Asphalt Treated Permeable Base, I-89
Georgia, Vermont

Report 2005-1
September 2005

State of Vermont
Agency of Transportation
Materials and Research Section

Dawn Terrill, Secretary of Transportation
Rich Tetreault, Director of Program Development
Don Lathrop, Materials and Research Engineer

Prepared by:

Craig Graham
Research and Development Supervisor

Reviewed by:

William E. Ahearn
Research and Testing
Engineer

Date: Sept 13, 2005

TECHNICAL REPORT STANDARD TITLE PAGE

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12. Sponsoring Agency Name and Address **Vermont Agency of Transportation Materials and Research Section 1 National Life Drive Montpelier, VT 05633**		13. Type of Report and Period Covered **Construction and Field Observations** 14. Sponsoring Agency Code	
15. Supplementary Notes			

16. Abstract

This report discusses the construction and 6 year performance of an experimental asphalt treated permeable base on an interstate highway in Georgia, VT, as compared with a section that had its base material recrushed and recompacted in place.

Evaluative criteria included cracking, roughness and field observations. After six years of performance both sections exhibited somewhat low roughness values, although there appears to be a greater degree of roughness in the ATPB area. There is also more longitudinal cracking evident in the experimental area with no transverse cracking evident in any of the sections over the length of the test.

17. Key Words Pavement Permeable Base Construction	18. Distribution Statement		
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Form DOT F 1700.7 (8-69)

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Figures & Tables

Introduction:

In the early 1990's the Vermont Agency of Transportation determined that a section of Interstate 89 was in need of rehabilitation. To facilitate this process, a project was developed that was designed with full depth rehabilitation of the bituminous pavement between MM 106.90 and 111.00 in both the northbound and southbound barrels of the highway. This section had been in service for 30 years, having been constructed initially in 1968, with a 1" maintenance treatment of bituminous concrete installed in 1982. Since that time, the pavement had developed thermal related fatigue, which was evident by regularly spaced transverse cracking. The situation has also been aggravated by retention of moisture in the aggregate layer below the pavement. As a result the highway experienced distress due to frost action that negatively affected ride. The combination of poor ride and accelerated rate of deterioration were instrumental in determining a need rehabilitation on this section of highway

During the design stage of this particular rehabilitation project, designated as Georgia-Fairfax IM 089-3(26), the Vermont Agency of Transportation (VTrans) determined that this would be an opportune time to examine the performance of asphalt treated permeable base (ATPB) as a solution to the pavement distress, such as was experienced in this section of highway. Encouraged by reports of New York State DOT's success with this treatment, VTrans elected to use New York's material specifications and incorporate a 0.80-km (½ mile) test section of the material into a particularly troublesome area of the project, from MM 109.00 to 109.50 in the northbound lane (Appendix A, pages 10 -13)

Material Description

The ATPB layer placed on this project was designed in accordance with New York State DOT specification (see Appendix B, page 14). The planned pavement structure consisted of the following courses of materials (in ascending order):

- 6" Sand
- 24" Dense Graded Crushed Stone
- 4" Asphalt Treated Permeable Base
- 6" Bituminous Pavement (Type I S) (binder course)
- 3.5" Bituminous Pavement (Type III S over Type II S) (surface courses)

Drainage was designed into the project by placement of a 200-mm diameter perforated PVC underdrain located under the edge of each shoulder. (See Appendix A, pages 11-13). Theoretically, the stable voids of the permeable base course creates a porous layer where moisture can freely flow to the edge drains. Should this treatment prove successful it could become a useful addition to the state's pavement treatment inventory.

The rest of the northbound lane was designed using a reclaimed base method. This entailed remixing and compacting eight inches of the existing bituminous concrete and base course in both the travel and passing lanes. Two 3 inch layers of Type IS bituminous binder course were placed on top of the lifts. This was followed by a 2 inch layer of Type IIS and a 1½ inch wearing course of Type IIIS bituminous concrete. This design as well as the shoulder design is shown in the typical sections in the project plans in Appendix A (pages 11 to 13). The asphalt binder used was PG 64-28

Project Description

This project, Georgia- Fairfax IM 089-3(26), was constructed during the summer of 1998. It initially consisted of a full depth removal and reclamation of the existing bituminous pavement to the subbase, in order to improve the drainage patterns and the frost and moisture related distresses inherent to this section highway. The project extended from MM 106.90 to MM 111.00 in both the northbound and southbound lanes, with the experimental ATPB section being installed across both lanes and most of the shoulder (see typical in Appendix A) between MM 109.00 to MM 109.50 in the northbound lane only.

Initial Pavement Condition

The performance of the ATPB treatment has been evaluated by observing the pavement condition over time, identifying any developing crack patterns using procedures detailed in the *Distress Identification Manual for the Long-Term Pavement Performance Project* (SHRP-P-338). Prior to construction, three test sites were established in the ATPB treatment area, as well as three control sites outside of the test section for comparison. The control sites were reconstructed with a standard unbound base material. The test sites are 100 feet in length and within each test site the rate of cracking, expressed in feet of cracking per 100 feet, are measured. However, because of safety concerns, rutting data was not collected as part of this evaluation. In addition, International Roughness Index (IRI) values, expressed in inches per mile of roughness have also been collected to document pavement roughness. These data are being used to evaluate the performance of ATPB test section. Further evaluations may include rutting readings to better describe the pavement's condition.

Before removal of the existing pavement, a crack survey was performed in the test sites, with the following results:

1997 Pre Construction Cracking Data (feet/100feet)

	Control	Control	ATPB	ATPB	ATPB	Control
1997 Cracking	**MM 108.5**	**MM 108.7**	**MM 109.1**	**MM 109.25**	**MM 109.4**	**MM 109.7**
Centerline	0	0	0	0	0	0
Longitudinal	153	261	63	147	102	128
Tranverse	82	94	78	92	142	85
Miscelleanous	27	10	43	79	45	36
Total	262	365	184	318	289	249

Table 1 - Pre Construction Cracking

As shown in Table 1, the study area of the project had considerable cracking, with longitudinal cracking being predominate. However the most severe cracks noted were those that were transverse and occurring in roughly three meter intervals. Rutting also appeared to be severe through much of the roadway, however it was not measured. International Roughness Index (IRI) values appear in Table 2: (For comparison, locations one-half mile north and south of the experimental section were used).

Preconstruction IRI Readings I-89 Georgia Fairfax - 1997				
From	To	IRI Left Lane	IRI Right Lane	Average
Control South				
108.5	108.6	143	182	162
108.6	108.7	134	164	149
108.7	108.8	112	127	120
108.8	108.9	119	178	148
108.9	109	152	179	165
Experimental Area				
109	109.1	192	212	202
109.1	109.2	133	190	162
109.2	109.3	129	197	163
109.3	109.4	119	156	137
109.4	109.5	134	179	156
Control North				
109.5	109.6	185	231	208
109.6	109.7	164	173	169
109.7	109.8	151	152	151
109.8	109.9	158	179	169
109.9	110	166	182	174

Table 2- Preconstruction IRI Readings, I-89, Georgia-Fairfax -1997

Cost Data

In 1998, the ATPB treatment was placed at a cost of $30 per ton or $6.67 per square yard. The bid price appears to be in line with standard bituminous concrete ($33/ton) materials installed on interstate highway projects during this construction year.

Construction

The project commenced with a full removal by milling of the existing pavement in the summer of 1998. As discussed earlier, the project design called for using reclaimed stabilized base (RSB), however it was discovered that the substructure contained a significant percentage of cobbles in a fine aggregate matrix. As these were too large to be incorporated into the reclaimed stabilized base, it was decided that instead of proceeding as designed that it would be better to increase the amount of subbase material and not use reclaimed stabilized base.

Figure 1 - Application of ATPB

Throughout the project in the place of the RSB, six inches of the 18 inches subbase material was removed and recrushed offsite. It was then replaced on the top of the original subbase material. An additional six inches of new material was placed on top of this lift and compacted (Figure 1). In the experimental area the four inch ATPB layer was placed next, after which two 3" lifts of Type IS bituminous concrete were applied. A 2" binder course of Type IIS was placed next, with the final layer being a 1.5 inch wearing course of Type IIIS bituminous concrete. The project was completed by the end of the 1998 season.

Laboratory Testing

Bituminous Concrete samples were obtained as acceptance samples and transported back to the VTrans' Materials Laboratory for analysis. These included the ATPB sections as well as the standard bituminous concrete. All samples met contract specifications in gradation and asphalt content. PG 64-28 asphalt cement was also sampled and analyzed at the laboratory. These materials also met contract specifications.

Field Observations - Cracking

The project site was visited in October 2002. The results of these observations are listed in Table 3 (the centerline paving joint is not included in the totals):

2002 Cracking Data (feet/100feet)						
	Control	Control	ATPB	ATPB	ATPB	Control
	MM 108.5	MM 108.7	MM 109.1	MM 109.25	MM 109.4	MM 109.7
Centerline (Paving Joint)	28	59	21	9	100	48
Longitudinal	0	0	16	143	80	72
Transverse	0	0	0	0	0	0
Miscellaneous	0	0	0	0	3	0
Total (Distress Related Cracking)	0	0	16	143	83	72

Table 3 -2002 Cracking Data

Very little cracking was evident in the first two control test sites, with only centerline/paving joint cracking noted. Cracks were not significantly evident in the shoulders as well. Limited longitudinal cracking appeared in the third test site (MM109.10, the first in the experimental area); with more significant longitudinal cracking in the second and third ATPB sites as well as the final control site. This can be identified as an 88-foot long crack located 1 to 1.5 feet from the centerline paving joint in test site 109.25. Few other types of cracks were noted within the test area. All of these cracks had also been sealed as part of the statewide crack seal project, and appear to be related to the center and right edge paving joints (Se Figures 2 and 3).

Figure 2 - Typical Control Site (MM 108.70)

Figure 3- ATPB Site (MM 109.25) (note paving joints and sealed crack locations)

The project was reinspected after two additional years of service both in October 2004. These results of these inspections are listed in Table 4:

2004 Cracking Data(feet/100feet)						
	Control	Control	ATPB	ATPB	ATPB	Control
	MM 108.5	MM 108.7	MM 109.1	MM 109.25	MM 109.4	MM 109.7
Centerline (Paving Joint)	100	100	100	100	100	100
Longitudinal	100	108	122	153	143	104
Transverse	0	0	0	0	0	0
Miscellaneous	0	0	0	4	5	0
Total (Distress Related Cracking)	100	108	122	157	148	104

Table 4- 2004 Cracking Data

The pattern exhibited in 2002 continues to become more apparent when these results are reviewed. A large majority of this cracking noted in this inspection is incidental to the paving joints at both the centerline and the right edge of the pavement. In each of the sections cracks incidental to the right edge line and the center line paving joints were evident through the entire 100 feet sections. When these results are removed from the data table the results indicates a trend of increased cracking in the ATPB area, although the counts are low.

2004 Cracking Data (no joint or centerline cracking)						
	Control	Control	ATPB	ATPB	ATPB	Control
	MM 108.5	MM 108.7	MM 109.1	MM 109.25	MM 109.4	MM 109.7
Centerline (Paving Joint)	0	0	0	0	0	0
Longitudinal	0	8	22	53	43	4
Transverse	0	0	0	0	0	0
Miscellaneous	0	0	0	4	5	0
Total (Distress Related Cracking)	0	8	22	57	48	4

Table 5 – 2004 Cracking data (minus paving joint and centerline cracking)

One of the major problems of this section of interstate highway before reconstruction was the earlier mentioned thermal related transverse cracking and frost related heaves. As of the inspection of October 2004 there is no evidence of any transverse cracking throughout the any of the test sites in this project. This includes both the experimental area and the control location immediately to north and south of the test section. Therefore at this point, it is unclear if the ATPB treatment has had any effect on reducing these types of cracks.

Roughness

Roughness was measured using a Dynatest 5051 Mark II Road Surface Profiler. Roughness measurements were taken every tenth of a mile. As discussed earlier the IRI values were very comparable throughout the control and experimental areas prior to construction. The control areas averaged 162 in/mi (average of both sections), ranging from a low of 120 in/mi to a high of 208 in/mi. The experimental area (MM 109.00 to 109.50) was very comparable with an average of 164 in/mi and a range of 137 to 202 in/mi over its half mile length. However the values measured varied greatly over this 1.5 mile section. This is illustrated in the graph in Figure 4.

At the 4 year inspection, the roughness values exhibited a consistent pattern in both the control and experimental areas. This pattern is shown in Figure 4 and Table 6. The IRI values in the control sections averaged 52 in/mi with a low of 41 and a high of 60 in/mi, with the experimental area exhibiting similar values and averaging 50 in/mi with the same sample range of 41 to 60 in/mi.

Figure 4 also shows the six year (2004) data for roughness in the experimental and two control areas. While the graph indicates that, on the average, the 2004 and 2002 readings are comparable, this can be misleading. Table 6 shows that, most all of the recorded roughness values decreased from the 2002 survey. This includes all values recorded in the travel lane and 10 of 15 values recorded in the passing lane.

In order to make additional conclusions, more data both in frequency of sampling and number of datasets, will be needed. When comparing the various roughness values with each other it is difficult, due to the small sample size, to make any inferences about trends

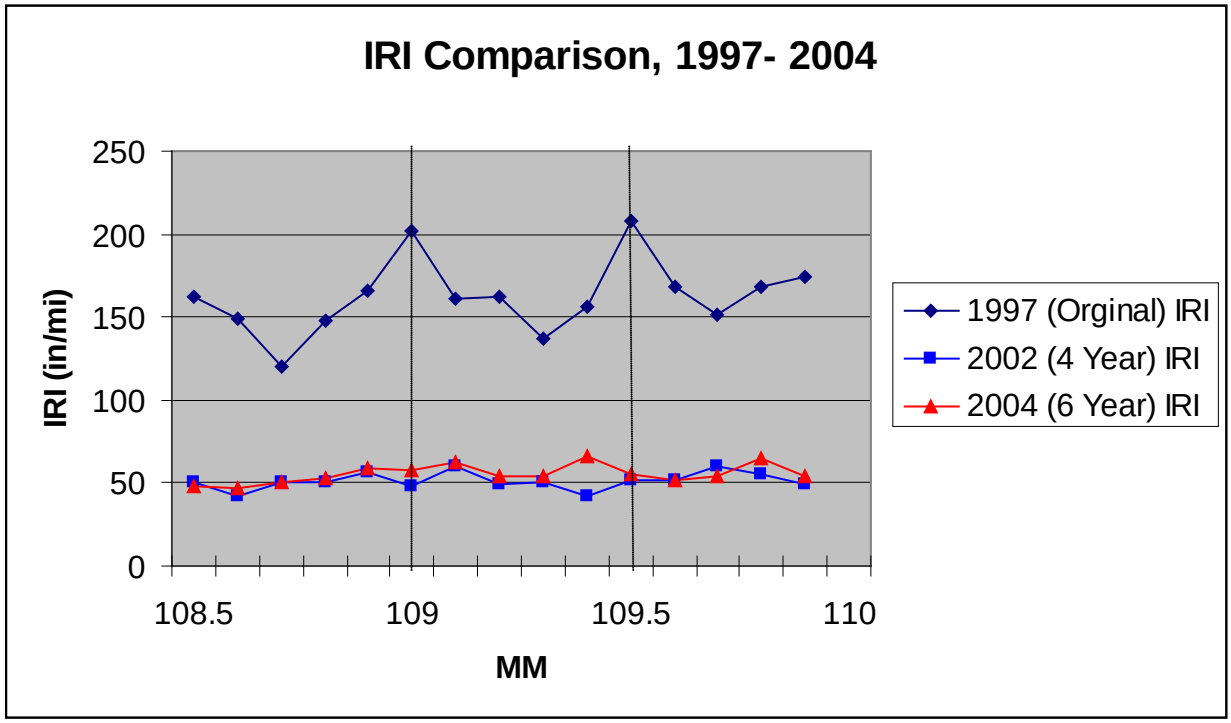


Figure 4- IRI comparison data

Follow Up

As of 2004, the data indicates a number of trends. Of primary concern is the crack counts results, which infer that increased cracking of the ATPB over the standard control section could be expected as the projects ages. One area of note is at MM 109.10, where pavement distress, though not yet a crack, was evident near the centerline paving joint. This is shown in both Figures 5 and 6. Areas like these were not present in the control areas north and south of the experimental location.

Figure 5 - Overview of Cracking in ATPB

Figure 6 - Distress in Test Site at MM 109.10

Assessing the roughness on this section of highway is difficult at this time. On interstate highways data is typically obtained in both the travel and passing lanes at 0.10 mile intervals. After carefully examining the IRI data collected for I-89 northbound between MM 108.5 through 110, it is clear that additional data is needed to make an assessment. IRI values are expected in increase in value over time due to typical aging and wear on the pavement surface. In addition, any cracking or rutting is also expected to increase over time which will affect IRI values.

While the half mile segment of ATPB and the control areas were somewhat comparable both prior to construction and four years after the project was completed, the data collected shows an unanticipated downward trend as the majority of the IRI values decreased between 2002 and 2004(see Table 6). The only increases occurred in the left, or passing, lane. All IRI decreased on the travel lane for both the control and experimental sections. Due to the unexpected downward trend it is recommended that additional IRI values be collected. Therefore, in an effort to better describe this trend, the frequency of the readings will be increased to gather at least 50 values each in the experimental and two control sections.

The ATPB section of I-89 will continue to be examined on a biennial basis to track the performance of this experimental material. Additional test locations in adjacent projects may also be included in the study. The focus of this investigation will be to determine if the ATPB treatment will prolong the service life to the bituminous pavement. Data collection of crack counts will be gathered in the 2005 constructions season. Increased frequency of IRI measurements will be undertaken to better describe roughness. Rutting measurements may also be taken to better describe the performance of the experimental and control treatments. Particular attention will be placed on the performance of the entire ATPB and control areas and their relationship to the test sites.

IRI Values for I-89 SB Bewtween MM 108.5 through MM 110										
Collection Year:		1997 (Preconstruction)			2002			2004		
From MM	To MM	Left Lane	Right Lane	Average	Left Lane	Right Lane	Average	Left Lane	Right Lane	Average
Control Section										
108.50	108.60	143.19	181.84	162.20	69.06	79.20	74.13	**52.00**	**45.00**	**48.50**
108.60	108.70	133.69	164.10	148.90	70.33	67.80	69.06	**54.00**	**40.50**	**47.25**
108.70	108.80	112.15	126.72	119.75	58.92	55.12	57.02	**53.50**	**47.50**	**50.50**
108.80	108.90	119.12	178.04	148.26	49.42	56.39	52.91	**53.00**	**53.00**	**53.00**
108.90	109.00	152.06	179.31	165.37	67.16	72.86	70.01	**67.00**	**50.00**	**58.50**
Ave		132.04	166.00	148.90	62.98	66.27	64.63	**55.90**	**47.20**	**51.55**
StDev				18.02			9.14			4.45
Experimental Section										
109.00	109.10	191.98	212.26	202.12	65.89	79.83	72.86	67.00	**49.50**	**58.25**
109.10	109.20	133.06	190.08	161.57	55.12	65.26	60.19	64.50	**61.50**	**63.00**
109.20	109.30	129.25	197.05	162.84	62.09	83.64	72.86	**56.00**	**52.00**	**54.00**
109.30	109.40	119.12	155.87	137.49	67.16	83.64	75.40	**59.50**	**49.00**	**54.25**
109.40	109.50	133.69	179.31	156.50	58.29	73.50	65.89	87.50	**45.00**	**66.25**
Ave		141.42	186.91	164.10	61.71	77.17	69.44	**57.75**	**51.40**	**59.15**
StDev				23.55			6.27			5.40
Control Section										
109.50	109.60	185.01	231.26	207.82	58.29	74.13	66.21	62.50	**48.00**	**55.25**
109.60	109.70	164.10	172.97	168.54	63.99	91.87	77.93	**50.00**	**54.00**	**52.00**
109.70	109.80	150.80	152.06	151.43	55.12	70.96	63.04	**52.00**	**56.50**	**54.25**
109.80	109.90	157.77	179.31	168.54	73.50	89.34	81.42	**71.00**	**59.50**	**65.25**
109.90	110.00	166.00	181.84	174.24	53.86	62.09	57.97	59.00	**49.00**	**54.00**
Ave		164.74	183.49	174.11	60.95	77.68	69.32	**57.67**	**53.40**	**56.15**
StDev				20.69			9.98			5.22

Table 6 - Rollup of IRI Values (All Values in in/mi)

Notes:

Bold - Denote IRI values that decrease from previous collection yr.

INDEX OF SHEETS
SEE SHEET 2

STATE OF VERMONT
AGENCY OF TRANSPORTATION

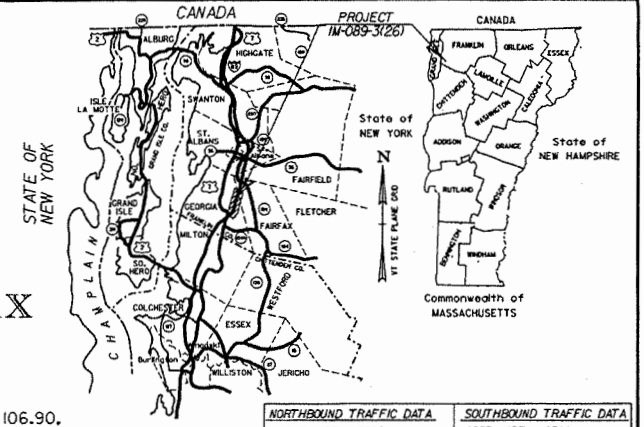
PROPOSED IMPROVEMENT
TOWNS OF GEORGIA AND FAIRFAX
COUNTY OF FRANKLIN
INTERSTATE ROUTE 89

RECORD PLANS

CONTRACTOR: MORRILL CONST. INC. N. HAVERHILL, N.H.
RESIDENT ENGINEER: STANCLIFF, RONALD
CONSTRUCTION BEGAN: SEPT 2, 1997
CONSTRUCTION COMPLETED: NOVEMBER 8, 1999
RECORD PLANS BY: CADD

I HEREBY CERTIFY THAT ALL THE CONSTRUCTION REQUIRED BY THIS SET OF DRAWINGS HAS BEEN ACCOMPLISHED AS INDICATED HEREIN.
BY _____ RESIDENT ENGINEER
DATE 1-13-04

NOTE: Any further information concerning final quantities, amounts or other details relative to this project may be found on microfilm in Central Files.



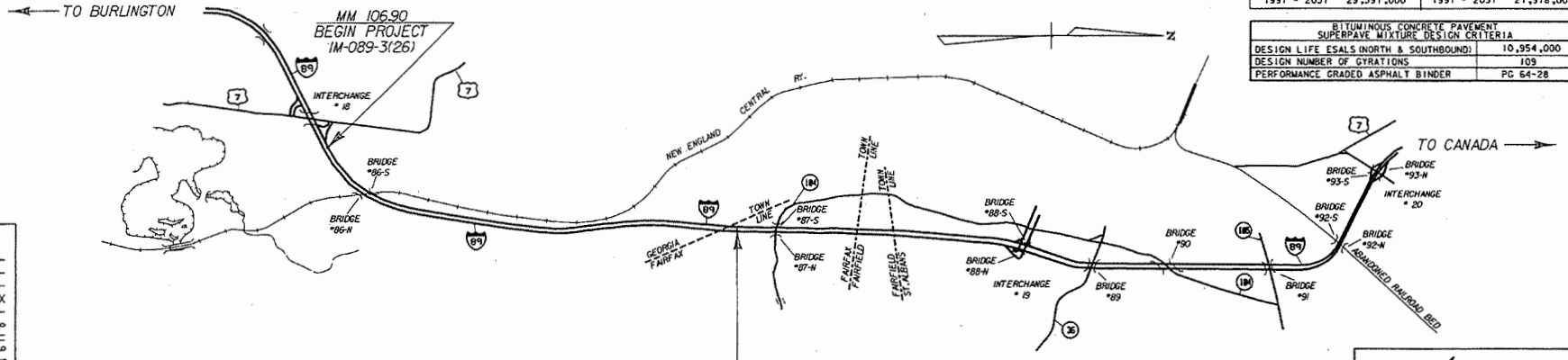
BEGINNING IN THE TOWN OF GEORGIA AT NORTHBOUND AND SOUTHBOUND MM 106.90, CONTINUING NORTHERLY 4.10 MILES, ENDING IN THE TOWN OF FAIRFAX AT NORTHBOUND AND SOUTHBOUND MM 111.00

LENGTH OF ROADWAY 21,648.00 FEET = 4.10 MILES
LENGTH OF PROJECT 21,648.00 FEET = 4.10 MILES

THIS PROJECT CONSISTS OF REPLACING THE EXISTING PAVEMENT AND SHOULDERS WITH NEW BITUMINOUS CONCRETE PAVEMENT, RECLAIMING THE SUBBASE, INSTALLING NEW GUARD RAIL, NEW DRAINAGE AND REHABILITATION OF EXISTING DRAINAGE, REHABILITATION OR REPLACEMENT OF R.O.W. FENCE, NEW SIGNS, AND OTHER RELATED SAFETY ENHANCEMENTS ON THE NORTHBOUND AND SOUTHBOUND LANES.

NORTHBOUND TRAFFIC DATA		SOUTHBOUND TRAFFIC DATA	
1997 ADT	6990	1997 ADT	6710
1997 DHV	1025	1997 DHV	985
1997 ADTT	930	1997 ADTT	710
1997 % T	7.0	1997 % T	8.0
2017 ADT	10480	2017 ADT	10070
2017 DHV	1430	2017 DHV	1380
2017 ADTT	1485	2017 ADTT	1130
2017 % T	7.0	2017 % T	9.0
D	64%	D	64%
V	TO MPH	V	TO MPH
18 KIP ESAL'S (FLEXIBLE)		18 KIP ESAL'S (FLEXIBLE)	
1997 - 2017	10,954,000	1997 - 2017	8,165,000
1997 - 2037	29,391,000	1997 - 2037	21,978,000

BITUMINOUS CONCRETE PAVEMENT SUPERPAVE MIXTURE DESIGN CRITERIA	
DESIGN LIFE ESALS (NORTH & SOUTHBOUND)	10,954,000
DESIGN NUMBER OF GYRATIONS	109
PERFORMANCE GRADED ASPHALT BINDER	PG 64-28



CONVENTIONAL SIGNS
COUNTY LINE
TOWN LINE
LIMITS OF ACCESS
POINT OF ACCESS
FENCE LINE
STONE WALL
TRAVELED WAY
GUARD RAIL
RAILROAD
SURVEY LINE
CULVERT
POWER POLE
TELEPHONE POLE
TREES
CONTROL OF ACCESS
PROPERTY LINE
R.O.W. TAKING LINE
SLOPE RIGHTS
TOP OF CUT
TOE OF SLOPE

DATUM
VERTICAL N/A
HORIZONTAL N/A

dp00711p.l

THESE PLANS ARE SUBJECT TO SUCH ENGINEERING CHANGES AS MAY BE REQUIRED BY THE FEDERAL HIGHWAY ADMINISTRATION OR THE CHIEF ENGINEER.
CONSTRUCTION IS TO BE CARRIED ON IN ACCORDANCE WITH THESE PLANS AND THE STANDARD SPECIFICATIONS FOR CONSTRUCTION DATED 1990, AS APPROVED BY THE FEDERAL HIGHWAY ADMINISTRATION ON MARCH 15, 1990 FOR USE ON THIS PROJECT, INCLUDING ALL SUBSEQUENT REVISIONS AND SUCH REVISED SPECIFICATIONS AND SPECIAL PROVISIONS AS ARE INCORPORATED IN THESE PLANS.

DATED PLOTTED: 26-MAR-1997

APPROVED _____ DATE 4/9/97
DIRECTOR OF ENGINEERING

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
APPROVED _____ DATE 4-2-97
DIVISION ADMINISTRATOR

PROJECT GEORGIA - FAIRFAX
IM-089-3(26)
SHEET 1 OF 121 SHEETS

NORMAL TYPICAL SECTION USING PERMEABLE BASE

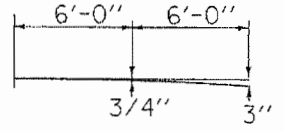
NORTHBOUND MM 109.00 TO MM 109.50 (NB STA. 3173+38 ~ 3199+78*)

THE FOLLOWING PROCEDURE WILL BE DONE FIRST:
COLD PLANE ENTIRE DEPTH OF EXISTING BITUMINOUS PAVEMENT (8"-9");
REMOVE 1"- 2" OF EXISTING STONE DUST SUBBASE MATERIAL TO ALLOW FOR NEW PERMEABLE BASE.
(POSSIBLY ADDITIONAL MATERIAL TO BE REMOVED TO MATCH GRADE AT MM 109.00
AND MM 109.50, AS DIRECTED BY THE ENGINEER)
SCARIFY, REGRADE, AND RECOMPACT. (THIS SCARIFYING, REGRADING, & RECOMPACTING IS TO BE PAID UNDER ITEM 212.20, SCARIFYING PAVEMENT--MODIFIED.)

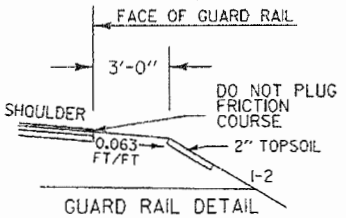
MATERIAL ITEM	THICKNESS TOLERANCE
PAVEMENT (TOTAL DEPTH)	± 1/4"
SUBBASE	± 1"

NEW PAVEMENT - ~~¾" OPEN GRADED ASPHALT FRICTION COURSE~~
3½" BITUMINOUS CONCRETE PAVEMENT (1½" TYPE III S OVER 2" TYPE II S)
6" BASE COURSE OF BITUMINOUS CONCRETE PAVEMENT, TYPE I S (TWO 3" LIFTS)
4" PLANT MIXED BASE COURSE (MODIFIED, PERMEABLE BASE)

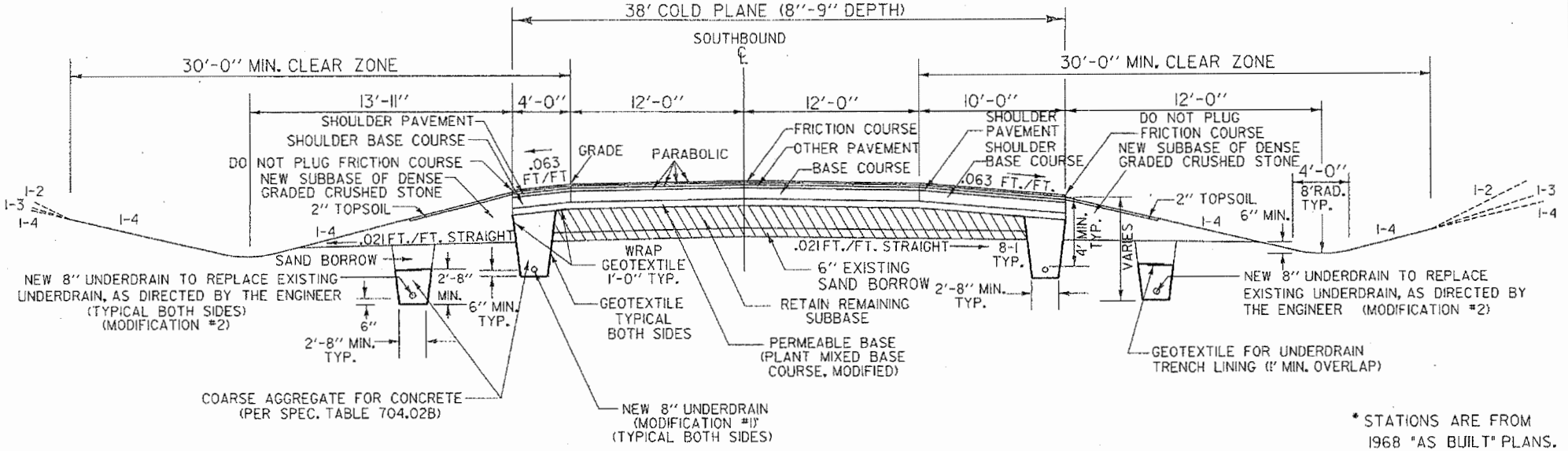
SHOULDERS: ~~¾" OPEN GRADED ASPHALT FRICTION COURSE~~
3½" BITUMINOUS CONCRETE PAVEMENT (1½" TYPE III S OVER 2" TYPE II S)
6" BASE COURSE OF BITUMINOUS CONCRETE PAVEMENT, TYPE I S (TWO 3" LIFTS)
4" PLANT MIXED BASE COURSE (MODIFIED, PERMEABLE BASE)



PARABOLIC DETAILS



GUARD RAIL DETAIL



* STATIONS ARE FROM 1968 "AS BUILT" PLANS.

PROJECT: GEORGIA - FAIRFAX	PROJECT NO.: IM-089-3(26)
DESIGN FILE NAME: /SODB/STA007A/DA007FRM.DGN	
XPARM FILE NAME: DA007TY6	PLOT DATE: 3-JUN-1997
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER: DELLA SANTA	DRAWN BY: SQUAD B
	SHEET: 5 OF

SOUTHBOUND NORMAL TYPICAL SECTION

SB MM 107.56 TO MM 110.74 (SB STA. 3098+37 ~ 3266+49*)

5" COLD PLANE

~~8" RECLAIMED STABILIZED BASE (COARSE AGGREGATE FOR CONCRETE ADDED WHEN NECESSARY TO ATTAIN DESIRED GRADATION, REFER TO SUPPLEMENTAL SPECIFICATION 310.20, RECLAIMED STABILIZED BASE.)~~

NEW PAVEMENT - ~~¾" OPEN GRADED ASPHALT FRICTION COURSE~~

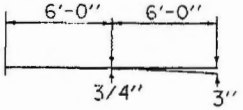
3½" BITUMINOUS CONCRETE PAVEMENT (1½" TYPE III S OVER 2" TYPE II S)

6" BASE COURSE OF BITUMINOUS CONCRETE PAVEMENT, TYPE I S (TWO 3" LIFTS)

SHOULDERS: ~~¾" OPEN GRADED ASPHALT FRICTION COURSE~~

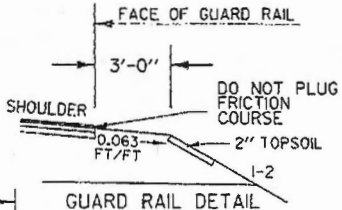
3½" BITUMINOUS CONCRETE PAVEMENT (1½" TYPE III S OVER 2" TYPE II S)

NOTE:
SB MM 106.90 TO MM 107.36 SHALL BE COLD PLANED ½" AND OVERLAID WITH ¾" OPEN GRADED ASPHALT FRICTION COURSE OVER 1½" BITUMINOUS CONCRETE PAVEMENT, TYPE III S. (38' WIDTH)

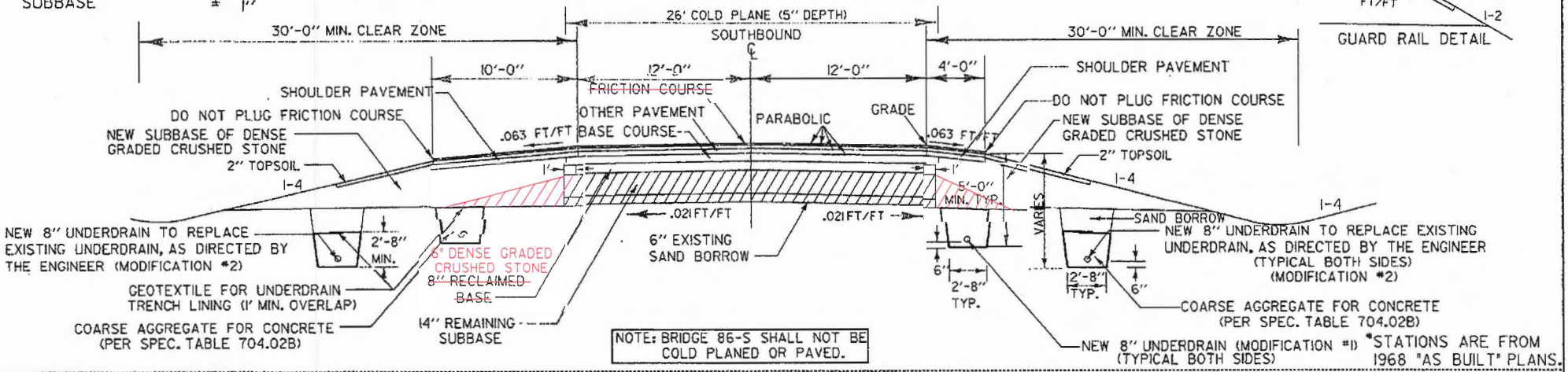


PARABOLIC DETAILS

MATERIAL ITEM	THICKNESS TOLERANCE
PAVEMENT (TOTAL DEPTH)	± 1/4"
SUBBASE	± 1"



GUARD RAIL DETAIL



NOTE: BRIDGE 86-S SHALL NOT BE COLD PLANED OR PAVED.

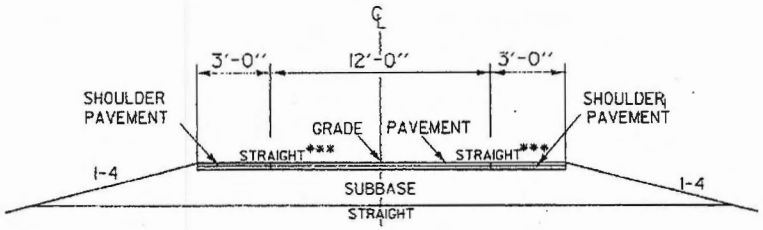
*STATIONS ARE FROM 1968 "AS BUILT" PLANS.

CROSSOVER TYPICAL SECTION

3½" BITUMINOUS CONCRETE PAVEMENT (1½" TYPE III OVER 2" TYPE II) (PG 64-28)

15" SUBBASE OF ACCEPTABLE GRAVEL MATERIAL

SHOULDERS: 3½" BITUMINOUS CONCRETE PAVEMENT (1½" TYPE III OVER 2" TYPE II) (PG 64-28)



***CROSS SLOPE VARIES ACCORDING TO BANKING.

NOT TO SCALE

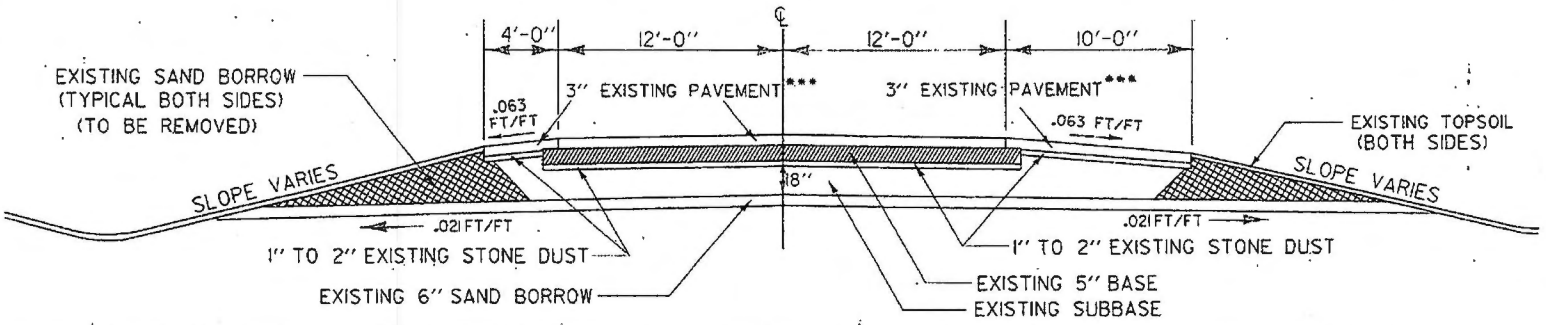
PROJECT: GEORGIA - FAIRFAX	PROJECT NO.: IM-089-3(26)
DESIGN FILE NAME: /SODB/8TA00TA/DA00TFRM.DGN	
IPARM FILE NAME: DA00TTY2	PLOT DATE: 15-MAY-1997
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER: DELLA SANTA	DRAWN BY: SQUAD B
	SHEET: 4 OF 121

EXISTING TYPICAL SECTION

MM 106.90 TO MM 111.00 (NB & SB)

(FOR REFERENCE ONLY)

*** FROM 1968 "AS BUILT" PLANS. SINCE THEN, A 1" OVERLAY HAS BEEN ADDED.



SEEDING FORMULA
RURAL AREAS

% WT.	LBS./A.	NAME	PUR %	GERM %
37.5	22.5	CREEPING RED FESCUE	98	85
37.5	22.5	TALL FESCUE	95	90
5.0	3.0	RED TOP	85	90
15.0	9.0	BIRDSFOOT TREFOIL	98	85
5.0	3.0	ANNUAL RYEGRASS	95	85
100.0	60.0			

GENERAL NOTES

SEED MIXTURE: SHALL NOT HAVE A WEED CONTENT EXCEEDING 0.40% BY WEIGHT AND SHALL BE FREE OF ALL NOXIOUS SEED.

SEED: TO BE APPLIED PER SEEDING FORMULAS OR AS DIRECTED BY THE ENGINEER.

FERTILIZER: FORMULA 10-20-10. TO BE USED WITH SEED, APPLIED AT THE RATE OF 500 LBS./ACRE. HYDRO SEEDERS MAY USE 19-19-19 FORMULA.

AGRICULTURAL LIMESTONE: TO BE APPLIED AT THE RATE OF 2 TONS/ACRE, OR AS DIRECTED BY THE ENGINEER.

HAY MULCH: TO BE PLACED ON EARTH SLOPES AT THE RATE OF 2 TONS/ACRE, OR AS DIRECTED BY THE ENGINEER.

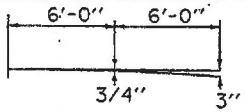
TOPSOIL: TO BE USED WITH SEED AS INDICATED ON THE PLANS, OR AS DIRECTED BY THE ENGINEER.

MARKER POSTS: TO BE PLACED AS INDICATED OR AS DIRECTED BY THE ENGINEER.

SLOPE ROUNDING: ALL CUT SLOPES TO BE ROUNDED IN ACCORDANCE WITH STANDARD SHEET B-5.

PAY LIMITS OF SAND BORROW: WHEN USED IN CONJUNCTION WITH UNDERDRAIN - SEE STANDARD SHEET D - 2.

TACK COAT: EMULSIFIED ASPHALT IS TO BE APPLIED AT THE RATE OF 0.05 GAL/SY BETWEEN SUCCESSIVE COURSES OF PAVEMENT AS DIRECTED BY THE ENGINEER.



PARABOLIC DETAILS

MATERIAL ITEM	THICKNESS TOLERANCE
PAVEMENT (TOTAL DEPTH)	± 1/4"
SUBBASE	± 1"

NORTHBOUND NORMAL TYPICAL SECTION

NB MM 107.56 TO MM 109.00 (NB STA. 3097+43 ~ 3173+38) *
NB MM 109.50 TO MM 110.11 (NB STA. 3199+78 ~ 3231+71*)
NB MM 110.63 TO MM 111.000 (NB STA. 3259+55 ~ 3278+95*)

5" COLD PLANE

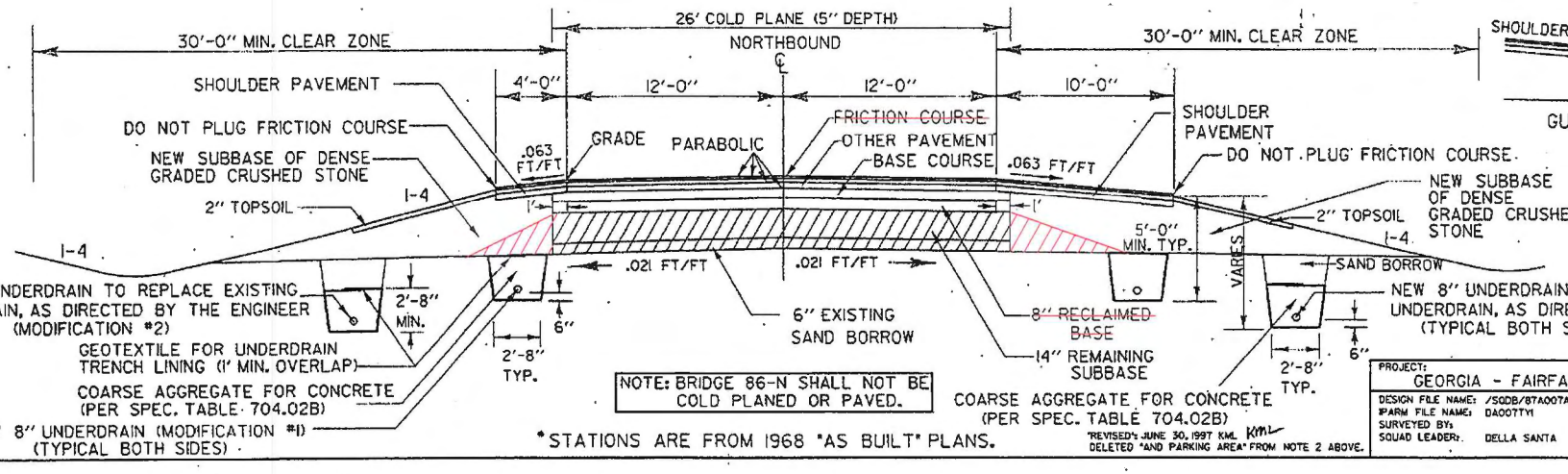
8" RECLAIMED STABILIZED BASE (COARSE AGGREGATE FOR CONCRETE ADDED WHEN NECESSARY TO ATTAIN DESIRED GRADATION. REFER TO SUPPLEMENTAL SPECIFICATION 310.20, RECLAIMED STABILIZED BASE.)

NEW PAVEMENT - ~~3/4" OPEN GRADED ASPHALT FRICTION COURSE~~
3 1/2" BITUMINOUS CONCRETE PAVEMENT (1 1/2" TYPE III S OVER 2" TYPE II S)
6" BASE COURSE OF BITUMINOUS CONCRETE PAVEMENT, TYPE I S (TWO 3" LIFTS)

SHOULDERS: ~~3/4" OPEN GRADED ASPHALT FRICTION COURSE~~
3 1/2" BITUMINOUS CONCRETE PAVEMENT (1 1/2" TYPE III S OVER 2" TYPE II S)

NOTE:
1) NB MM 106.90 TO MM 107.38 SHALL BE COLD PLANED 1 1/2" AND OVERLAID WITH 3/4" OPEN GRADED ASPHALT FRICTION COURSE OVER 1 1/2" BITUMINOUS CONCRETE PAVEMENT, TYPE III S. (38' WIDTH)

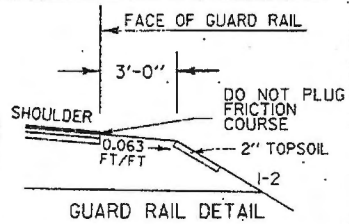
2) THE NORTHBOUND REST AREA RAMPS SHALL BE OVERLAID WITH 1 1/2" BITUMINOUS CONCRETE PAVEMENT, TYPE III (PG 64-28).



NOTE: BRIDGE 86-N SHALL NOT BE COLD PLANED OR PAVED.

*STATIONS ARE FROM 1968 "AS BUILT" PLANS.

*REVISED: JUNE 30, 1997 KML DELETED "AND PARKING AREA" FROM NOTE 2 ABOVE.



GUARD RAIL DETAIL

NOT TO SCALE

PROJECT: GEORGIA - FAIRFAX	PROJECT NO.: IM-089-3(26)
DESIGN FILE NAME: /SQDB/87A007A/DA007FRM.DGN	
PARM FILE NAME: DA007TY1	PLOT DATE: 1-JUL-1997
SURVEYED BY:	SURVEY DATE:
SQUAD LEADER: DELLA SANTA	DRAWN BY: SQUAD B
	SHEET: 3 OF 121

47. (Continued)

The scarified surface shall then be regraded and recompacted in accordance with section 301.04, SPECIFIC CONSTRUCTION REQUIREMENTS, subsection (c) Subbase of Dense Graded Crushed Stone and section 301.05, SURFACE TOLERANCE.

48. 212.03, METHOD OF MEASUREMENT, is hereby modified by deleting the word "pavement" in the second line and replacing it with the work "subbase."

49. 212.04, BASIS OF PAYMENT, is hereby modified by adding the word "modified" between the words "pavement" and "will" in the first line.

50. 212.04, BASIS OF PAYMENT, is hereby further modified by adding the following pay item:

Pay Item	Pay Unit
212.20 Scarifying Pavement (Modified)	Square Yard

SECTION 303 - PLANT MIXED BASE COURSE

51. 303.02, MATERIALS, (b) Gradation, is hereby modified by being deleted in its entirety and replaced with the following:

Screen Size	GRADATION Design General Limits, % Passing	Production Tolerance
1 1/2"	95-100	-
1"	80-95	±5
1/2"	30-60	±6
#4	6-20	±7
#8	3-14	-
#200	0-3	-
Asphalt Content, %	1.5 - 3.0	±0.4
Asphalt Cement,	PG 64-28	
Mixing Temp. Range	200° - 275°F	

52. 303.17, BASIS OF PAYMENT, is hereby modified by adding the words "or Plant Mixed Base Course (Modified)" after the comma in the second line of the first paragraph.

53. 303.14, BASIS OF PAYMENT, is hereby further modified by adding the following:

Payment will be made under:

Pay Item	Pay Unit
303.25 Plant Mixed Base Course (Modified)	TON

SECTION 310 - RECLAIMED STABILIZED BASE

54. SUPPLEMENTAL SPECIFICATION SECTION 310 - RECLAIMED STABILIZED BASE dated May 15, 1995 is hereby made a new section of the specifications, superseding all previous editions and their modifications.

Modification to this Supplemental follow.