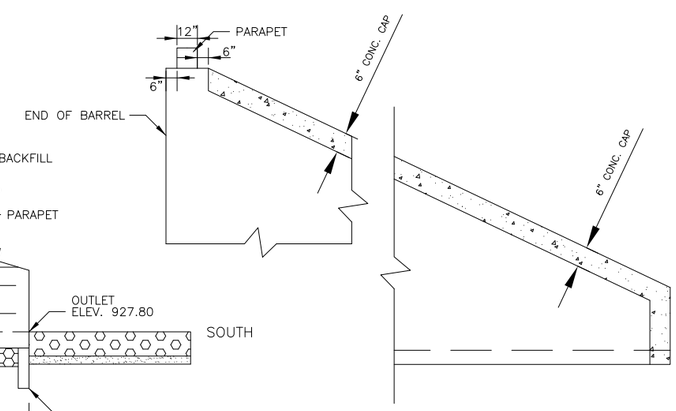
END VIEW

NOT TO SCALE

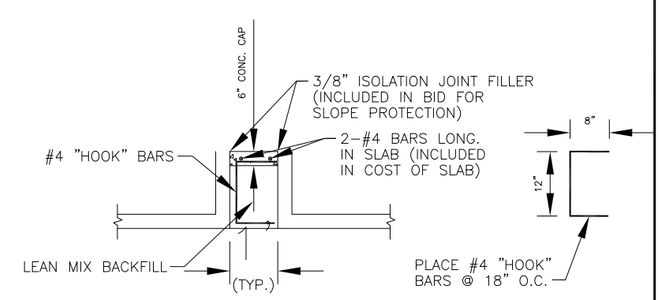


SIDE VIEW

NOT TO SCALE



NOTE:
ALL COSTS ASSOCIATED WITH PLACING CONCRETE CAP (INCLUDING REINFORCEMENT) TO BE INCLUDED IN THE PRICE BID FOR "FLOWABLE FILL"



CONCRETE CAP DETAILS

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CASS COUNTY HIGHWAY DEPARTMENT
PROJECT NO. CH1505
BOX CULVERT DETAILS

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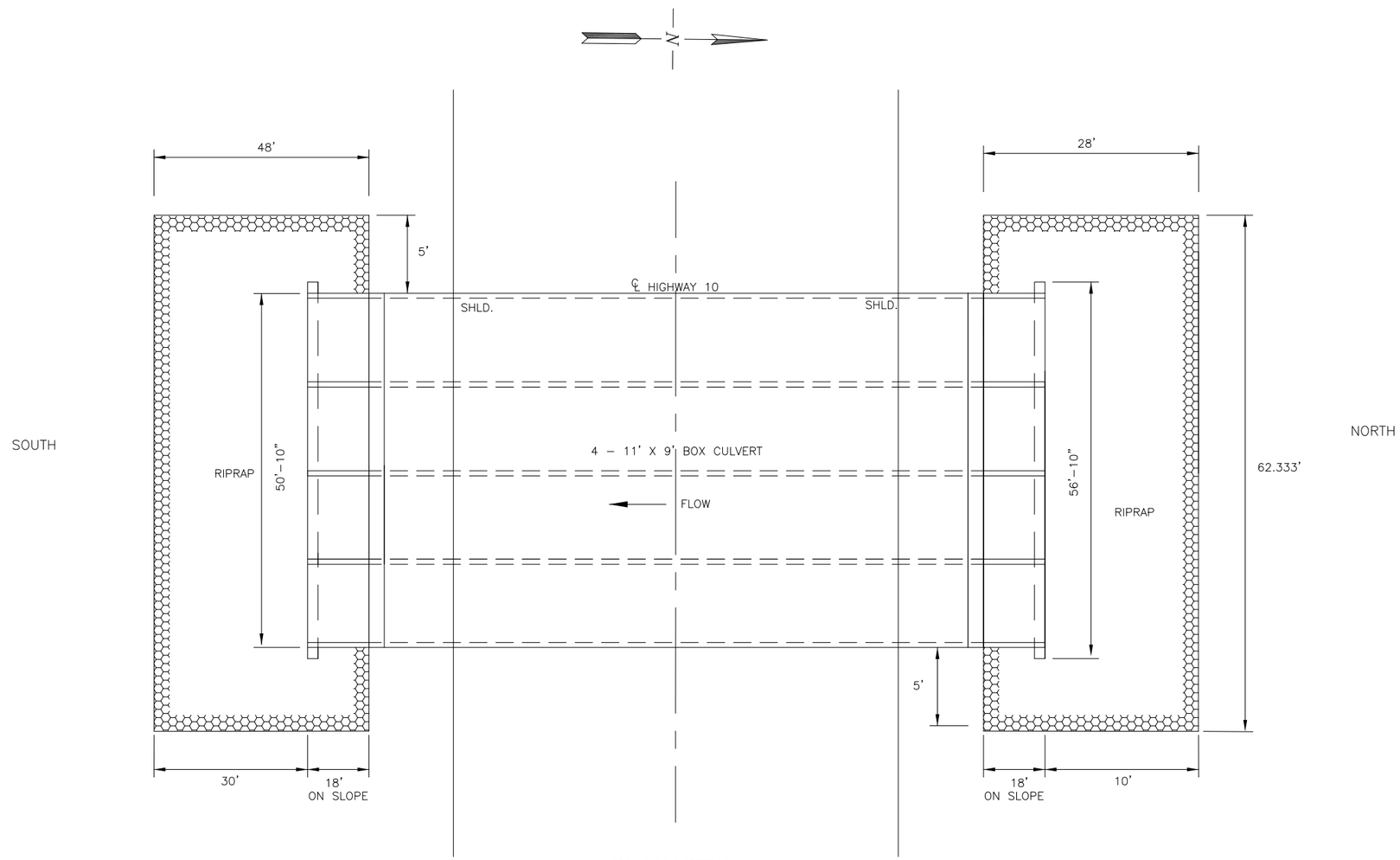
STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
N.D.	CH1505	26	26



PLAN VIEW

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