



Georgia Department of Transportation

RECONSTRUCTION OF SR 3 / US 19/41
Project No. NH-001-4 (47)
Spalding County, Georgia

Value Engineering Study Report
Preliminary Design Submittal

November 2008

Designer:
Georgia Department of Transportation

Value Engineering Consultant
Lewis & Zimmerman Associates, Inc.





Lewis & Zimmerman Associates, Inc.

Taking the Chance out of Change

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November 17, 2008

Ms. Lisa Myers, Design Review Engineering Manager
State of Georgia
Department of Transportation
600 West Peachtree Street, 5th Floor
Atlanta, Georgia 30308

**re: Reconstruction of SR 3 / US 19/41
Project No. NH-001-4 (47), Spalding County, Georgia
Value Engineering Study Report**

Dear Ms. Myers:

Lewis & Zimmerman Associates, Inc. (LZA) is pleased to submit two copies of the value engineering study report on the referenced project. The VE recommendations presented will provide a variety of improvements that will enhance the true value and constructability of the Reconstruction of SR 3 / US 19/41 project in Spalding County, Georgia. Some of the more interesting alternatives optimize the drainage system along the road and the potential for two-way frontage roads along SR 3.

We appreciate your assistance in the conduct of the study the excellent participation of the GDOT design team. Please do not hesitate to contact David Hamilton at 253-925-8741 if you have any questions as you review this report. On behalf of LZA and the entire VE team, we hope our services have been informative and useful to the goal of value improvement on this project.

Sincerely,

LEWIS & ZIMMERMAN ASSOCIATES, INC.

David A. Hamilton, P.E., CVS, CCE, LEED™ AP
Vice President/VE Team Leader
Certified Value Specialist No. 910506 - Life

Enclosures

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EXECUTIVE SUMMARY

INTRODUCTION

This value engineering (VE) study summarizes the events and results of the VE study conducted by Lewis & Zimmerman Associates, Inc. (LZA) for the Georgia Department of Transportation (GDOT). The subject of the study was the Preliminary Design Submittal on the Reconstruction of SR 13 / US 19/41 located in Spalding County, Georgia. This busy corridor is in need of major improvements to widen the roadway from four lanes to six lanes, increasing the Level of Service in this rapidly developing area south of Atlanta. The project is being designed by GDOT design personnel.

The study was conducted October 21 - 24, 2008 at the GDOT Central Office, located in Atlanta, Georgia and was conducted under the value engineering guidelines of GDOT and SAVE. VE team members consisted of a Certified Value Specialist from LZA, and design and construction professionals from local engineering consultants.

Decision Making

Value engineering studies by their nature identify alternate design schemes, construction methods, and project delivery options, which if accepted by the project users and design team, may impact the final scope, design documents, budget, schedule, functionality, and appearance of the SR 3 / US 19/41 reconstruction project. The task of the VE team is to identify possible solutions, whereas the task of the GDOT in-house design team is to choose the most favorable of the VE alternatives for incorporation into the project.

Decisions are needed on each of the alternatives presented in this report and personnel from the design team are totally empowered to accept, reject, or modify these alternatives. Value engineering by its' nature searches for new, unique, and different methods to provide for the needed project functions at the lowest total life cycle cost. The blending of these new and sometimes challenging ideas with established procedures, norms, and protocol is the responsibility of these user representatives. The project team should feel free to accept alternatives which support its construction program and similarly reject alternatives which do not optimize its goals for the Reconstruction of SR 3 / US 19/41.

PURPOSE AND NEED

Project NH-001-4 (47) Spalding County is the widening and reconstruction of SR3/US 19/41 from north of the "Y" junction of SR 3 and US 19/41 Business in Griffin, extending north to a point approximately 150 meters north of Laprade Road for a total project length of 2.4 km. SR 3 / US 19/41 will be widened from four lanes to six lanes. The road will have a 6-meter wide raised median with curb and gutter on urban shoulders. The two parallel bridges over the Norfolk Southern Railway will be replaced with a single wider bridge to accommodate the required six-lane section.

The roadway section includes a median, sidewalks, turn lanes, traffic signals, erosion control and drainage improvements.

Current and Future Traffic Data

The current traffic along the corridor is: 59,100 A.D.T. for the year 2010; 100,700 A.D.T. for the year 2030 and 79,000 D.H.V. for the year 2030 with 5% trucks and 7% 24-hour trucks. The study conducted by Street Smarts in November 2003 examined the volumes at Moran Road and the new driveway 564 ft. north. The peak hourly volume for northbound left turns onto Moran Road is listed as 361 for the PM hours and 436 for Saturday traffic. The peak volume for the new driveway north of Moran Road is listed as 362 for the PM hours and 185 for Saturday traffic. Both of these volumes are for year 2010 and no adjustment was made for 2030 traffic although conventional wisdom would allow for an increase.

Accidents

During the years of 2002 through 2004, a total of 124 accidents occurred in the vicinity of Moran Road and the new driveway. Three quarters of these accidents were rear-end accidents. The majority of rear-end collisions occurred in the northbound lanes. With increasing traffic and expected increases in the left turn movements, the frequency of this type of accident should increase with time.

Construction Cost

The estimated cost for the project, including right-of-way and engineering fees is \$18.15 million.

CONCERNS AND OBJECTIVES

During the presentation by the representatives from the GDOT design team on the first day of the VE study, several areas of concern in the development of the project were noted. These items were identified as areas of opportunity to improve value, meet design requirements, satisfy goals, and reduce project risk. They are:

- The cost for new right-of-way is quite modest due mostly to the very wide existing right-of-way.
- The bridges spanning over the Norfolk Southern Railway appear to be in need of replacement due to their age and the condition survey.
- The investment in the new drainage system appears rather robust and some optimization may be possible.

Project Constraints

Discussions held during the VE study evolved around several key constraints that must be incorporated in the design:

- The proposed alignment along SR 3 is generally fixed due to the large amount of retail development in the area. The frequency of existing driveways off of SR 3 improves access to local businesses, but increases the potential for rear-end accidents from through traffic.
- There are a number of side streets which tend to fix the roadway profile in a number of locations.
- Traffic projections along SR 3 reinforce the decision for six lanes with a median through the corridor.

RESULTS

To address the concerns noted above, the VE team conducted a brainstorming session and identified numerous ways to improve the value and constructability of the project. All of the alternatives developed are summarized on the following Summary of Value Engineering Alternatives table and detailed in the Study Results section of the report. Note the same alternatives are mutually exclusive or interrelated so that the total cost savings achievable is dependent on the combination of ideas selected for implementation.

A summary of the key recommendations include:

Drainage (D)

Optimization of the drainage design is possible through two measures. First, the type of pipe could be changed from concrete to HDPE pipe saving in excess of \$320,000. This pipe is being widely used by many agencies for its cost effectiveness, weight, and resistance to corrosion. Further optimization to the drainage system would include reductions to the length of pipe, number of catch basins, and reuse of more of the existing drainage system. Savings in this area could exceed \$375,000.

Alignment (A)

To reduce the potential for rear-end accidents for cars turning off of the mainline, it is proposed that either a one-way or two-way frontage road system be considered. The lowest cost option would be the one-way frontage road system northbound (NB) and southbound (SB), saving an estimated \$160,000. A two-way system on both the NB and SB sides would cost an additional \$4,000 to the project, but greatly improve the safety of the corridor and Level of Service for through traffic.

Some lane continuity issues need to be corrected near the left turn lanes at Bowling Drive. This will eliminate movements for through traffic, streamlining and minimizing movements for these vehicles.

Bridge (B)

Design of the bridges over the Norfolk Southern Railroad line have not been advanced, but the replacement of these structures does appear to be justified due to the condition survey and traffic capacity projections. Various options including short span steel and short span concrete structures could adequately serve this location. Costs ranging from \$1.6 to 1.7 million are anticipated. Staging for the bridge replacement appears to be viable using a 3-stage construction plan.



SUMMARY OF VALUE ENGINEERING ALTERNATIVES

PROJECT: RECONSTRUCTION OF SR 3 / US 19/41

Project: NH-001-4 (47), Spalding County, Georgia

		PRESENT WORTH OF COST SAVINGS				
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
DRAINAGE (D)						
						\$0
D-1	Use HDPE pipe for storm sewers in lieu of concrete pipe.	\$322,517	\$0	\$322,517		\$322,517
D-2	Reduce the number of catch basins.	\$72,166	\$0	\$72,166		\$72,166
D-3	Reduce the length of storm sewers by using existing catch basins and drain pipes where possible.	\$377,245	\$0	\$377,245		\$377,245
ALIGNMENT (A)						
DESIGN SUGGESTION						
A-2	Improve lane continuity of US 19 / 41 left turn lanes at Bowling Drive.					
A-4	Use a two-way connector/frontage road southbound and a one-way connector road northbound.	\$392,940	\$311,984	\$80,956		\$80,956
DESIGN SUGGESTION						
A-6	Combine some of the driveways to reduce the number of entry drives.					
A-10	Use one-way connector/frontage roads in both northbound and southbound directions..	\$392,940	\$233,670	\$159,270		\$159,270
A-11	Use two-way connector/frontage roads in both the northbound and southbound directions.	\$392,940	\$397,910	(\$4,970)		(\$4,970)
SECTION (S)						
DESIGN SUGGESTION						
S-1	Use 24-inch-wide curb and gutter in lieu of 30-inch wide section.					

STUDY RESULTS

GENERAL

The results are the major feature of a VE study since they represent the benefits that can be realized on the project by GDOT, local patrons that use the SR 3 / US 19/41 and the design team.

The recommended engineering and construction management suggestions are presented as individual alternatives for specific change. These may be in the form of VE alternatives with cost savings, or design suggestions without associated cost. Individual comments on the current design are presented with a summary of the original design, a description of the proposed enhancements to the chosen improvement scheme, and if appropriate, a descriptive evaluation of the advantages and disadvantages. Suggested alternatives on the current project are accompanied by a brief narrative to compare the original design and the proposed modifications. Sketches, where appropriate, are also presented.

Examples of improved value include improved constructability, ease of maintenance, minimization of risk, and less disruption to roadway operations during construction. In addition, some ideas cannot be quantified in terms of cost with the design information provided; these are also presented as design suggestions and are intended to improve the quality of the project.

The summaries of the more favorable improvements to the project follow this narrative on a table entitled, *Summary of Value Engineering Alternatives Cost Savings*. The table is divided into major project elements for convenience of the reviewer and is used to divide the results section. The complete documentation of the developed VE alternatives follows the *Summary of Value Engineering Alternatives*.

RESULTS OF THE STUDY

The VE team brainstormed 31 creative ideas that could enhance the value of the project in the areas noted by GDOT as being desirable, such as cost control, safety, durability, ease of operation, expected life, constructability, and traffic improvement. Evaluation of those ideas considered the full range of project value objectives and resulted in the development of a number of alternatives and design suggestions.

The alternatives and design suggestions are identified with the following designations to aid in organization and review.

CATEGORY	PREFIX
Alignment	A
Section	S

Drainage	D
Bridge	B

EVALUATION OF ALTERNATIVES

When reviewing the study results, the reader should consider each part of an alternative or design suggestion on its own merit. There may be a tendency to disregard an alternative because of concern about one part of it. Each area within an alternative that is acceptable should be considered for use in the final design, even if the entire alternative is not implemented. Design variations of these alternatives are encouraged.

Cost Comparisons

Cost is a primary basis of comparison for alternative designs, but other project criteria must be considered also when selecting alternatives for further analysis. Negative impacts upon existing traffic is extremely critical and design modifications that impact traffic, right of way, safety, or environmental elements should be selected carefully following detailed review.

Comparison cost estimates were prepared for the original design and the alternative design using the project cost estimate or data from the GDOT cost database. A markup of 10% was added to account for project engineering and construction supervision.

All alternatives and design suggestions were developed independently of each other. However, some of the alternatives are mutually exclusive or interrelated so acceptance of one idea may impact the cost savings of another idea. The reader should evaluate those alternatives carefully in order to select the combination of ideas with the greatest beneficial impact on the project.

CONSIDERATIONS AND ASSUMPTIONS

In the preparation of this report and the alternatives that follow, the VE team made some assumptions with respect to conditions that may occur in the future. In addition, the VE team reviewed the project documentation, relying solely upon the information provided by the designer and owner, and relying on that information as being true, complete and accurate.



SUMMARY OF VALUE ENGINEERING ALTERNATIVES

PROJECT: RECONSTRUCTION OF SR 3 / US 19/41 <i>Project: NH-001-4 (47), Spalding County, Georgia</i>		PRESENT WORTH OF COST SAVINGS				
ALT. NO.	DESCRIPTION	ORIGINAL COST	ALTERNATIVE COST	INITIAL COST SAVINGS	RECURRING COST SAVINGS	TOTAL PW LCC SAVINGS
DRAINAGE (D)						
D-1	Use HDPE pipe for storm sewers in lieu of concrete pipe.	\$322,517	\$0	\$322,517		\$322,517
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A-4	Use a two-way connector/frontage road southbound and a one-way connector road northbound.	\$392,940	\$311,984	\$80,956		\$80,956
A-6	Combine some of the driveways to reduce the number of entry drives.				DESIGN SUGGESTION	
A-10	Use one-way connector/frontage roads in both northbound and southbound directions..	\$392,940	\$233,670	\$159,270		\$159,270
A-11	Use two-way connector/frontage roads in both the northbound and southbound directions.	\$392,940	\$397,910	(\$4,970)		(\$4,970)
SECTION (S)						
S-1	Use 24-inch-wide curb and gutter in lieu of 30-inch wide section.				DESIGN SUGGESTION	

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 19/41 RECONSTRUCTION**
Project No. NH-001-4 (047), Spalding County
Preliminary Submittal

ALTERNATIVE NO.: **B-1**

DESCRIPTION: **CONSTRUCT A SHORT SPAN STEEL BRIDGE OVER THE RAILROAD**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN:

The design for the new bridge has not been completed, but it is assumed that it will match the existing grade and maintain the existing clearance over the railroad. The design is assumed to be short span steel or concrete bridge.

ALTERNATIVE:

Replace the existing short span steel bridge with a similar short span steel bridge with 30- to 40- ft. spans.

ADVANTAGES:

- Matches existing profile
- Maintains existing 23-ft. railroad clearance

DISADVANTAGES:

- More intermediate bents

DISCUSSION:

Due to recent bridge inspections and load rating, GDOT has determined the need to replace the bridges. The existing structure depth (30 WF 124) will need to be preserved to maintain the existing grade and clearance to the railroad. The bridges will be four spans, about 30 to 40 ft each.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN (Estimated Cost)	\$ 1,664,091	—	\$ 1,664,091
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 1,664,091	—	\$ 1,664,091

CALCULATIONS



PROJECT: **RECONSTRUCTION OF SR 3 / US 19**
Project No. NH-001-4 (047) - Spalding County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: B-1

SHEET NO.: 2 of 5

Bridge Area \Rightarrow Assume 1 wide Bridge

Width

$$5 \text{ Lanes} = 3.6 \text{ m} \times 5 = 18 \text{ m}$$

$$4 \text{ Lanes} = 3.6 \text{ m} \times 4 = 14.4 \text{ m}$$

$$\text{Median} = 2.4 \text{ m} = 2.4 \text{ m}$$

$$2 \text{ side walks} = 1.5 \text{ m} \times 2 = 3.0 \text{ m}$$

$$2 \text{ Barriers} = 0.32 \times 2 = 0.64 \text{ m}$$

$$\underline{38.44 \text{ m}} = 126.1 \text{ ft}$$

$$\underline{\text{Length}} = 133.3 \text{ ft}$$

$$\underline{\text{Area}} = 133.3 \text{ ft} \times 126.1 \text{ ft} = 16809 \text{ ft}^2$$

$$\underline{\text{Cost}} = (\text{Say}) \text{ } \$90/\text{ft}^2 \times 16809 \text{ ft}^2 = \underline{\underline{\$1,512,810}}$$

B-1
3 of 5

Myers, Lisa

From: McManus, Brad
Sent: Tuesday, October 21, 2008 11:20 AM
To: Myers, Lisa
Subject: FW: Bridge Condition Survey P. I. No. 342621

Below is an email about the Bridge recommendation.

Brad McManus, PE
Design Group Manager
GDOT, Office of Road Design
Room Number 2629
600 West Peachtree Street
Atlanta, Georgia 30308
Phone 404 631 1630
fax 404 631 1949

From: Doyle, Andy (Jesse)
Sent: Thursday, June 05, 2008 8:48 AM
To: Alexander, Lionel; McManus, Brad
Cc: Banks, Myron
Subject: Bridge Condition Survey P. I. No. 342621

NH000-0001-04(047) / Spalding County
Structure ID 255-0004-0 & 255-0005-0
Location ID 255-00003D-005.74N &
255-00003D-005.75N

P.I. No. 342621
SR 3 / US 19 over Norfolk Railroad

A Bridge Condition Survey has been completed for this project. This Condition Survey replaces the Bridge Condition Survey from March 9, 1998. These bridges were built in 1954 and consist of concrete bents and steel beams. Both structures have a sufficiency rating of 62.10. The structures have a calculated load capacity of slightly less than an HS – 15 structure. Both structures should be replaced due to the following items:

- 1) The existing decks have an asphalt overlay of approximately 5" over the concrete decks. Both decks have hairline cracking in the bottom of the deck and transverse cracking in the asphalt along the joints. There are longitudinal cracks along the outside of the deck (in lane number 2 for each structure). The deck condition survey from OMR recommends replacing the deck for these structures. This office also recommends replacement of the deck, sidewalks, and handrails.
- 2) The exterior beams (under the sidewalk for lane #2) appear to be rotating. Steel bracing for the sidewalk and handrail have been mounted to these beams. The beams, bracing, sidewalk, handrail, and a small portion of the deck appear to be rotating away from the structure. This line of beams should be replaced during the project.
- 3) The structural steel has a lead based paint system. The structural steel should be thoroughly cleaned and painted with a new system.

Based on the issues listed above, the load rating, and the current and projected ADT, these structures should be replaced. There are no items to be salvaged as a part of this construction project. If further information is required for this project, please contact me.

Andy Doyle, PE
Georgia Department of Transportation
Regional Bridge Inspection Engineer
Office of Maintenance
(404) 635 - 8193
(404) 805 - 7997 (cell)

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COST WORKSHEET



PROJECT: **RECONSTRUCTION OF SR 3 / US 19**
Project No. NH-001-4 (047) - Spalding County, Georgia

ALTERNATIVE NO.: **B-1**

DESCRIPTION:

SHEET NO.: **5 of 5**

PROJECT ITEM		ORIGINAL ESTIMATE			PROPOSED ESTIMATE		
ITEM	UNITS	NO. OF UNITS	COST/ UNIT	TOTAL	NO. OF UNITS	COST/ UNIT	TOTAL
<i>Proposed Alternate</i>							
<i>Short Span</i>							
<i>Steel Bridge</i>	<i>SF</i>				<i>16,809</i>	<i>90</i>	<i>1,512,810</i>
							<i>1,512,810</i>
							<i>151,281</i>
							<i>1,664,091</i>
Subtotal							<i>1,512,810</i>
Markup (%) at		<i>10%</i>					<i>151,281</i>
TOTAL							<i>1,664,091</i>

CALCULATIONS



PROJECT: **RECONSTRUCTION OF SR 3 / US 19**
Project No. NH-001-4 (047) - Spalding County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: B-2

SHEET NO.: 2 of 5

Bridge Area \Rightarrow Assume 1 wide Bridge

Width

$$5 \text{ Lanes} = 3.6 \text{ m} \times 5 = 18 \text{ m}$$

$$4 \text{ Lanes} = 3.6 \text{ m} \times 4 = 14.4 \text{ m}$$

$$\text{Median} = 2.4 \text{ m} = 2.4 \text{ m}$$

$$2 \text{ sidewalks} = 1.5 \text{ m} \times 2 = 3.0 \text{ m}$$

$$2 \text{ Barriers} = 0.32 \times 2 = 0.64 \text{ m}$$

$$\underline{38.44 \text{ m}} = 126.1 \text{ Ft}$$

$$\underline{\text{Length}} = 133.3 \text{ Ft}$$

$$\underline{\text{Area}} = 133.3 \text{ Ft} \times 126.1 \text{ Ft} = 16809 \text{ Ft}^2$$

$$\underline{\text{Cost}} = (\text{Say}) \$ 85/\text{Ft}^2 \times 16809 \text{ Ft}^2 = \underline{\underline{\$ 1,428,765}}$$

B-2
3 of 5

Myers, Lisa

From: McManus, Brad
Sent: Tuesday, October 21, 2008 11:20 AM
To: Myers, Lisa
Subject: FW: Bridge Condition Survey P. I. No. 342621

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Brad McManus, PE
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255-00003D-005.75N
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SR 3 / US 19 over Norfolk Railroad

A Bridge Condition Survey has been completed for this project. This Condition Survey replaces the Bridge Condition Survey from March 9, 1998. These bridges were built in 1954 and consist of concrete bents and steel beams. Both structures have a sufficiency rating of 62.10. The structures have a calculated load capacity of slightly less than an HS – 15 structure. Both structures should be replaced due to the following items:

- 1) The existing decks have an asphalt overlay of approximately 5" over the concrete decks. Both decks have hairline cracking in the bottom of the deck and transverse cracking in the asphalt along the joints. There are longitudinal cracks along the outside of the deck (in lane number 2 for each structure). The deck condition survey from OMR recommends replacing the deck for these structures. This office also recommends replacement of the deck, sidewalks, and handrails.
- 2) The exterior beams (under the sidewalk for lane #2) appear to be rotating. Steel bracing for the sidewalk and handrail have been mounted to these beams. The beams, bracing, sidewalk, handrail, and a small portion of the deck appear to be rotating away from the structure. This line of beams should be replaced during the project.
- 3) The structural steel has a lead based paint system. The structural steel should be thoroughly cleaned and painted with a new system.

Based on the issues listed above, the load rating, and the current and projected ADT, these structures should be replaced. There are no items to be salvaged as a part of this construction project. If further information is required for this project, please contact me.

Andy Doyle, PE
Georgia Department of Transportation
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Office of Maintenance
(404) 635 - 8193
(404) 805 - 7997 (cell)

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VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 19 RECONSTRUCTION**
Project No. NH-001-4 (047), Spalding County
Preliminary Submittal

ALTERNATIVE NO.: **B-6**

DESCRIPTION: **REMOVE BRIDGE SIDEWALK AND REDUCE SHOULDER WIDTH**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

The original design uses a 5-ft.-wide raised sidewalk on the bridge.

ALTERNATIVE: (Sketch attached)

Use a 5-ft. shoulder with no raised sidewalk.

ADVANTAGES:

- Eliminates sidewalk concrete costs

DISADVANTAGES:

- Eliminates pedestrian traffic on the bridge

DISCUSSION:

To remove the sidewalk and add a shoulder, the shoulder would typically be 10- ft.-wide. Reduce the shoulder to a 5-ft.-wide rural shoulder. Most businesses are north of the bridge. Therefore, sidewalk could be stopped before the bridge.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 12,284	—	\$ 12,284
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 12,284	—	\$ 12,284



PROJECT: **RECONSTRUCTION OF SR 3 / US 19**
 Project No. NH-001-4 (047) - Spalding County, Georgia
 Preliminary Submittal

ALTERNATIVE NO.: B-6

SHEET NO.: 2 of 4

Remove concrete for 6" raised sidewalk

$$2\% (x\text{-slope}) \times 5' = 0.1' = 1.2''$$

Sidewalk thickness at end of bridge Deck:

$$6'' (\text{Sidewalk}) + 2\% x\text{-slope} (1.2'') + 2\% x\text{-slope} (1.2'') =$$

$$\Rightarrow 6'' + 1.2'' + 1.2'' = 8.4'' \text{ at end of bridge deck}$$

$$\text{Say } \frac{(6'' + 8.4'')}{2} = 7.2'' \text{ avg. thickness}$$

$$\begin{aligned} \text{Sidewalk Volume} &= 133.3' (L) \times 5' (w) \times \frac{7.2''}{12} (\text{thick}) = 400 \text{ FE}^3 \\ &= 14.81 \text{ CY/sidewalk} \end{aligned}$$

$$2 \text{ sidewalks} \Rightarrow 14.81 \text{ CY} \times 2 = 29.62 \text{ CY}$$

$$\text{Class A Conc Cost} = \$377 / \text{CY}$$

$$\text{Sidewalk Cost} = 29.62 \text{ CY} \times \$377 / \text{CY} = \underline{\underline{\$11,167}}$$

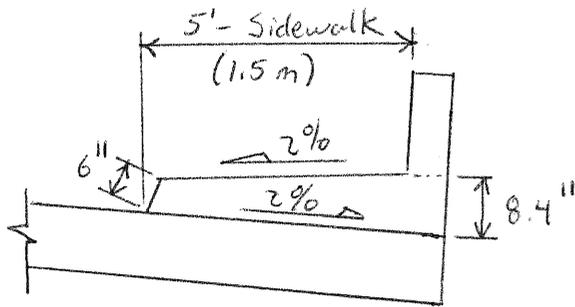
PROJECT: **RECONSTRUCTION OF SR 3 / US 19**
Project No. NH-001-4 (047) - Spalding County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: B-6

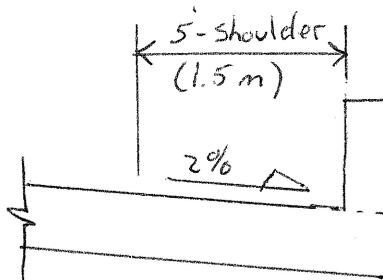
ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: 3 of 4

PROPOSED



ALTERNATE



VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 19 RECONSTRUCTION**
Project No. NH-001-4 (047), Spalding County
Preliminary Submittal

ALTERNATIVE NO.: **B-10**

DESCRIPTION: **COMPLETE CONSTRUCTION PHASING**

SHEET NO.: **1 of 2**

ORIGINAL DESIGN:

Construction phasing is not complete.

ALTERNATIVE: (Sketch attached)

Use the following construction phasing for the bridge:

- Construct the middle portion of the proposed bridge between existing bridges, 27.34 ft. in the middle.
- Reroute the southbound traffic to the middle and demolish the existing southbound bridge.
- Reroute traffic to the new portion of the bridge and demolish the existing northbound bridge.
- Complete the bridge.

ADVANTAGES:

- Maintains four lanes of traffic on the bridge
- Keeps traffic flowing

DISADVANTAGES:

- Tightens middle portion between the existing bridges
- Phases bridge construction

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE		DESIGN SUGGESTION	
SAVINGS (Original minus Alternative)			



VALUE ENGINEERING ALTERNATIVE



PROJECT:	SR 3/US 19 RECONSTRUCTION Project No. NH-001-4 (047), Spalding County <i>Preliminary Submittal</i>	ALTERNATIVE NO.:	D-1
DESCRIPTION:	USE HDPE STORM SEWERS IN LIEU OF CONCRETE PIPES	SHEET NO.:	1 of 3

ORIGINAL DESIGN:

The original design uses concrete storm sewers.

ALTERNATIVE:

Use high density polyethylene pipe (HDPE) for storm sewers.

ADVANTAGES:

- Reduces cost
- Unlike heavy 8-ft. long concrete pipes, HDPE pipes come in 20-ft. sections
- Simplifies installation

DISADVANTAGES:

- Requires a waiver/design exception because GDOT uses only concrete pipes

DISCUSSION:

HDPE pipes are available up to 60 inches in diameter. They have an excellent 30-year history in Europe. Since groundwater has not been indicated in the area, the buoyancy factor is non-existent for HDPE pipes.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 322,517	—	\$ 322,517
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 322,517	—	\$ 322,517

CALCULATIONS



PROJECT: **RECONSTRUCTION OF SR 3 / US 19**
 Project No. NH-001-4 (047) - Spalding County, Georgia
 Preliminary Submittal

ALTERNATIVE NO.:

D-1

SHEET NO.: 2 of 3

450 mm (18") H 0.3-3 m (1'-9") costs \$134.54 per meter
 Per 2008 RS Means, 18" HDPE costs \$18.60/ft. [p. 312]
 Add excavation & backfill costs (6'-10') \$ 6.55/ft. [p. 210]
 Total installed costs = \$ 25.15/ft

$\times 3.28$ ft/meter

\$ 82.49 per meter

\therefore for 450 mm HDPE pipe,

Savings per meter of installed cost is $134.54 - 82.49 = \$52.05$

HDPE pipes are only available upto 1500 mm (60") size.

Pipe Size mm (inch)	Concrete cost/meter (\$)	HDPE cost/meter (\$)	Savings cost/meter (\$)
450 (18)	134.54	82.49	52.05
600 (24)	169.89	106.76	63.13
750 (30)	231.36	151.04	80.32
900 (36)	296.25	180.56	115.69
1050 (42)	382.59	213.36	169.23
1200 (48)	521.84	290.92	230.92
1350 (54)	627.77	375.72	252.05

For 900 mm (36") pipe cost/meter for 140 m of concrete pipe is, 264.14 for upto 3 m & for 110 m of concrete pipe, it is 328.37 from 3 m - 4.5 m. Thus average cost is \$296.25 for 250 m of pipe.

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 19 RECONSTRUCTION**
Project No. NH-001-4 (047), Spalding County
Preliminary Submittal

ALTERNATIVE NO.: **D-2**

DESCRIPTION: **REDUCE THE NUMBER OF CATCH BASINS**

SHEET NO.: **1 of 9**

ORIGINAL DESIGN: (Sketch attached)

Catch basins are included in the design.

ALTERNATIVE: (Sketch attached)

Selectively eliminate some of the catch basins while ensuring that the gutter spread is within allowable limits.

ADVANTAGES:

- Reduces cost

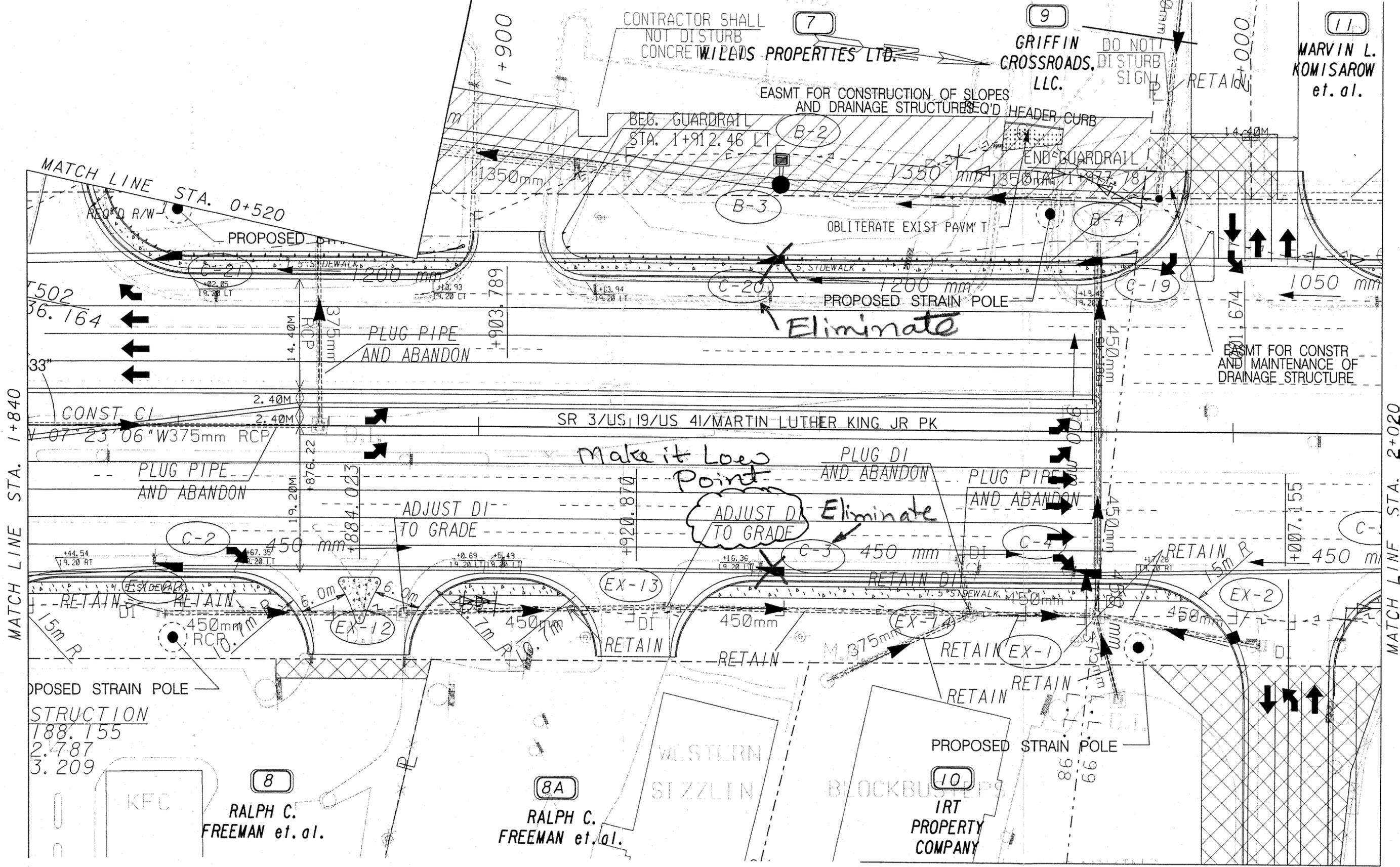
DISADVANTAGES:

- Increases gutter spread

DISCUSSION:

Due to the lack of necessary data, the team did not perform hydraulic calculations. The suggestions outlined in the following pages are based on the experience of the VE team and the assumptions that the gutter spread (typically 8 ft.) limit is not violated.

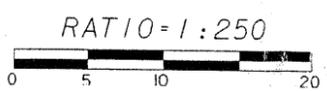
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 72,166	—	\$ 72,166
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 72,166	—	\$ 72,166



MATCH LINE SHEET NO.

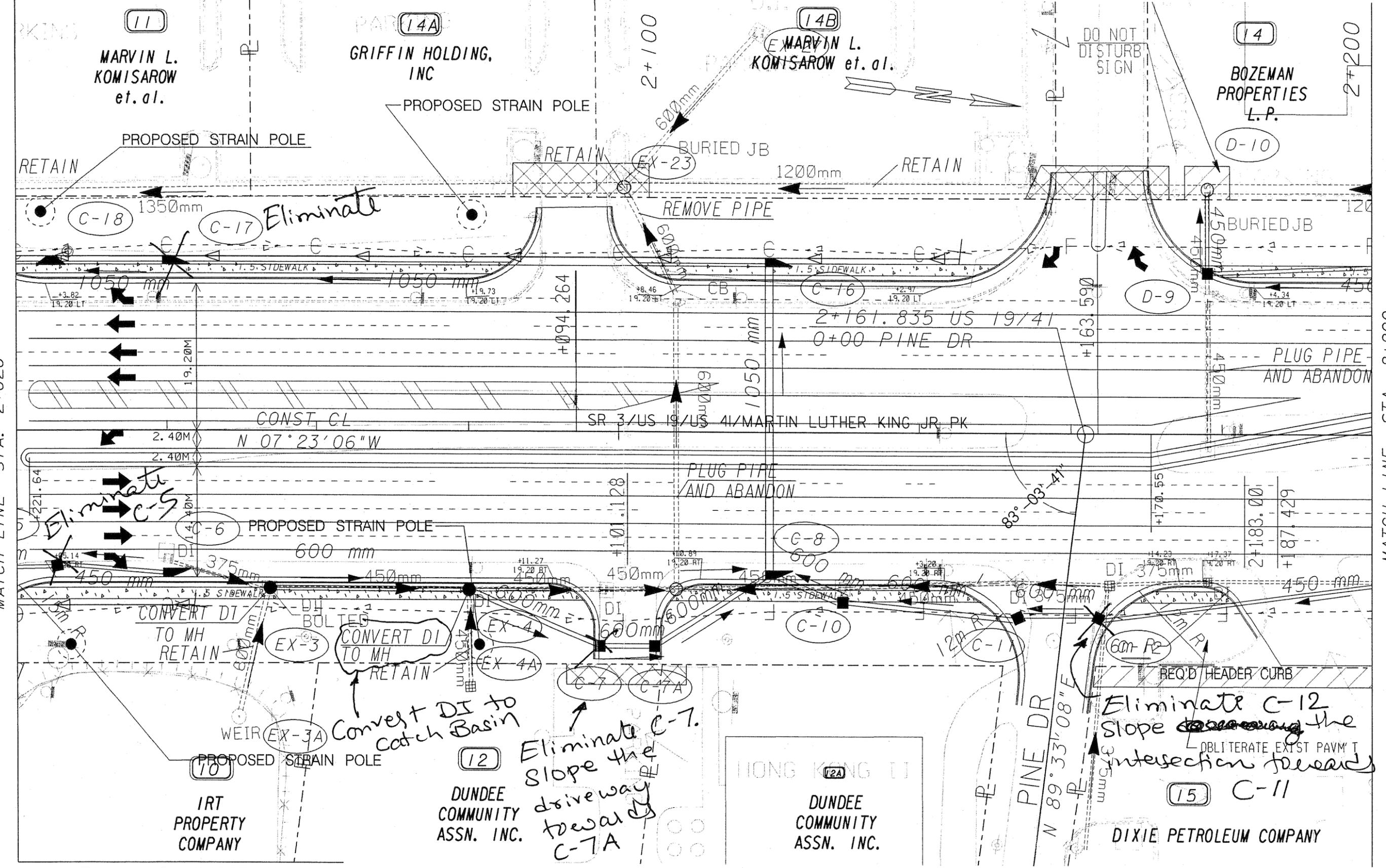
Alt. D-2 Sheet 2 of 9

GEORGIA
DEPARTMENT OF TRANSPORTATION



DATE	REVISIONS	DATE	REVISIONS

GEORGIA
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLANS
PROJECT NH-0001-04(047)



MATCH LINE STA. 2+020

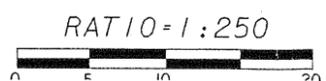
MATCH LINE STA. 2+200

MATCH LINE SHEET NO.

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.

Alt. D-2 Sheet 3 of 9

GEORGIA
DEPARTMENT



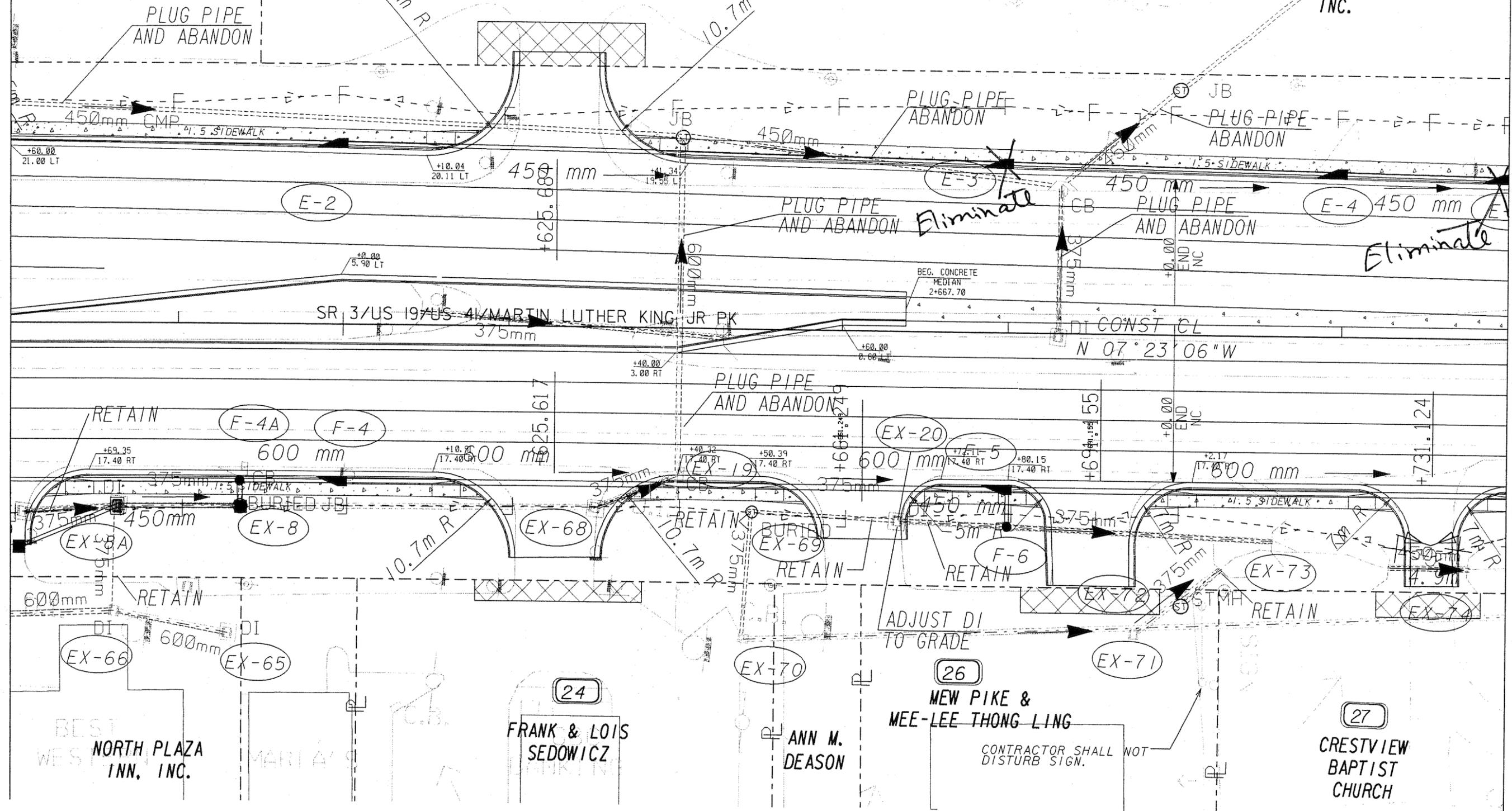
DATE	REVISIONS	DATE	REVISIONS

GEORGIA
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLANS
PROJECT NH-0001-04(047)

23
ZOE B, INC.

NOTE: ALL DRIVEWAY RADII SHALL BE 7.6 m UNLESS FLAGGED OTHERWISE.

25
HALPERN ENTERPRISES INC.



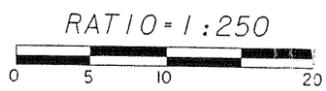
MATCH LINE STA. 2+560

MATCH LINE STA. 2+740

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.

Alt D-2 Sheet 4 of 9

GEORGIA DEPARTMENT



DATE	REVISIONS	DATE	REVISIONS

GEORGIA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLAN
PROJECT NH-0001-04(047)

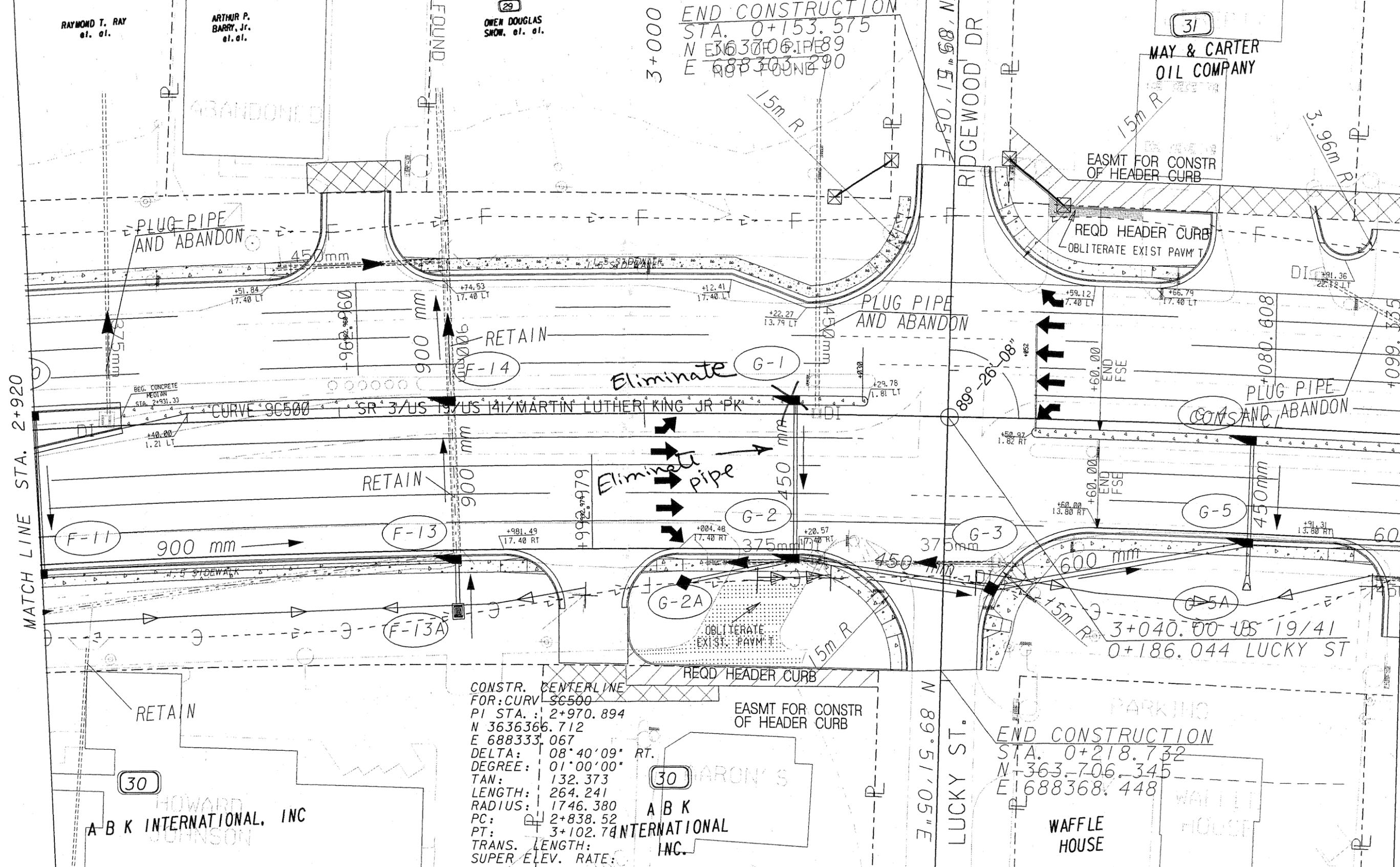
RAYMOND T. RAY
et. al.

ARTHUR P.
BARRY, Jr.
et. al.

OWEN DOUGLAS
SNOW, et. al.

END CONSTRUCTION
STA. 0+153.575
N 363706.1189
E 688303.290

MAY & CARTER
OIL COMPANY



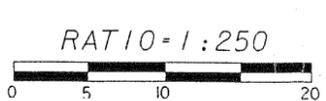
MATCH LINE STA. 2+920

CONSTR. CENTERLINE
FOR CURV SC500
PI STA. : 2+970.894
N 363636.712
E 688333.067
DELTA: 08°40'09" RT.
DEGREE: 01°00'00"
TAN: 132.373
LENGTH: 264.241
RADIUS: 1746.380
PC: 2+838.52
PT: 3+102.78
TRANS. LENGTH:
SUPER ELEV. RATE:

END CONSTRUCTION
STA. 0+218.732
N 363706.345
E 688368.448

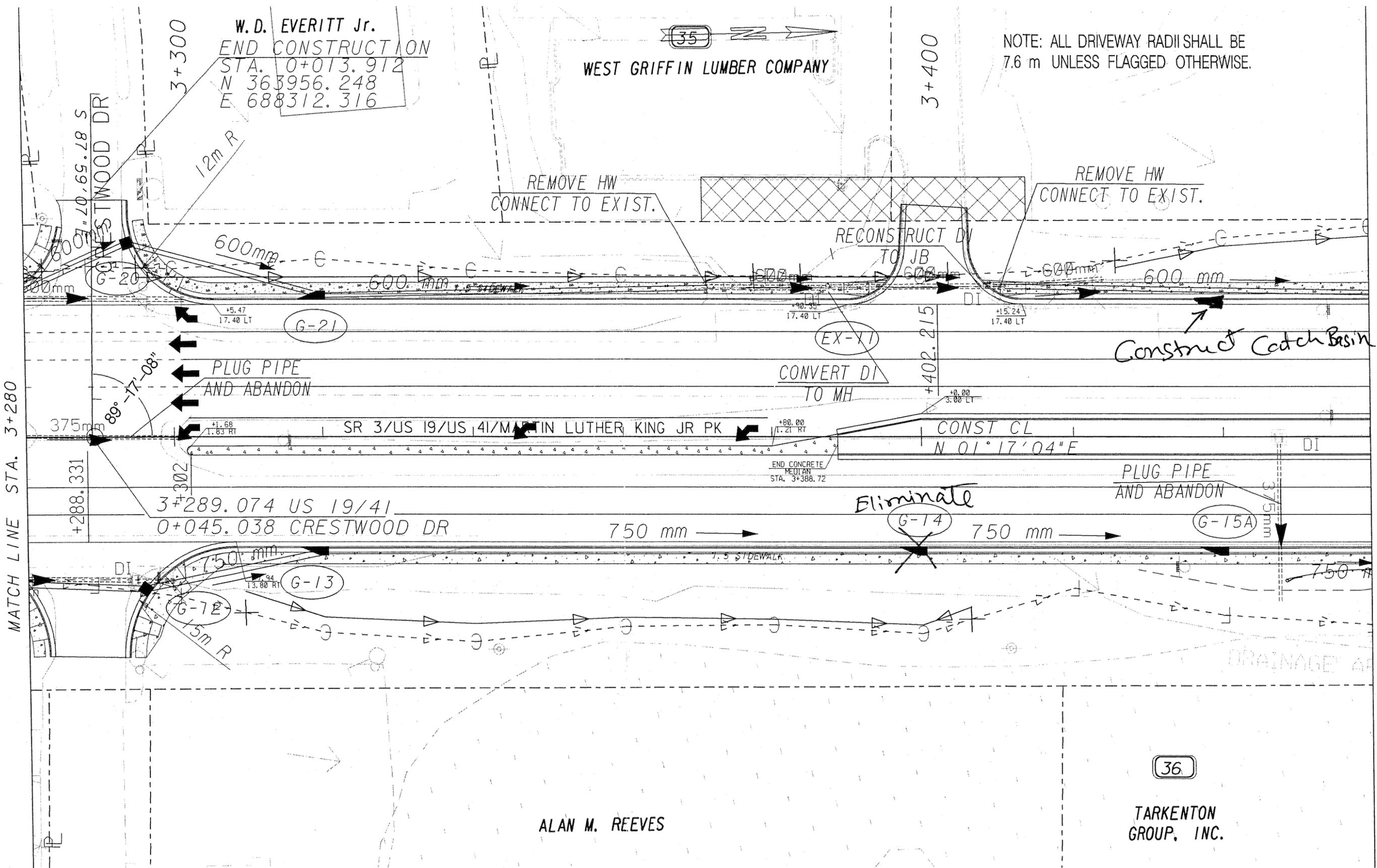
NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED. * Flow entering G-1 will be distributed in G-3, G-4 & G-5 * Alt. D-2 sheet 5 of 9

GEORGIA
DEPARTMENT
OF



DATE	REVISIONS	DATE	REVISIONS

GEORGIA
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION PLANS
PROJECT NH-0001-04(047)



W.D. EVERITT Jr.
 END CONSTRUCTION
 STA. 0+013.912
 N 363956.248
 E 688312.316

NOTE: ALL DRIVEWAY RADII SHALL BE 7.6 m UNLESS FLAGGED OTHERWISE.

WEST GRIFFIN LUMBER COMPANY

REMOVE HW
 CONNECT TO EXIST.

REMOVE HW
 CONNECT TO EXIST.

RECONSTRUCT DI
 TO JB

CONVERT DI
 TO MH

Construct Catch Basin

PLUG PIPE
 AND ABANDON

Eliminate

PLUG PIPE
 AND ABANDON

MATCH LINE STA. 3+280

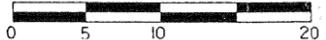
MATCH LINE STA. 3+460

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.

Alt. D-2 sheet 7 of 9

GEORGIA
 DEPARTMENT

RATIO=1:250



DATE	REVISIONS	DATE	REVISIONS

TARKENTON
 GROUP, INC.

GEORGIA
 DEPARTMENT OF TRANSPORTATION
 CONSTRUCTION 2-304
 PROJECT NH-0001-04(047)

35

WEST GRIFFIN LUMBER COMPANY

3+500

3+600

EASMT FOR CONSTR OF SEDIMENT BASIN

BEG. GUARDRAIL
STA. 3+460.00 LT

G-24

Eliminate

G-25A

G-25

H-3A

Eliminate

SR 3/US 19/US 41/MARTIN LUTHER KING JR PK
N 01°17'04"E

CONST CL
W 01°17'04"E DI

G-15

Eliminate

G-16A

G-16

RETAIN

H-1A

Eliminate

BEG. GUARDRAIL
STA. 3+460.00 RT

PROXIMATE

NOTE: ALL DRIVEWAY RADII SHALL BE
7.6 m UNLESS FLAGGED OTHERWISE.

36

TARKENTON
GROUP, INC.

DENSE WOODS

37

TARKENTON
GROUP, INC

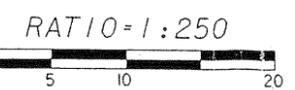
39

KAPILA M. PATEL

NOTE: ALL DIMENSIONS ARE IN METERS
UNLESS OTHERWISE NOTED.

Alt. D-2 Sheet 8 of 9

GEORGIA
DEPARTMENT



DATE	REVISIONS	DATE	REVISIONS

GEORGIA
DEPARTMENT OF TRANSPORTATION
CONSTRUCTION 2-314
PROJECT NH-0001-04(047)

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 19 RECONSTRUCTION**
Project No. NH-001-4 (047), Spalding County
Preliminary Submittal

ALTERNATIVE NO.: **D-3**

DESCRIPTION: **REDUCE THE STORM SEWERS BY USING EXISTING
 CATCH BASINS AND DRAIN PIPES WHERE POSSIBLE**

SHEET NO.: **1 of 13**

ORIGINAL DESIGN: (Sketch attached)

New storm sewers will be constructed parallel to the existing storm sewers in many locations.

ALTERNATIVE: (Sketch attached)

Do not construct new storm sewers. Using catch basins and concrete flumes, divert the storm flow to the existing network of drain pipes where possible.

ADVANTAGES:

- Reduces cost

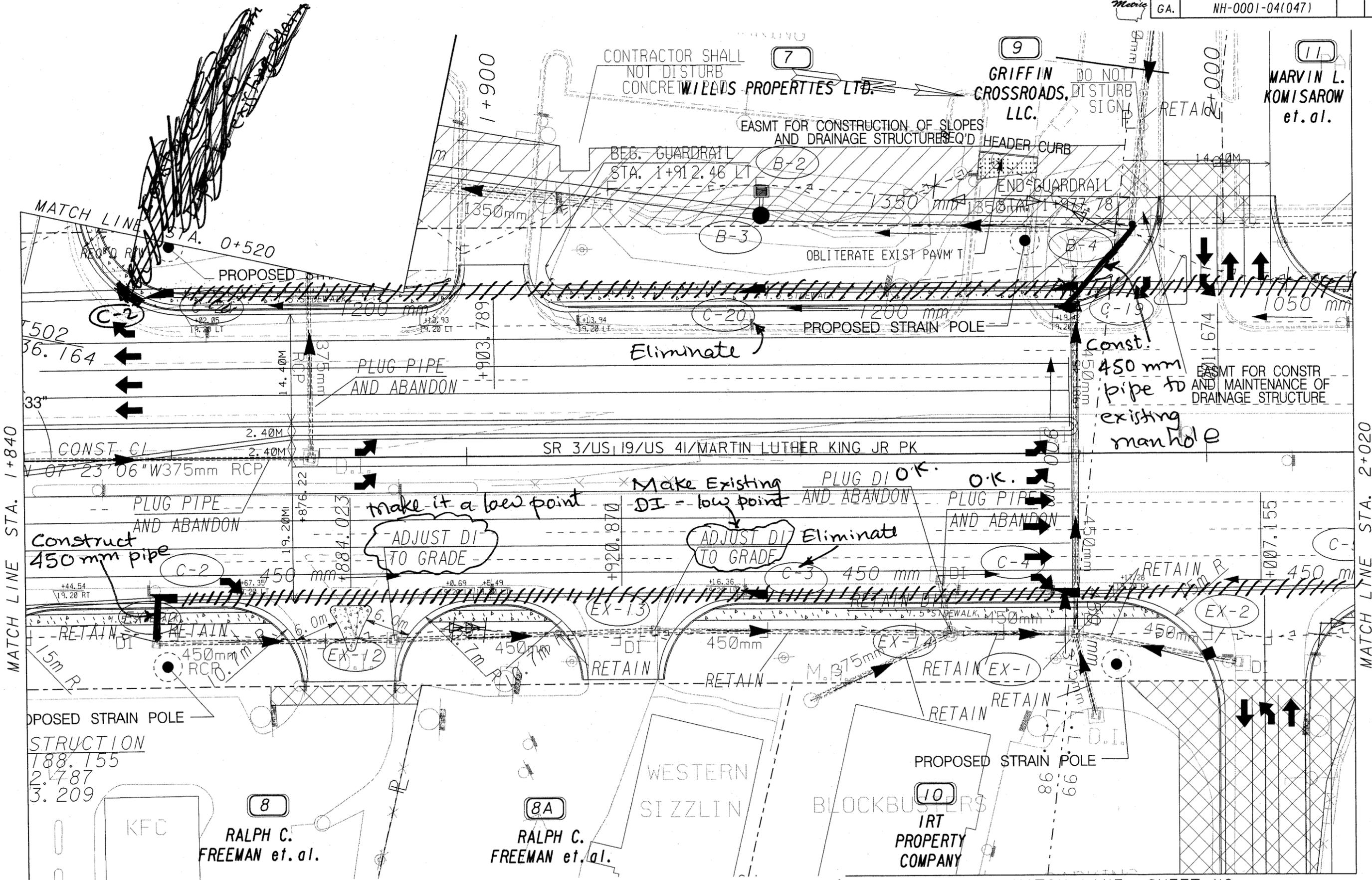
DISADVANTAGES:

- Increases gutter spreads
- Uses questionable, older infrastructure

DISCUSSION:

It is assumed that the existing network of drain inlets, catch basins and storm water pipes is in reasonably good condition with a serviceable life of at least 30 years. A video inspection of the existing pipe network is recommended. Some inlets may need reconstruction, and some pipes may need to be lined.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 377,245	—	\$ 377,245
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 377,245	—	\$ 377,245



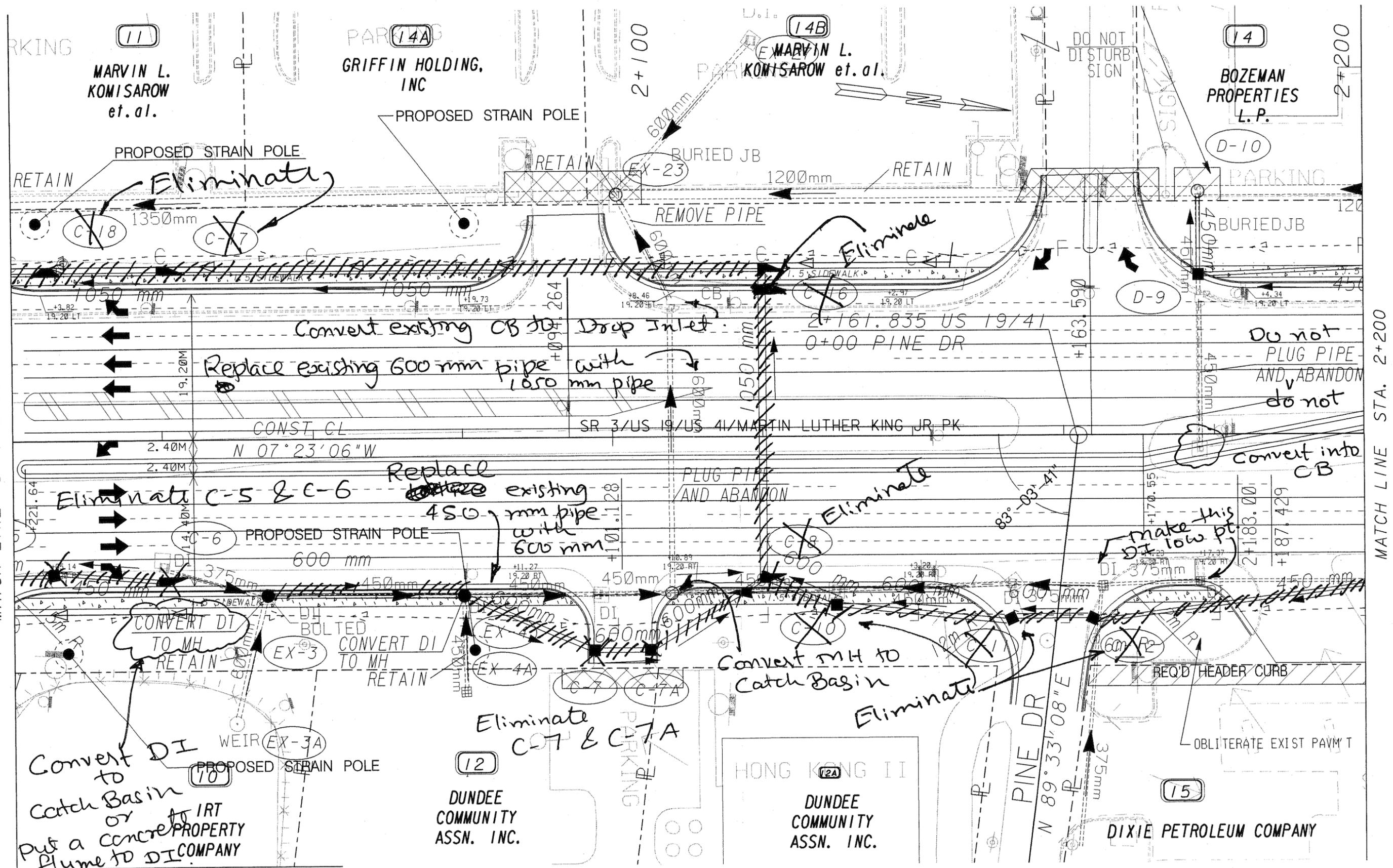
MATCH LINE STA. 1+840

MATCH LINE STA. 2+020

Why is drainage going right, then up & then left?
 Alt. D-3 Sheet 2 of 3

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.

DATE	REVISIONS	DATE	REVISIONS



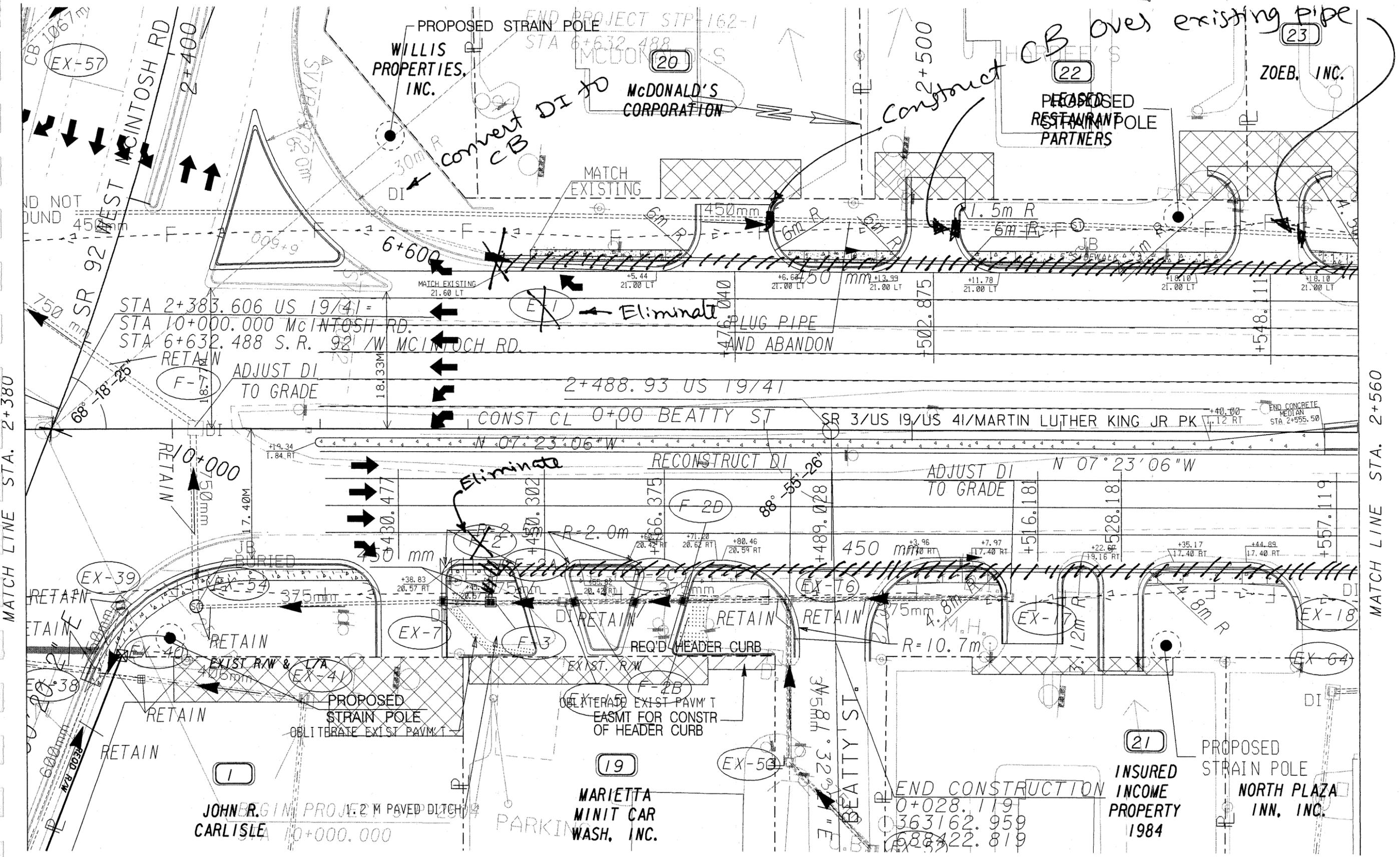
MATCH LINE STA. 2+020

MATCH LINE STA. 2+200

MATCH LINE SHEET NO.

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.

Alt. D-3 sheet 3 of 13



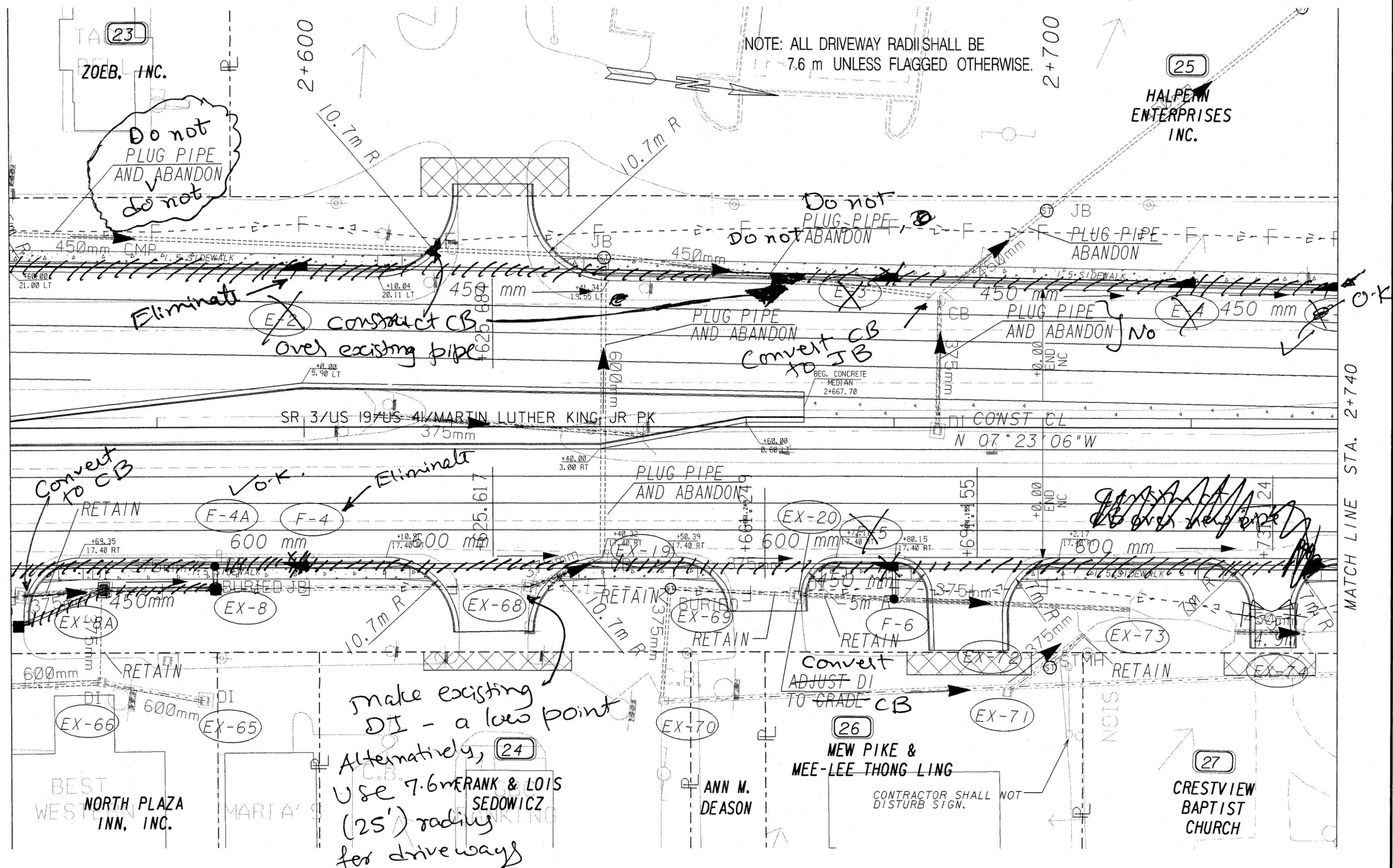
MATCH LINE STA. 2+380

MATCH LINE STA. 2+560

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.

Alt. D-3 Sheet 5 of 13

DATE	REVISIONS	DATE	REVISIONS



NOTE: ALL DRIVEWAY RADII SHALL BE 7.6 m UNLESS FLAGGED OTHERWISE.

Do not PLUG PIPE AND ABANDON Do not

Do not PLUG PIPE AND ABANDON

PLUG PIPE AND ABANDON

Eliminate EX-2 construct CB over existing pipe

PLUG PIPE AND ABANDON Convert CB to JB

PLUG PIPE AND ABANDON No

Convert to CB

Make existing DI - a low point Alternatively, (24) Use 7.6m (25') radius for driveways

Convert ADJUST DI TO GRADE CB

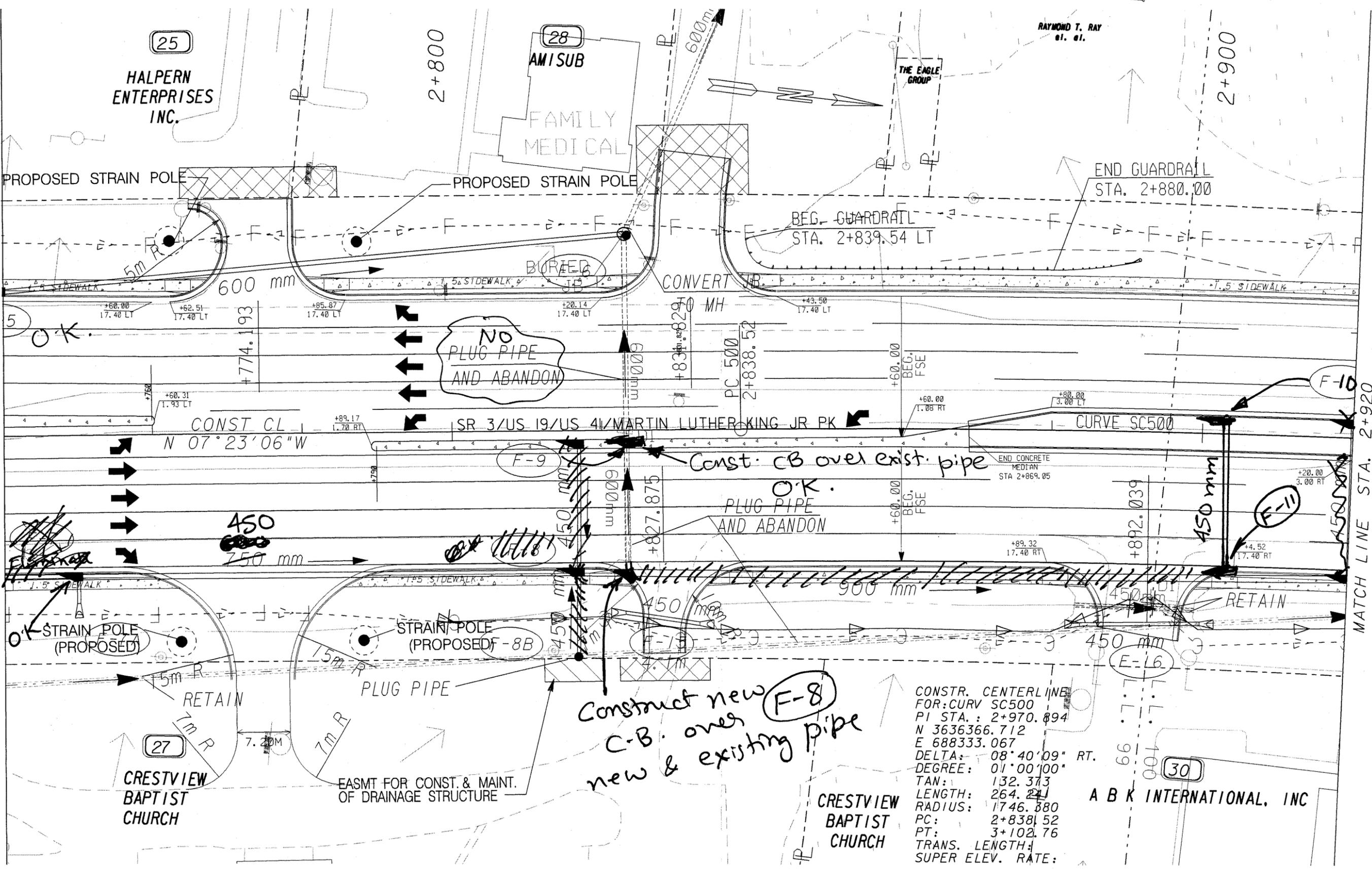
Handwritten scribbles and notes

MATCH LINE STA. 2+560

MATCH LINE STA. 2+740

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.

DATE	REVISIONS	DATE	REVISIONS



MATCH LINE STA. 2+740

MATCH LINE STA. 2+920

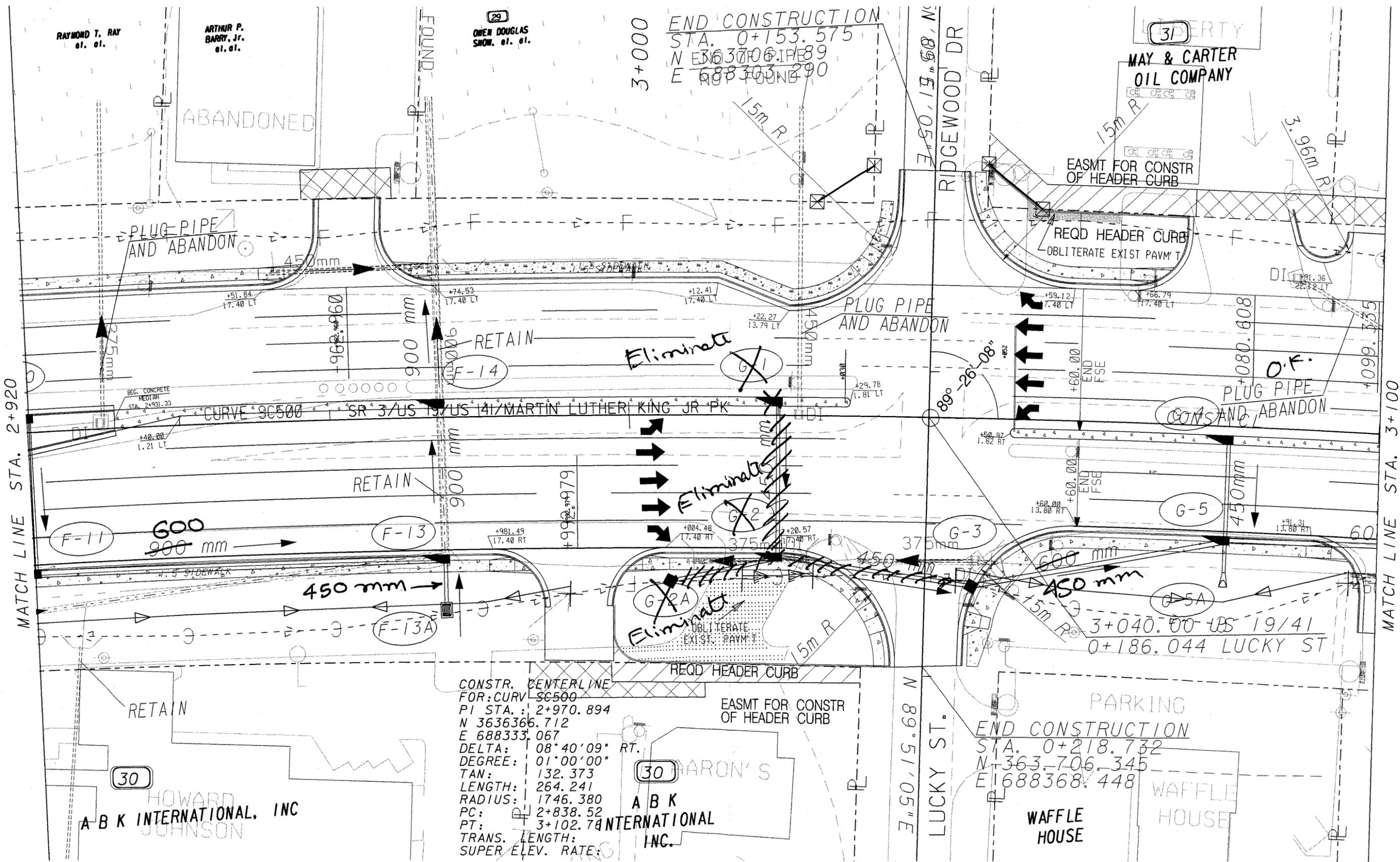
CONSTR. CENTERLINE
 FOR: CURV SC500
 PI STA.: 2+970.894
 N 3636366.712
 E 688333.067
 DELTA: 08° 40' 09" RT.
 DEGREE: 01° 00' 00"
 TAN: 132.373
 LENGTH: 264.24
 RADIUS: 1746.380
 PC: 2+838.52
 PT: 3+102.76
 TRANS. LENGTH:
 SUPER ELEV. RATE:

A B K INTERNATIONAL, INC

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.

Att. D-3 sheet 7 of 13

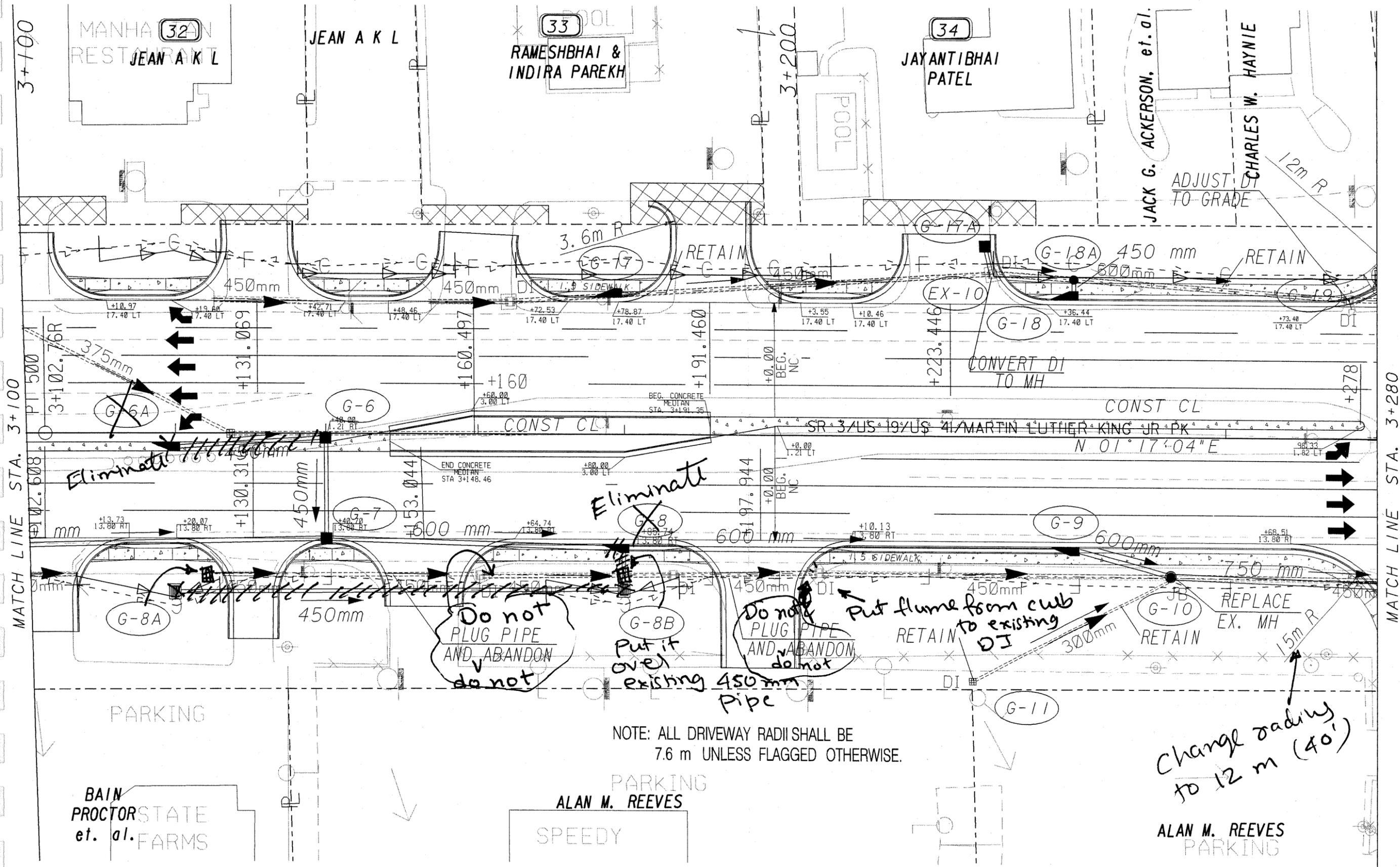
DATE	REVISIONS	DATE	REVISIONS



NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.

Alt. D-3 sheet 8 of 13

DATE	REVISIONS	DATE	REVISIONS



NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.

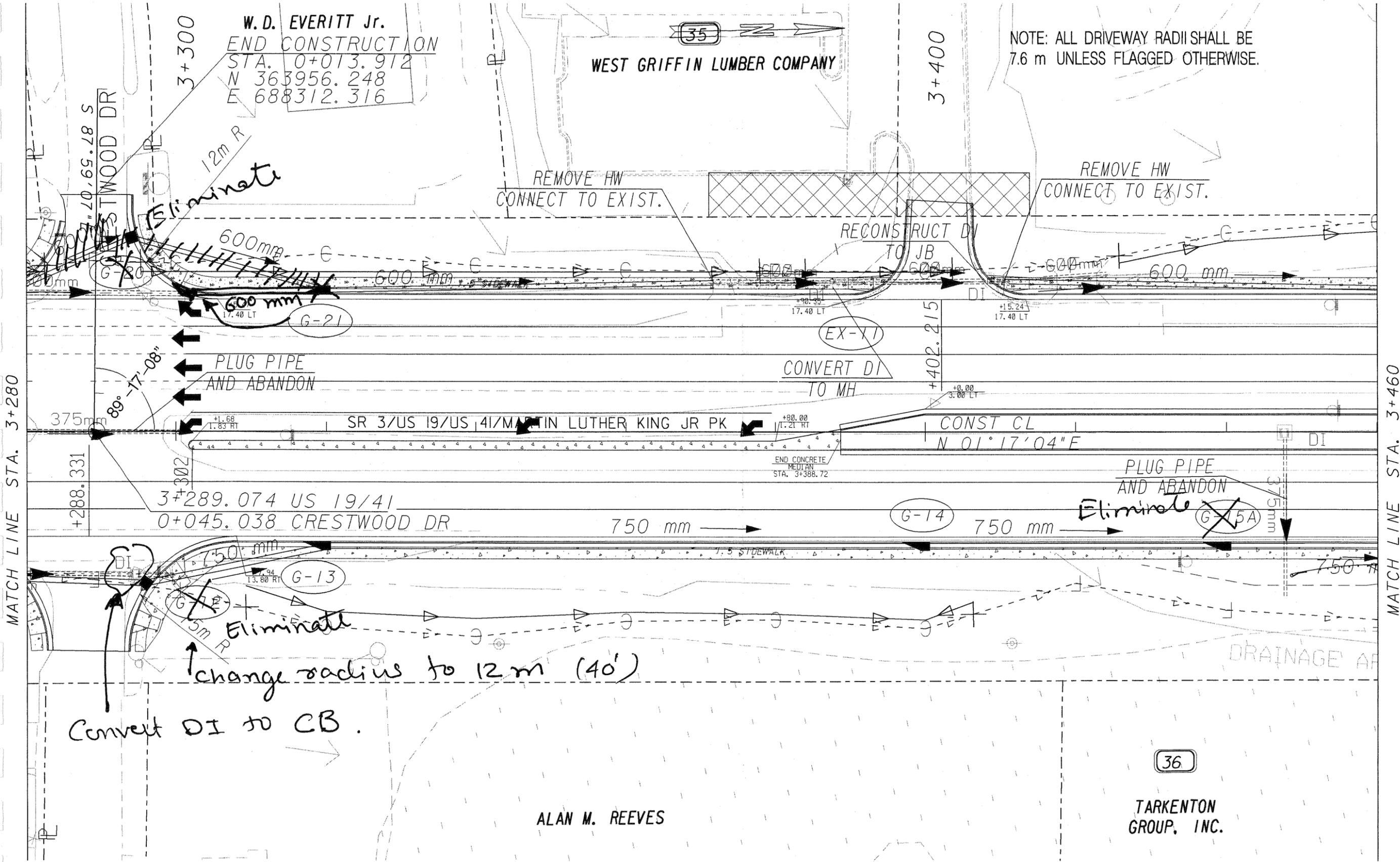
Alt. D-3 Sheet 9 of 13



W. D. EVERITT Jr.
 END CONSTRUCTION
 STA. 0+013.912
 N 363956.248
 E 688312.316

WEST GRIFFIN LUMBER COMPANY

NOTE: ALL DRIVEWAY RADII SHALL BE 7.6 m UNLESS FLAGGED OTHERWISE.



MATCH LINE STA. 3+280

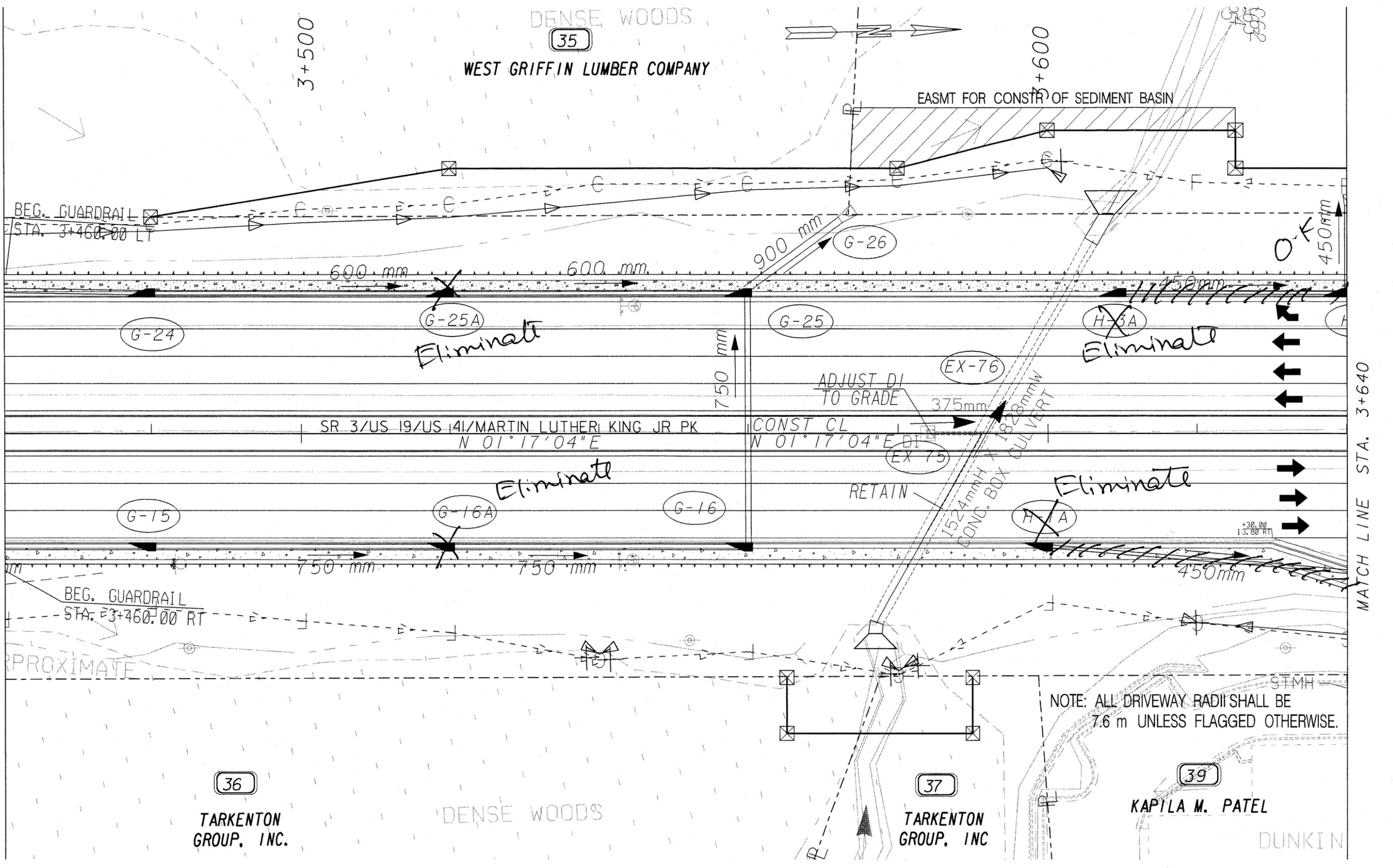
MATCH LINE STA. 3+460

ALAN M. REEVES

TARKENTON GROUP, INC.

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.

Alt. D-3 sheet 10 of 13



MATCH LINE STA. 3+460

MATCH LINE STA. 3+640

NOTE: ALL DRIVEWAY RADII SHALL BE 7.6 m UNLESS FLAGGED OTHERWISE.

36
TARKENTON GROUP, INC.

37
TARKENTON GROUP, INC.

39
KAPILA M. PATEL

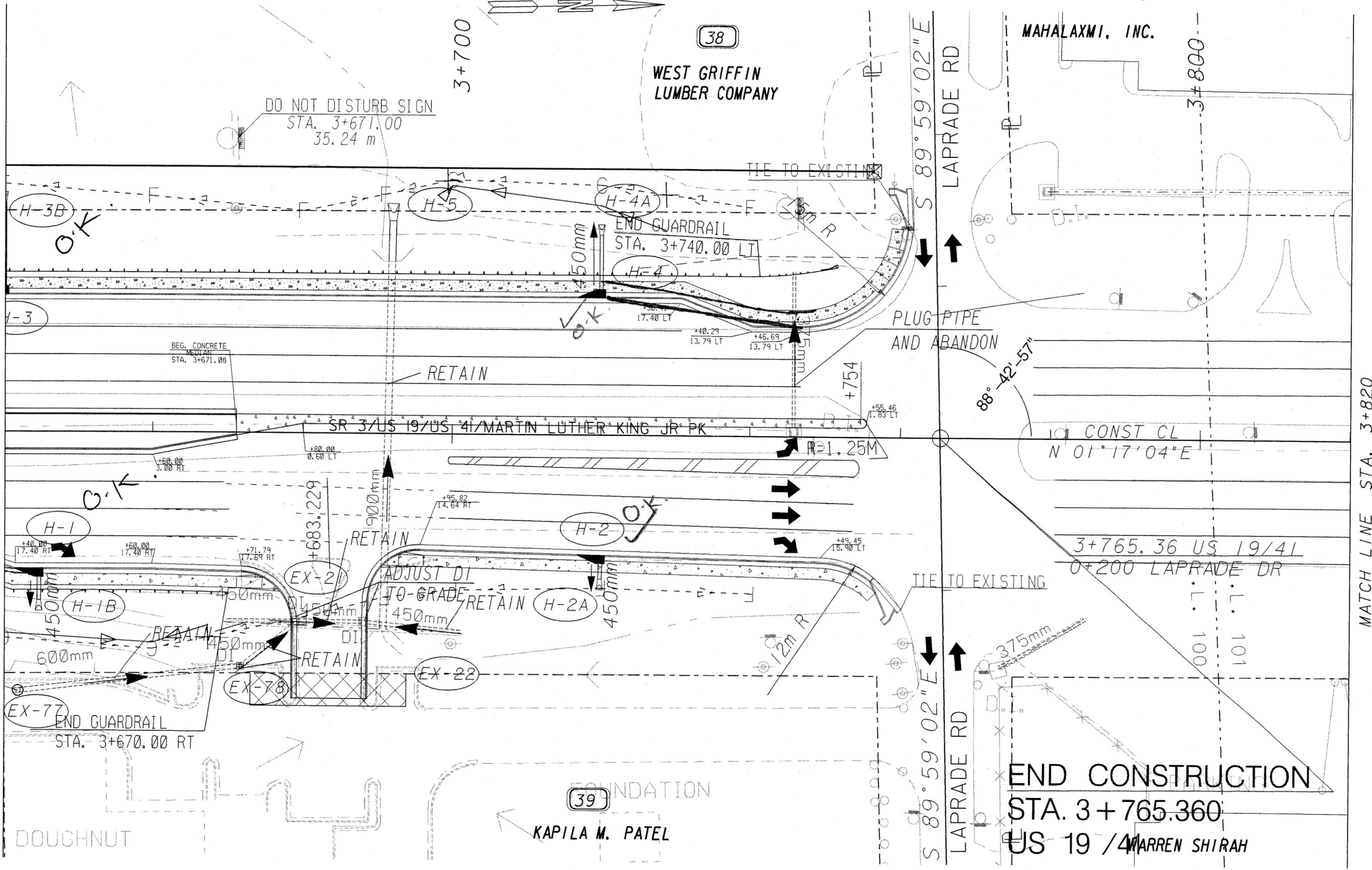
NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.

Alt-D-3 Sheet 11 of 13

DATE	REVISIONS	DATE	REVISIONS



STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	NH-0001-04(047)		



MATCH LINE STA. 3+640

MATCH LINE STA. 3+820

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.

GEORGIA

RATIO=1:250

DATE	REVISIONS	DATE	REVISIONS

GEORGIA DEPARTMENT OF TRANSPORTATION

END CONSTRUCTION
 STA. 3 + 765.360
 US 19 / 4 WARREN SHIRAH

Alt. D-3 Sheet 12 of 13

VALUE ENGINEERING ALTERNATIVE



PROJECT:	SR 3/US 19 RECONSTRUCTION Project No. NH-001-4 (047), Spalding County <i>Preliminary Submittal</i>	ALTERNATIVE NO.: A-2
DESCRIPTION:	IMPROVE LANE CONTINUITY OF US 19/41 LEFT-TURN LANES AT BOWLING DRIVE	SHEET NO.: 1 of 3

ORIGINAL DESIGN: (Sketch attached)

The original design has both US 19/41 northbound lanes shifting into the median to become left-turn only lanes at the median opening for the Griffin Crossroads shopping center entrance.

ALTERNATIVE: (Sketch attached)

Keep the two northbound US 19/41 lanes in the median at the same alignment. Make the left lane a left-turn only lane and develop the second left turn in the median. Keep the right northbound US 19/41 lane a through lane.

ADVANTAGES:

- Costs are the same
- Reduces weaving for through traffic
- Increases safety by eliminating weaving of two lanes

DISADVANTAGES:

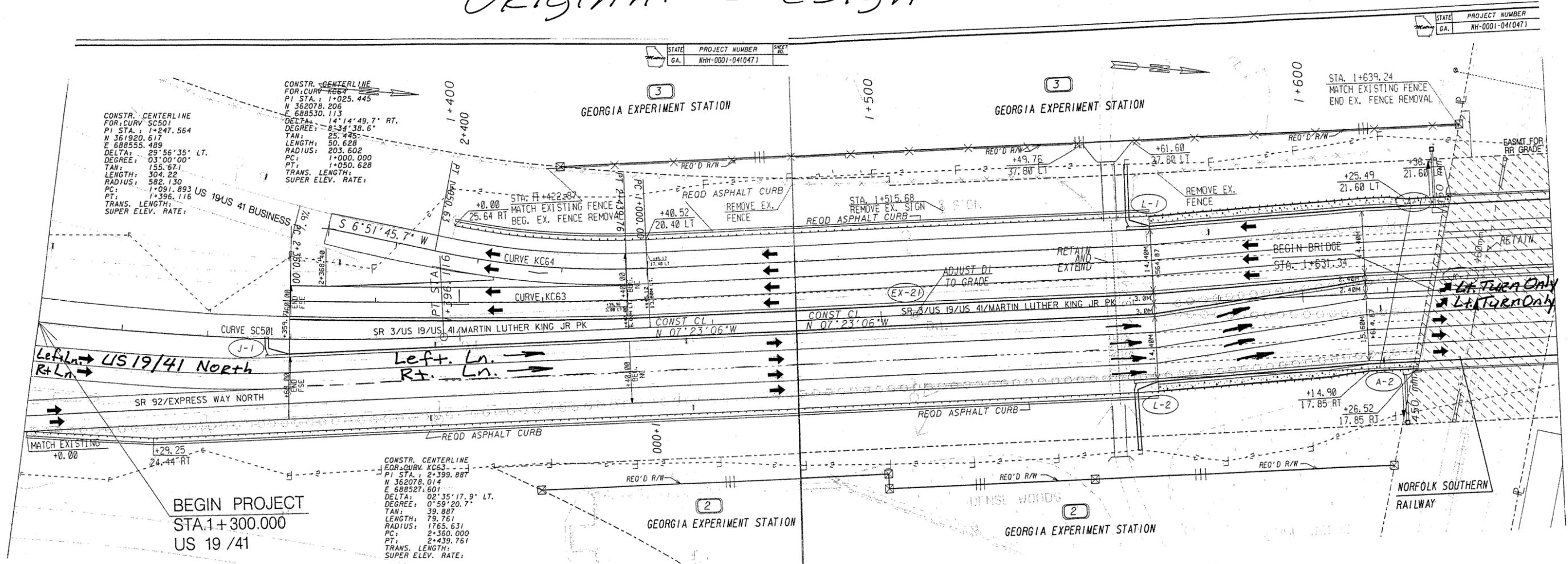
- None apparent

DISCUSSION:

The present lane layout for US 19/41 has the two northbound lanes shifting towards the median, then these lanes become left-turn only lanes. This would require a vehicle in the left northbound US 19/41 lane to weave two lanes to get to the closest through lane for this section of US 19/41. The alternative design requires a weave of only one lane.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE			
SAVINGS (Original minus Alternative)			
DESIGN SUGGESTION			

Original Design



VALUE ENGINEERING ALTERNATIVE



PROJECT: SR 3/US 19 RECONSTRUCTION Project No. NH-001-4 (047), Spalding County <i>Preliminary Submittal</i>	ALTERNATIVE NO.: A-4
DESCRIPTION: USE TWO-WAY SOUTHBOUND AND ONE-WAY NORTHBOUND CONNECTOR/SERVICE ROADS	SHEET NO.: 1 of 3

ORIGINAL DESIGN:

The original design widens US 19/41 with an additional lane in each direction, closes the existing median with left lanes at the median openings, and adds a raised, curbed median.

ALTERNATIVE: (See sketches for Alt. Nos. A-10 and A-11)

Do not add outside lanes to US 19/41. Keep the raised curbed median for US 19/41 and add left-turn lanes. Add a southbound two-way connector/service road and a northbound one-way connector/service road for local access to businesses.

ADVANTAGES:

- Reduces cost
- Circulates the local “shopping” traffic on service roads and moves traffic off of US 19/41

DISADVANTAGES:

- None apparent

DISCUSSION:

This alternative closes the median opening at the shopping center. It requires the median opening at Bowling Drive to be fully directional at the intersection. The present design restricts the left turns at this intersection except for northbound US 19/41 traffic.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 392,940	—	\$ 392,940
ALTERNATIVE	\$ 311,984	—	\$ 311,984
SAVINGS (Original minus Alternative)	\$ 80,956	—	\$ 80,956

CALCULATIONS



PROJECT: **RECONSTRUCTION OF SR 3 / US 19**
Project No. NH-001-4 (047) - Spalding County, Georgia
Preliminary Submittal

ALTERNATIVE NO.: **A-4**

SHEET NO.: **2 of 3**

Alternate Costs:
Pavement Area for Two-Way SB Connector/
Service Rd

$$420m \times (7.2m) = 3,024 m^2$$

Pavement Area for One-Way
NB Connector:

$$430 \times (3.6m) = 1,548 m^2$$

$$\text{Total Conn. Area} = 4,572 m^2$$

Alt. Estimate of C.Bs = 9 EA.

Alt. Estimate 450mm Pipe = 60m

Alt. curb & gutter = 1,700m

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 19 RECONSTRUCTION**
Project No. NH-001-4 (047), Spalding County
Preliminary Submittal

ALTERNATIVE NO.: **A-6**

DESCRIPTION: **ELIMINATE/COMBINE DRIVEWAYS**

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (Sketch attached)

Driveway entrances are provided for each business.

ALTERNATIVE: (Sketch attached)

Eliminate and combine some of the driveway entrances by continuing curb, gutter and sidewalks.

ADVANTAGES:

- Improves safety
- Looks clean
- Slightly reduces costs

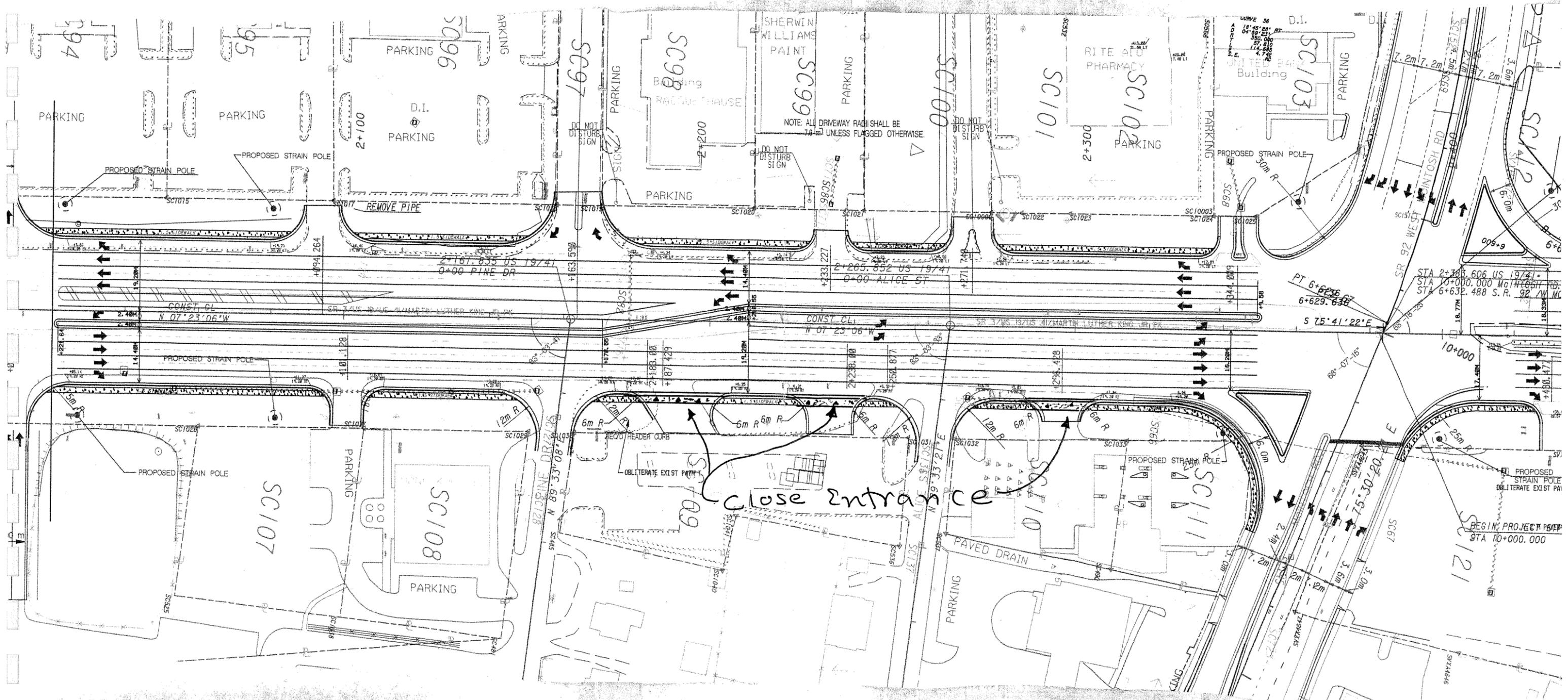
DISADVANTAGES:

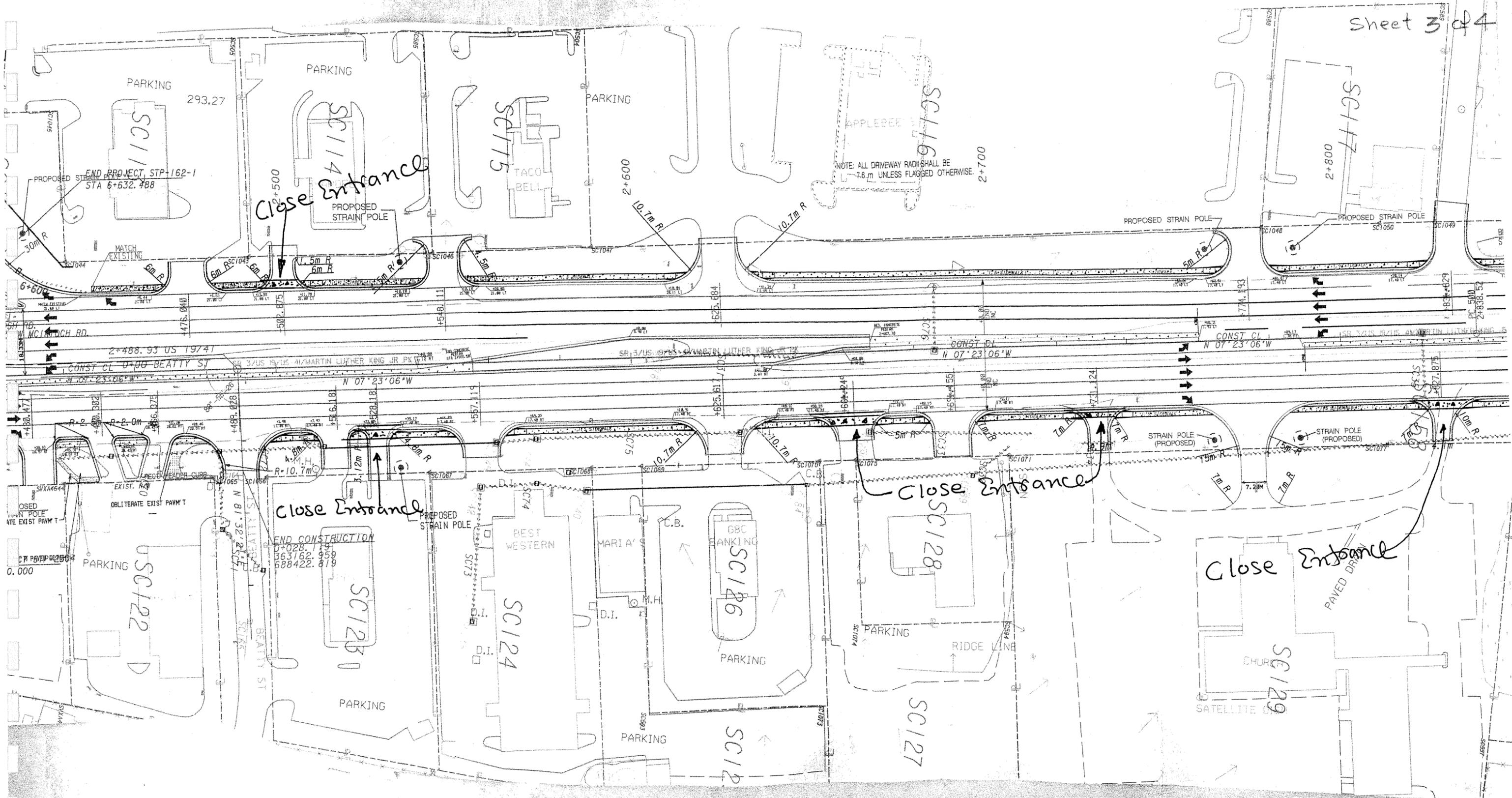
- Creates an inconvenience to business users and owners

DISCUSSION:

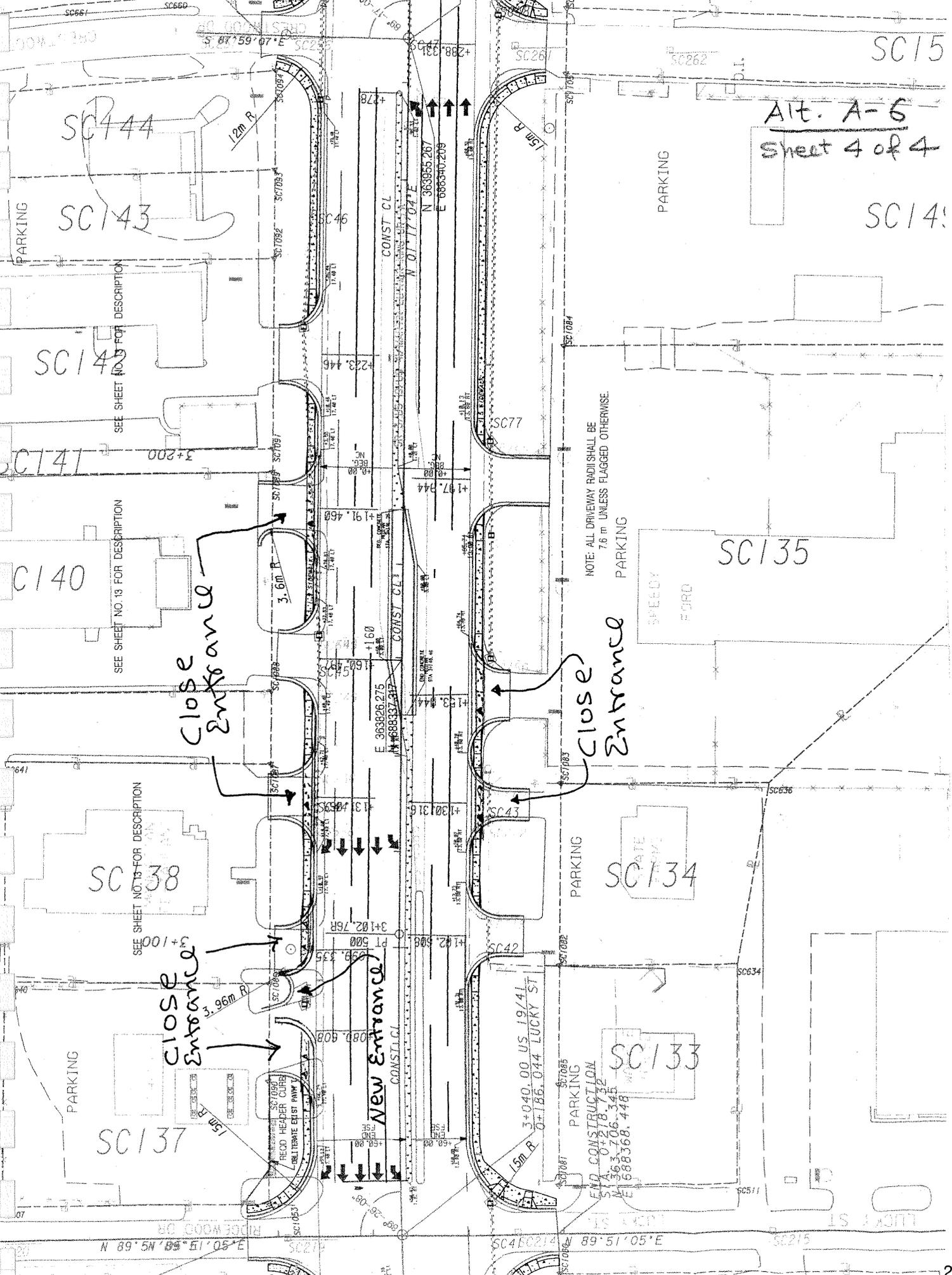
If this alternative is adapted, GDOT may have to hold a public hearing on the site and get support from the local businesses.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE	DESIGN SUGGESTION		
SAVINGS (Original minus Alternative)			





Alt. A-5
Sheet 4 of 4



SEE SHEET NO. 13 FOR DESCRIPTION

SEE SHEET NO. 13 FOR DESCRIPTION

SEE SHEET NO. 13 FOR DESCRIPTION

NOTE: ALL DRIVEWAY RADII SHALL BE 7.6 m UNLESS FLAGGED OTHERWISE

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 19 RECONSTRUCTION**
Project No. NH-001-4 (047), Spalding County
Preliminary Submittal

ALTERNATIVE NO.: **A-10**

DESCRIPTION: **USE ONE-WAY CONNECTOR/SERVICE ROADS IN
 NORTHBOUND AND SOUTHBOUND DIRECTIONS**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN:

The present design widens US 19/41 with an additional lane in each direction, closes the existing median and provides left-turn lanes at the median openings, and adds a raised, curbed median.

ALTERNATIVE: (Sketch attached)

Do not add outside lanes to US 19/41. Keep the raised, curbed median for US 19/41 and add left-turn lanes. Add one-way connector/service roads in both the northbound and southbound directions for local access to businesses.

ADVANTAGES:

- Reduces cost
- Circulates the local “shopping” traffic on service roads and moves traffic off of US 19/41

DISADVANTAGES:

- Does not increase the capacity of US 19/41

DISCUSSION:

This alternative design would close the proposed median opening at ACCLOU shopping center drive and allow the median opening at Bowling Road to be a full-directional intersection. The present design restricts all left turns except for northbound US 19/41.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 392,940	—	\$ 392,940
ALTERNATIVE	\$ 233,670	—	\$ 233,670
SAVINGS (Original minus Alternative)	\$ 159,270	—	\$ 159,270

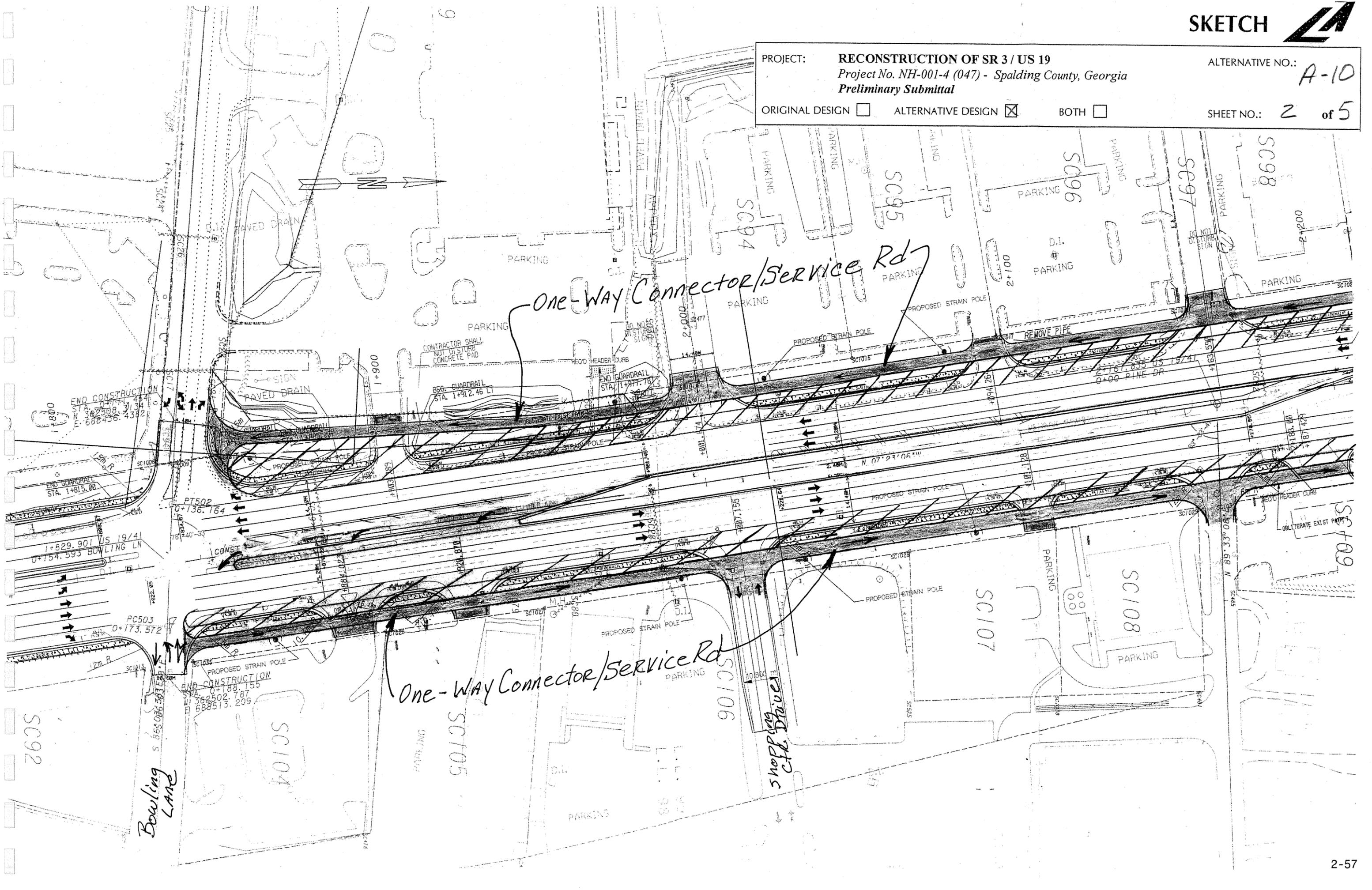


PROJECT: **RECONSTRUCTION OF SR 3 / US 19**
 Project No. NH-001-4 (047) - Spalding County, Georgia
 Preliminary Submittal

ALTERNATIVE NO.: **A-10**

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: **2** of **5**

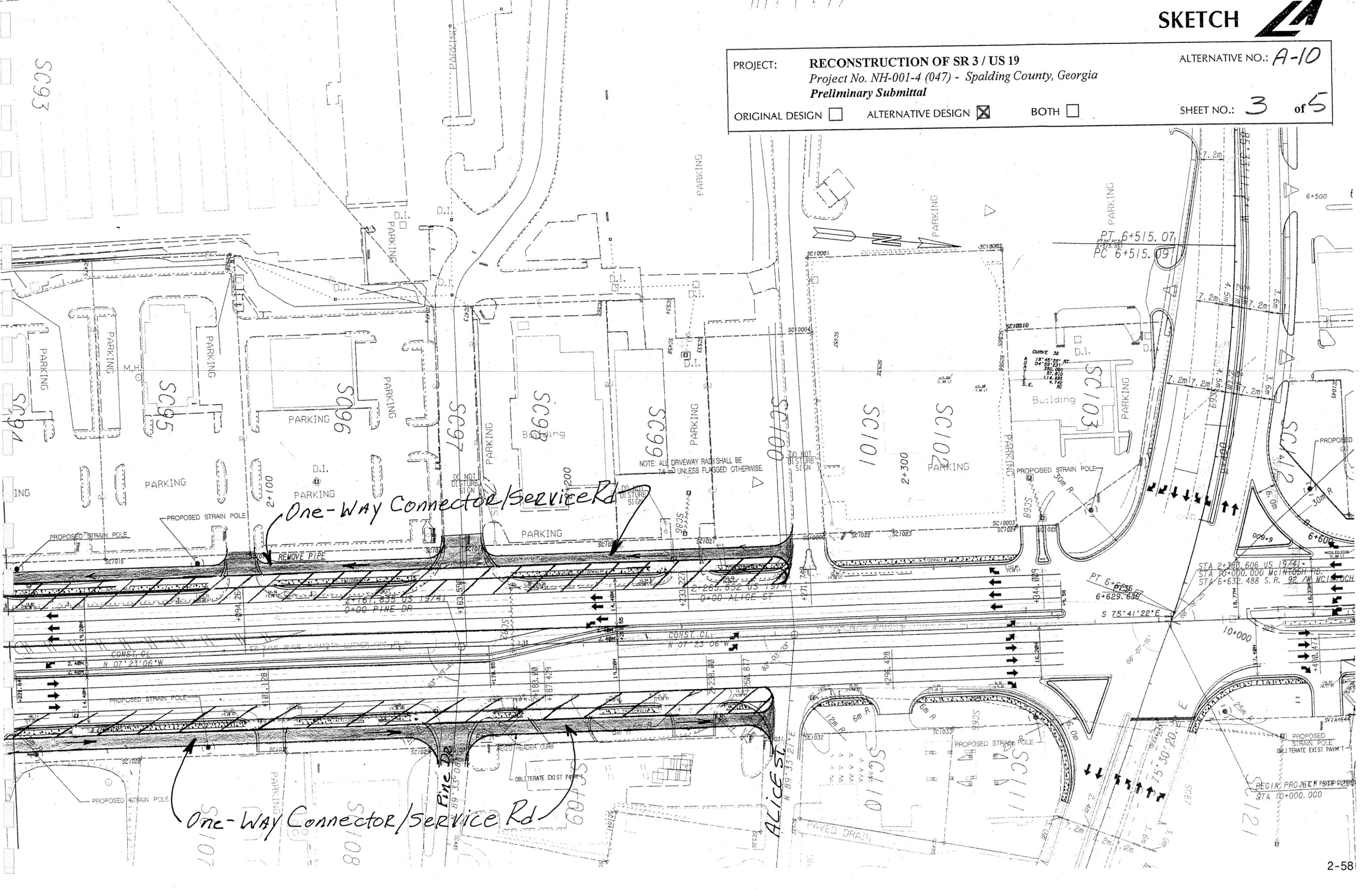


PROJECT: **RECONSTRUCTION OF SR 3 / US 19**
 Project No. NH-001-4 (047) - Spalding County, Georgia
 Preliminary Submittal

ALTERNATIVE NO.: **A-10**

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: **3** of **5**



NOTE: ALL DRIVEWAY RADII SHALL BE 7.6M UNLESS FLAGGED OTHERWISE.

CURVE 36
 18°45'28" RT
 0+29.851
 390.000
 57.810
 174.845
 4.745
 S.E.

STA 2+783.606 US 1974
 STA 10+000.000 MCINTOSH RD.
 STA 6+632.488 S.R. 92 W. MCINTOSH

CALCULATIONS



PROJECT: **RECONSTRUCTION OF SR 3 / US 19**
 Project No. NH-001-4 (047) - Spalding County, Georgia
 Preliminary Submittal

ALTERNATIVE NO.:
 A-10

SHEET NO.: 4 of 5

Cost to incorporate Alt. (A-7).
 Pavement Area for One-Way Connector/Service Rds

$$\text{SB Connector: } 420\text{m} \times 3.6\text{m (one lane)} = 1,512\text{m}^2$$

$$\text{NB Connector: } 430\text{m} \times 3.6\text{m (one lane)} = 1,548\text{m}^2$$

$$\text{NB \& SB Conn. Area} = 3,060\text{m}^2$$

Alt. curb & gutter = 1,700m see Alt. A-11 sht. 5
 (calculations)

Alt. add'l C.B.s = 6EA.

Alt. Add'l (450mm) 18" STR. DR. PIPE = 80m

Original Costs for an add'l lane in each
 direction: Pavement Area = 3,060m² (see Alt. A-11
 sht 5)

for this calculation and calculations
 for mainline and connector Pavement Costs
 see Alt. (A-11) sht 5 (calculations)

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 19 RECONSTRUCTION**
Project No. NH-001-4 (047), Spalding County
Preliminary Submittal

ALTERNATIVE NO.: **A-11**

DESCRIPTION: **USE TWO-WAY CONNECTORS/SERVICE ROADS IN THE
 NORTHBOUND AND SOUTHBOUND DIRECTIONS**

SHEET NO.: **1 of 6**

ORIGINAL DESIGN:

The present design widens US 19/41 with an additional lane in each direction, closes the existing median and provides left-turn lanes at the median openings, and adds a raised, curbed median.

ALTERNATIVE: (Sketch attached)

Do not add outside lanes to US 19/41. Close the median to provide left turns with a raised (6 in.) median. Add two-way connector/parallel service roads to US 19/41 on the northbound and southbound directions for access to local businesses.

ADVANTAGES:

- Eliminates dangerous intersection at ACCLOU shopping center drive
- Circulates the local "shopping" traffic on service roads and moves traffic off of US 19/41

DISADVANTAGES:

- Increases costs slightly
- Does not increase capacity on US 19/41

DISCUSSION:

This alternative would close the proposed median opening at the ACCLOU shopping center drive and allow the median openings at Bowling Road and Doran Road to be full-directional intersections. The present design restricts all left turns except for northbound US 19/41 and closes all the driveways onto US 19/41 between Bowling Road and McIntosh and provides access only to the new frontage service roads.

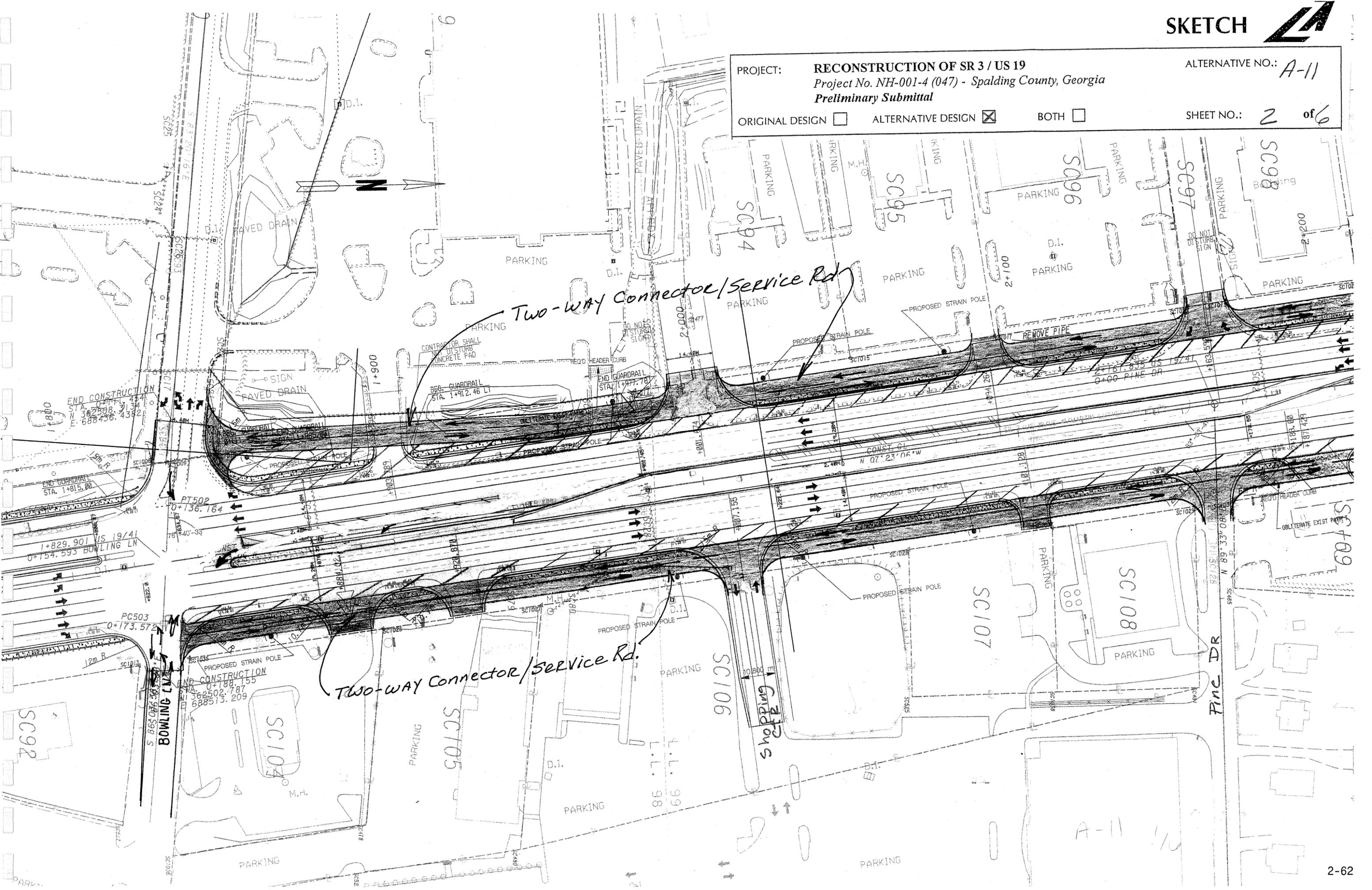
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 392,940	—	\$ 392,940
ALTERNATIVE	\$ 397,910	—	\$ 397,910
SAVINGS (Original minus Alternative)	\$ (4,970)	—	\$ (4,970)

PROJECT: **RECONSTRUCTION OF SR 3 / US 19**
 Project No. NH-001-4 (047) - Spalding County, Georgia
 Preliminary Submittal

ALTERNATIVE NO.: **A-11**

ORIGINAL DESIGN ALTERNATIVE DESIGN BOTH

SHEET NO.: **2** of **6**



CALCULATIONS



PROJECT: **RECONSTRUCTION OF SR 3 / US 19**
 Project No. NH-001-4 (047) - Spalding County, Georgia
 Preliminary Submittal

ALTERNATIVE NO.: A-11

SHEET NO.: 4 of 6

Pavement Cost for Full Depth w/

$$(12.5\text{mm Asph. Conc.}) \frac{90\text{kg}}{\text{m}^2} \times \frac{\text{MG}}{1000\text{kg}} \times \frac{\$85}{\text{MG}} = \$7.65/\text{m}^2$$

$$(19\text{mm Asph. Conc.}) \frac{120\text{kg}}{\text{m}^2} \times \frac{\text{MG}}{1000\text{kg}} \times \frac{\$78}{\text{MG}} = \$9.36/\text{m}^2$$

$$(25\text{mm Asph. Conc.}) \frac{480\text{kg}}{\text{m}^2} \times \frac{\text{MG}}{1000\text{kg}} \times \frac{\$78}{\text{MG}} = \$37.44/\text{m}^2$$

$$\text{GAB}(300\text{mm}) \frac{720\text{kg}}{\text{m}^2} \times \frac{\text{MG}}{1000\text{kg}} \times \$21.59 = \$15.55/\text{m}^2$$

$$\text{Total Full Depth} = \$70.00/\text{m}^2$$

Proposed Pavement Section for Connector/ Service Rds

$$(12.5\text{mm Asph.}) 1\frac{1}{2}'' \left(\frac{90\text{kg}}{\text{m}^2} \right) = \$7.65/\text{m}^2$$

$$(19\text{mm Asph.}) 2'' \left(\frac{120\text{kg}}{\text{m}^2} \right) = \$9.36/\text{m}^2$$

$$(25\text{mm Asph.}) 4'' \left(\frac{240\text{kg}}{\text{m}^2} \right) = \$18.72/\text{m}^2$$

$$\text{GAB}(250\text{mm}) 8'' \left(\frac{480\text{kg}}{\text{m}^2} \right) = \$10.36/\text{m}^2$$

$$\text{Connector Pavement Section} = \$46.09/\text{m}^2$$

CALCULATIONS



PROJECT:

RECONSTRUCTION OF SR 3 / US 19

Project No. NH-001-4 (047) - Spalding County, Georgia
Preliminary Submittal

ALTERNATIVE NO.:

A-11

SHEET NO.:

5 of 6

Costs to incorporate Alt. (A-11).
Pavement for two-way connectors/service Rds.
Assume a Pavement Section of $1\frac{1}{2}$ " (12.5mm), 2 " (19mm)
 290kg/m^2 , 120kg/m^2
 4 " (25mm), and 250mm GAB
 240kg/m^2

SB Connector; Length = 420 m
NB Connector; Length = 430 m
Service Rds. in both directions = 850 m
width = 2 Lanes = 7.2 m
Connectors Roadway Area (Alternate) $(850\text{m} \times 7.2\text{m}) = 6,120\text{m}^2$
Pavement

Original Cost for an additional Lane in each direction width = 3.6m Length = 850m (both directions)
Original Additional outside lanes: $(3.6\text{m}) \times 850\text{m} = 3,060\text{m}^2$
Pavement Area

Alternate Length of Reg'd curb & gutter for Connector/service Rds:

NB connector $430\text{m} \times 2$ (sides) = 860m
SB connector $420\text{m} \times 2$ (sides) = 840m
1,700m

Additional catch Basins for Connectors ≈ 12 EA.
Additional 18" storm Drain Pipe (450mm) $\approx 80\text{m}$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 3/US 19 RECONSTRUCTION**
Project No. NH-001-4 (047), Spalding County
Preliminary Submittal

ALTERNATIVE NO.: **S-1**

DESCRIPTION: **USE 24-IN. IN LIEU OF 30-IN. CURB AND GUTTER SECTION**

SHEET NO.: **1 of 1**

ORIGINAL DESIGN:

The original design uses 30-in.wide Type 2 and Type 7 curb and gutter sections throughout the project.

ALTERNATIVE:

Use 24-in. wide Type 2 and Type 7 curb and gutter sections throughout the project.

ADVANTAGES:

- May reduce costs
- Saves six inches of right-of-way on each side of the road

DISADVANTAGES:

- Increases gutter spread due to reduced gutter width

DISCUSSION:

A twenty-four-inch-wide curb and gutter is common in cities and counties. If GDOT adapts this as a standard, cost reductions will occur because of the reduced amount of concrete used. Currently, the cost is almost the same since right-of-way has already been bought.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN			
ALTERNATIVE			
SAVINGS (Original minus Alternative)			

DESIGN SUGGESTION

PROJECT DESCRIPTION

PURPOSE AND NEED

Project NH-001-4 (47) Spalding County is the widening and reconstruction of SR3/US 19/41 from north of the "Y" junction of SR 3 and US 19/41 Business in Griffin, extending north to a point approximately 150 meters north of Laprade Road for a total project length of 2.4 km. SR 3 / US 19/41 will be widened from four lanes to six lanes. The road will have a 6-meter wide raised median with curb and gutter on urban shoulders. The two parallel bridges over the Norfolk Southern Railway will be replaced with a single wider bridge to accommodate the required six-lane section. The roadway section includes a median, sidewalks, turn lanes, traffic signals, erosion control and drainage improvements.

Current and Future Traffic Data

The current traffic along the corridor is: 59,100 A.D.T. for the year 2010; 100,700 A.D.T. for the year 2030 and 79,000 D.H.V. for the year 2030 with 5% trucks and 7% 24-hour trucks. The study conducted by Street Smarts in November 2003 examined the volumes at Moran Road and the new driveway 564 ft. north. The peak hourly volume for northbound left turns onto Moran Road is listed as 361 for the PM hours and 436 for Saturday traffic. The peak volume for the new driveway north of Moran Road is listed as 362 for the PM hours and 185 for Saturday traffic. Both of these volumes are for year 2010 and no adjustment was made for 2030 traffic although conventional wisdom would allow for an increase.

Accidents

During the years of 2002 through 2004, a total of 124 accidents occurred in the vicinity of Moran Road and the new driveway. Three quarters of these accidents were rear-end accidents. The majority of rear-end collisions occurred in the northbound lanes. With increasing traffic and expected increases in the left turn movements, the frequency of this type of accident should increase with time.

Construction Cost

The estimated cost for the project, including right-of-way and engineering fees is \$18.15 million.

VALUE ANALYSIS AND CONCLUSION

GENERAL

This section describes the value analysis procedure used during the value engineering study on the Reconstruction of SR 3 / US 19/41 located in Spalding County. It is followed by separate narratives and conclusions concerning:

- Value Engineering Workshop Participants
- Economic Data
- Function Analysis (Project Purpose and Need)
- Creative Idea Listing and Judgment of Ideas

A systematic approach was used in the VE study and the key procedures involved were organized into three distinct parts: 1) pre-study, 2) VE orientation meeting and workshop, and 3) post-study. A Task Flow Diagram, which outlines each of the procedures included in the VE study, is attached for reference.

PRE-STUDY PREPARATION

Pre-study preparation for the VE effort consisted of scheduling study participants and tasks, and gathering necessary project documents from the GDOT design team. Information relating to alternative analysis and phasing is also very important, as it tends to drive the construction methods. Information relating to the preliminary cost estimate prepared by GDOT was used as the basis for the comparison/analysis during the VE study.

VALUE ENGINEERING WORKSHOP EFFORT

The VE workshop effort consisted of a 30-hour workshop beginning with an orientation meeting on October 21, 2008 and the final VE Presentation on October 24, 2008. During the workshop, the VE job plan was followed in compliance of FHWA and GDOT guidelines for the conduct of VE studies. The job plan guided the search for alternatives to mitigate or eliminate high cost drivers and potential risk elements. It includes six phases:

- Information Phase (including function analysis, discussions of project purpose and need)
- Speculation Phase
- Analysis Phase
- Development Phase
- Presentation Phase
- Implementation Phase

Information Phase

At the beginning of the study, the decisions that have influenced the project design and proposed construction methods had to be reviewed and understood. For this reason, the GDOT design team presented information about the project to the VE team on the first day of the VE workshop. Following the presentation meeting, the VE team spent the remainder of the first day reviewing the project documents, discussing the project purpose and need, and identifying the key elements of the project. Throughout the study the following documents were utilized to establish guidelines for action and for determining cost implications for the various alternatives:

- Preliminary Design Submittal - Plan and Profile – Reconstruction of SR 3 / US 19/41, dated October 2008, prepared by GDOT.
- Revised Project Concept Report, dated March 24, 2005, prepared by Wolverton & Associates.
- Project Cost Estimate Report, dated April 16, 2008, prepared by GDOT.

Speculation Phase

This VE study phase involves the analysis of the project's functions and the creation and listing of ideas. Function analysis is a means of evaluating a project to see if the expenditures actually perform the requirements of the project, or if there are disproportionate amounts of money spent on support functions. These elements add cost to the final product, but have a relatively low worth to the basic function. This creates a high cost-to-worth ratio and the VE team targets these areas for value improvement. GDOT design criteria was compared to the as-designed drawings for general conformance of the typical section.

The VE team then generates as many ideas as possible to provide the necessary functions within the highway project at a lower total life cycle cost, or to improve the quality of the project. Methods to improve on the maintenance of the traffic plan were also discussed. Judgment of the ideas was restricted at this point. The VE team was looking for a large quantity of ideas and free association of ideas. Creative idea worksheets were organized by project elements.

Analysis Phase

During this phase of the workshop, the VE team judged the ideas generated during the speculation phase in comparison to project objectives established by GDOT. The team evaluated each of the VE ideas for feasibility and incorporation into the project. Advantages and disadvantages of each idea were discussed to find the best ideas for development. Ideas found to be irrelevant or not worthy of additional study were discarded. Those which represented the greatest potential for cost savings or improvement to the project were then developed further to be presented during the presentation phase.

To assist the team in ranking the creative ideas, each of the criteria were discussed, and the following criteria definitions were developed in the project purpose and need.

Construction Cost – The initial cost of the material is important and should be considered.

Safety – Safety is very important and must control all decision making.

Level of Service – The projected LOS must be achieved to meet the purpose and need.

Impact Upon Trucks – There is a relatively high percentage of trucks in the area.

Life Cycle Costs – The costs of operating and maintaining the highway is extremely important. These costs would include labor and materials over the next 30 years.

Right-of-Way Cost – It is important to minimize right-of-way purchase if possible.

The VE team would have liked to develop all the ideas that were generated, but time constraints limited the number of ideas that could be developed. Therefore, each idea was compared with the present design concept in terms of how well it met the design criteria. Advantages and disadvantages were discussed and the ideas were rated on a scale of 1 to 5, with the best ideas rated 5. Ideas rated four or higher were generally developed into written VE alternatives.

Development Phase

Each highly-rated idea was expanded into a workable solution. The development consisted of a description of the alternative, life cycle cost comparisons where applicable, and a descriptive evaluation of the advantages and disadvantages of the proposed alternatives. Each alternative was written with a brief narrative to compare the original design to the proposed change. Sketches and design calculations, where appropriate, were also prepared in this part of the study. Analysis also compared each new alternative with others presented in the design report. The VE alternatives and comparisons are included in the section entitled: *Study Results*.

Presentation Phase

The last phase of the VE team's workshop was to present the recommendations. The presentation was held on October 24, 2008 and included personnel from GDOT. During the meeting, a handout was distributed that included a summary listing of the VE study Alternatives and Design Suggestions. These documents were presented to give the attendees an executive summary of the proposals and the key findings of the VE team.

POST STUDY PROCEDURES

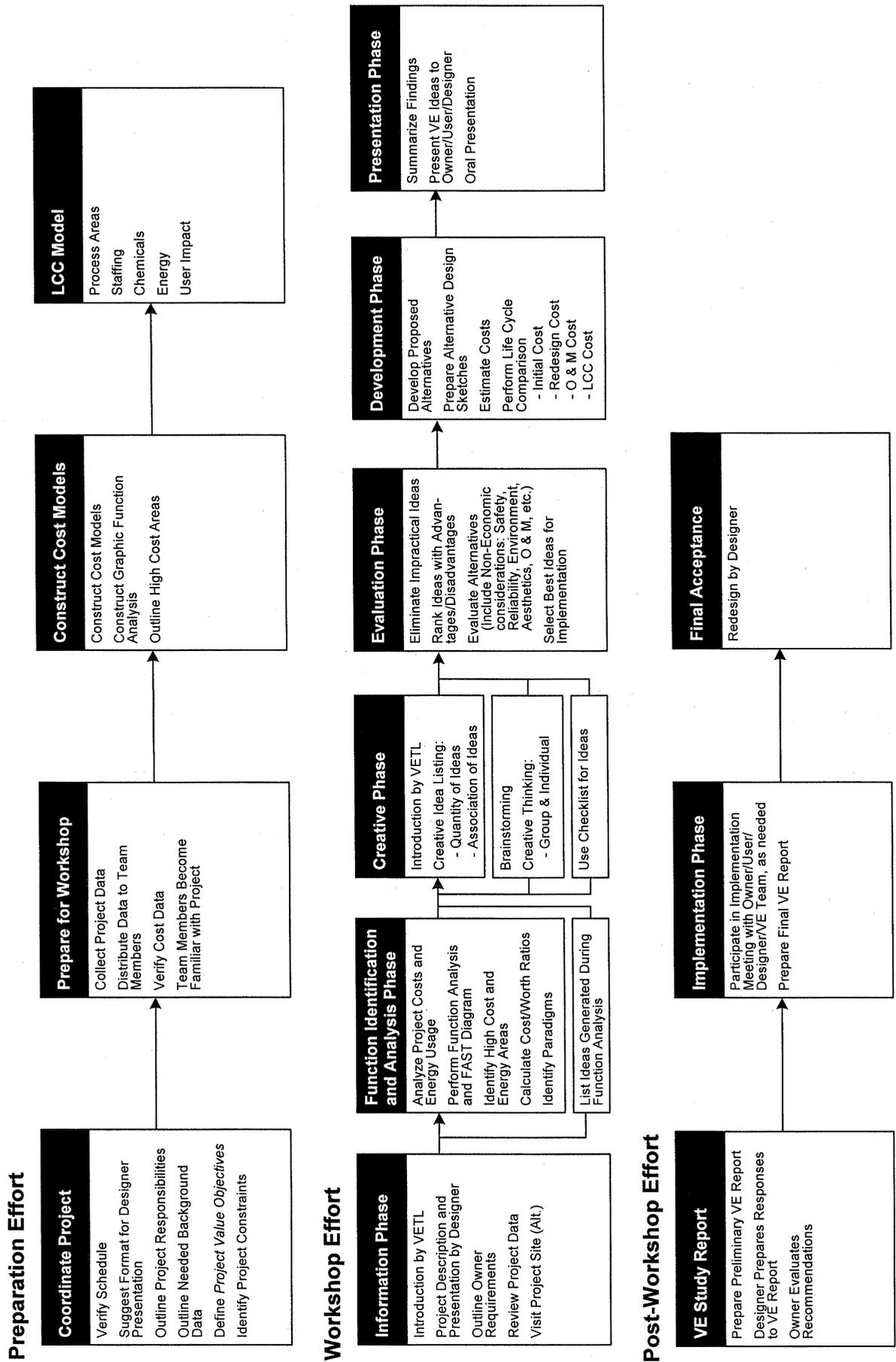
The post-study portion of the VE study includes the preparation of this Value Engineering Study Report. Personnel from GDOT management and the design team will analyze each alternative and prepare a short response, recommending either incorporating the alternative into the project, offering modifications before implementation or presenting reasons for rejection. LZA is available at your convenience as you review the alternatives. Please do not hesitate to call on us for clarification or further information as you consider an implementation approach.

Implementation Phase

Following distribution of the VE report and collection of written comments from all parties, a VE implementation phase meeting is typically scheduled. At this time, each VE alternative will be considered, discussed, and a final disposition made. During this process, a VE alternative may be accepted as written, rejected for cause, modified to improve the idea, or in some cases, the idea may need further study to establish its' merits.



Value Engineering Study Task Flow Diagram



VALUE ENGINEERING WORKSHOP PARTICIPANTS

The VE Team was organized by GDOT and Lewis & Zimmerman Associates, Inc. to provide specific expertise on the unique project elements involved. Team members consisted of a multi-disciplined group with professional design experience and a working knowledge of highway design, construction, environmental permitting, and VE procedures. Members of the team consisted of the following professionals:

VE Team

David Hamilton, PE, CVS, CCE, LEED ^{AP}	VE Team Leader/Civil	Lewis & Zimmerman Assoc.
Joe Leoni, PE	Highway Design Engineer	ARCADIS
Paresh Parikh, PE	Construction Engineer	Delon Hampton
Mike Moilanen, PE	Bridge Engineer	ARCADIS

GDOT

Lisa Myers	VE Coordinator	GDOT
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DESIGNER'S PRESENTATION

An overview of the project was presented on Tuesday, October 21, 2008, by the GDOT design team. The purpose of this meeting, in addition to being an integral part of the Information Gathering Phase of the VE Study, was to bring the VE Team "up-to-speed" regarding the overall project specifics including traffic projections, accident history, drainage elements, construction phasing, local permitting issues, and estimated project cost. Additionally, the meeting afforded the design staff the opportunity to highlight in greater detail, those areas of the project requiring additional or special attention.

VALUE ENGINEERING TEAM'S FORMAL ORAL PRESENTATION

A formal oral VE presentation was conducted on Friday, October 24, 2008 to review the VE alternatives with the GDOT project management and design staff. The attendees received a copy of the Presentation Outline, and **Summary of Potential Cost Savings**. An attendance list for the meeting is attached.

VE TEAM PRESENTATION



PROJECT: RECONSTRUCTION OF SR 3 / US 19
Project No. 342621-NH-001-4(47) - Spalding County, Georgia

DATE:
October 24, 2008

NAME & E-MAIL (PLEASE PRINT)	ORGANIZATION/TITLE	PHONE/FAX
David Hamilton, PE, CVS, CCE, LEED em: hamiltonve@aol.com	Lewis & Zimmerman Associates, Inc. FACD Facilitator/Civil	ph: 253-925-8741 fx: 253-925-8791
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Pareesh J. Parikh em: pparikh@delonhampton.com	Delon Hampton and Associates	ph: 404-419-8434 fx: 404-524-2575
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Lisa Myers em: lmyers@dot.ga.gov	GDOT Eng Services DREM	ph: 404-631-1770 fx:
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ECONOMIC DATA

Economic criteria used for evaluation were developed by the VE team with information gathered from the Federal Office of Management & Budget. To express costs in a meaningful manner, the VE team alternatives are presented on the basis of discounted present worth. Criteria for the planning project period and interest rates are based on the following parameters:

Year of Analysis:	2008
Construction Dollars Based Upon:	2008
Economic Planning Life:	30 years starting in 2008
Bond (Discount) Rate:	3.1%
Inflation/Escalation Rate:	0.0% (Constant dollar method)
Net Discount Rate:	3.1%
Uniform Present Worth (UPW) Factor:	19.3495
Cost of Power/Electricity (Average without Demand Charge)	\$0.10/kwh
Cost of Labor (\$/hr)	\$60/hr

Schedule of Work

Right of way is scheduled to be complete in 2009, with construction completed in 2011. This allows for an 18 - 24 month construction duration depending upon award date, shop drawing approval, and material availability.

Total Present Worth

Discussion during the VE study included impacts of 30-year present worth cost for major elements, however no life cycle calculations were completed.

VE Alternatives Mark-up

Cost estimates were prepared for each of the VE alternatives using unit prices contained in the project cost estimate and unit prices in the GDOT cost database. The unit prices contained in the estimate are considered to include all contractor mark-ups, mobilization, overhead, and profit. A markup of 10% was added to account for engineering and construction services, plus inflation.

COST MODEL

The Reconstruction of SR 3 / US 19/41 will greatly improve safety and capacity along the alignment in this busy area of Spalding County while reducing accidents caused by deficiencies in the corridor. To achieve these benefits, a considerable investment in the infrastructure is required, including construction of an expanded roadway section, raised median, signalized intersections, addition of sidewalks, and acquisition of the needed right of way. The total construction cost of the project is estimated at approximately \$15.0M, plus right of way in the amount of \$3.1M. Since the cost of right of way is a substantial portion of the cost of the required construction, the total width of the section must be reviewed carefully to ensure proper investments are made.

Project Cost

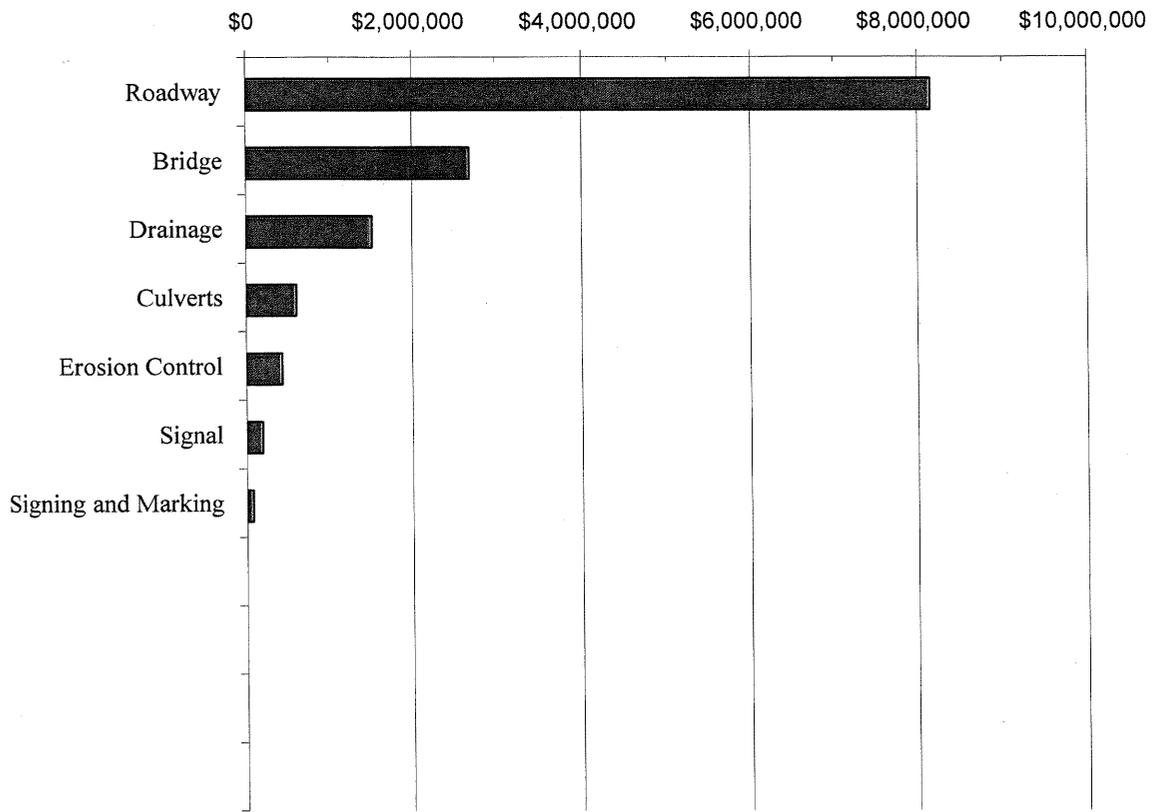
The data used to analyze costs by design element and are presented on the *Cost Histogram table*. To gain an overview of the total project cost, the *Pareto Analysis* was prepared. This table presents total project costs by roadway element.

COST HISTOGRAM



PROJECT: **RECONSTRUCTION OF SR 3 / US 19**
Project No. 342621- NH-001-4(47) - Spalding, Georgia

TOTAL PROJECT		COST	PERCENT	CUM. PERCENT
Roadway		8,166,470	59.70%	59.70%
Bridge	80%	2,693,200	19.69%	79.39%
Drainage		1,518,052	11.10%	90.49%
Culverts		600,699	4.39%	94.88%
Erosion Control		430,485	3.15%	98.02%
Signal		194,601	1.42%	99.45%
Signing and Marking		75,700	0.55%	100.00%
<i>Construction Subtotal</i>		13,679,207	100.00%	
E&C Rate (Applied to construction cost only)	10.00%	1,367,921		
Escalation Rate @ 5% per Year (2 years)		0		
Right of Way		3,100,000		
Reimbursable Utilities				
TOTAL CONSTRUCTION & RIGHT OF WAY		\$ 18,147,128	Comp Markup:	21.28%



FUNCTION ANALYSIS

FUNCTIONAL PURPOSE AND NEED

A Function Analysis of the Reconstruction of SR 3 / US 19/41 was prepared to: (1) understand the project purpose and need, (2) define the requirements for each project element, and (3) to ensure a complete and thorough understanding by the VE Team of the basic function(s), and identify other public goals through the corridor. Random Function Analysis Worksheets for the project elements are attached. Function Analysis is a means of evaluating a project to see if the expenditures actually perform the requirements of the project, or if there are disproportionate amounts of money spent on support functions. These support elements add cost to the final product, but may have a relatively low worth to the basic function. This creates a high cost-to-worth ratio.

The Function Analysis sheets include verb and noun function definition of the element, and the VE Teams identification of basic or secondary functions. This exercise stimulated the VE Team members to think in terms of the areas in which to channel their creative idea development.

The key issues that evolved from the function analysis session were the concurrence of the project needs and purpose. The basic function of the project is to "Increase Capacity", and "Improve LOS". Adding turn lanes, redesigning the intersections, and improving the sight stopping distance will greatly improve safety, reduce delays in this busy Spalding County corridor, and help to meet other required project goals.

Other key functions are presented on the Random Function Analysis forms.

The goals as established for the project appear consistent with the functions identified by the VE team. Therefore the function analysis justifies the project need and purpose and will greatly improve driving conditions along this corridor. This project will be a marked improvement in the aesthetics of the corridor and provides added functionality for pedestrians in the area.

CREATIVE IDEA LISTING AND JUDGMENT OF IDEAS

During the creative phase, numerous ideas, alternative proposals and/or recommendations were generated for the Reconstruction of SR 3 / US 19/41 using conventional brainstorming techniques as recorded on the following pages.

The creative session yielded a total of 31 ideas for further consideration by the team. These ideas were grouped into the following categories with letter prefixes to identify the area of study. For example, Bridge ideas have a designation of "B", and Alignment ideas are identified with a prefix of "A".

CATEGORY	PREFIX
Alignment	A
Section	S
Drainage	D
Bridge	B

These ideas were then discussed between the VE team members to identify the advantages/disadvantages of each. The VE Team compared each of the ideas with the as-designed solution determining whether it improved value, was equal in value, or lessened the value of the presented solution in terms of: Capital Cost, Schedule, Functionality/Safety, Maintainability, Durability and Life Cycle Costs.

To assist the team in ranking the creative ideas, each of the criteria were discussed and the following criteria definitions were developed from the statement of project need as presented by GDOT on the first day of the VE study.

Construction Cost – The initial cost of the material is important and should be considered.

Safety – Safety is very important and must control all decision making.

Level of Service – The projected LOS must be achieved to meet the design year projections.

Impact Upon Trucks – There is a reasonably high percentage of trucks in the area.

Life Cycle Costs – The costs of operating and maintaining the highway is extremely important.

These costs would include labor and materials over the next 30 years.

Right of Way Cost – It is important to minimize R/W costs if possible.

Creative Idea Ranking

The ideas were then ranked on a qualitative scale of 1 (poor) to 5 (excellent) on how well the VE team believed the idea met the project purpose and need criteria shown above. The higher rated ideas, with scores of 4 or 5, were then developed into formal alternatives and included in the Study Report. Some ideas were judged to have minimal cost impacts on the project but provided enhancements in the form of improved safety, accident reduction, constructability or potential to save unknown or hidden costs. These were given the designation "DS" which indicates a design suggestion. This designation is also

used when an idea increases cost resulting from improving the functionality of the project or system, and is deemed by the VE Team to be of significant value to the owner or designer.

Typically, all ideas rated 4 or 5 are developed by the VE team and included in the Study Report. When this is not the case, an idea was combined with another related idea or discarded, as a result of additional research, which indicated the concept as not being cost-effective or technically feasible. All readers are encouraged to review the **Creative Idea Listing and Evaluation** worksheets since they may suggest additional ideas that can be applied to the design.

