



SR 141/Bethelview Road @ SR 9 (Atlanta Highway) Intersection Improvements

CSSTP-0007-00(999), P.I. No. 0007999
Forsyth County, Georgia

Value Engineering Study Report

September 2009

Designers

PARSONS

H&L Heath & Lineback Engineers, Inc.

and



Value Engineering Consultant

Lewis & Zimmerman Associates, Inc.





Mr. Matthew J. Sanders, AVS
Value Engineering Specialist
Georgia Department of Transportation - Engineering Services
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Columbia, Maryland 21046
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www.lza.com

Re: CSSTP-0007-00 (999), P.I. No. 0007999
SR 141/Bethelview Road @ SR 9 (Atlanta Highway)
Intersection Improvements
Value Engineering Study Report

Date:
September 28, 2009

Dear Mr. Sanders:

Lewis & Zimmerman Associates, Inc. is pleased to submit two hard copies and one electronic copy of the referenced value engineering (VE) study report documenting the study that took place on September 14-17, 2009. The objective of the VE effort was to identify opportunities to enhance the value of the project and reduce impacts to the businesses located along the project site.

Contact:
Howard Greenfield

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301.984.9590 x 20

Email:
hgreenfield@lza.com

The VE team developed several ideas which provide opportunities to reduce the requirements for right-of-way which dominates this project. By implementing the VE alternatives, major damages to three properties can be avoided saving over \$1 million.

Our ref:
LZ083349.0000

We thank you for your assistance during the course of the VE team's work. Please do not hesitate to call upon us if you or any of the reviewers have any questions regarding the information presented in this report.

Sincerely yours,

LEWIS & ZIMMERMAN ASSOCIATES, INC.
an ARCADIS company

A handwritten signature in black ink, appearing to read 'Howard B. Greenfield'.

Howard B. Greenfield, PE, CVS
Vice President

Attachment

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EXECUTIVE SUMMARY

INTRODUCTION

This value engineering (VE) study report documents the events and results of the VE study conducted by Lewis & Zimmerman Associates, Inc. for the Georgia Department of Transportation (GDOT). The subject of the study was the CSSTP-0007-00 (999), P.I. No. 0007999, SR 141/Bethelview Road @ SR 9 (Atlanta Highway) Intersection Improvements project in Forsyth County. Parsons and Heath & Lineback Engineers, Inc. developed the project to the preliminary design stage in 1990 and now GDOT staff is taking over the completion of the design. The preliminary design documents and an updated GDOT cost estimate were used as the basis of the VE study which was conducted September 14-17, 2009, at GDOT's Atlanta, Georgia headquarters.

Comprising the VE team was a highway engineer, a construction specialist and a Certified Value Specialist (CVS) team leader. The team used the following six-phase VE job plan to guide its deliberations.

- Information Gathering Phase
- Function Identification and Analysis Phase
- Creative Idea Generation Phase
- Evaluation/Judgment of Creative Ideas Phase
- Alternative Development Phase
- Presentation Phase

PROJECT DESCRIPTION

This project will upgrade the intersection of SR 141/Bethelview Road and SR 9 to increase capacity to meet acceptable levels of service in the 2032 design year and improve safety by reducing the higher than average state-wide crash rates at this location. Improvements will include:

- Widening Bethelview Road to two through lanes in each direction separated by a raised median north of the intersection to match SR 141 south of the intersection
- Providing SR 141 and Bethelview Road with two left turn lanes, a right turn lane and free right turn pockets at the intersection and a southbound right turn lane to access businesses to the west to about 600 ft north of the intersection
- Widening SR 9 to two through lanes in each direction separated by a raised median from 485 ft west of the intersection to 439 ft east of the intersection
- Providing SR 9 with two left turn lanes in each direction, a right turn lane in each direction and free right turn pockets at the intersection
- Providing 4-ft-wide bicycle lanes on each side of SR 9 west of the intersection
- Replacing the existing traffic signal with one that will accommodate the new lane configuration
- Adding piped storm water drainage throughout the project area

- Installing a concrete gravity retaining wall on SR 9 along the Shell Gasoline Station property to protect an existing power utility transmission pole
- Providing 5-ft-wide sidewalks on both sides of each road for the full extent of the project

The total cost of the project is approximately \$11.8 million, including \$6 million for right-of-way, \$5.4 million for construction, and \$0.4 million for reimbursable utilities.

CONCERNS AND OBJECTIVES

This project continues the improvement of SR 141 which has taken place to the south of the project site. Future projects will widen Bethelview Road to the north and SR 9 to the east and west to accommodate the increase in traffic in this fast-growing area. Since the inception of the project, there has been significant commercial development in the intersection area with the exception of the northwest quadrant of the intersection. Thus, in order to widen the two roads, right-of-way and construction easements must be obtained from very expensive commercial property.

With this background, the VE team was tasked with identifying opportunities that will enhance the functionality of the project and reduce impacts to the businesses located along the project site.

RESULTS OF THE STUDY

The value engineering team developed eight alternatives to address the concerns noted above with the emphasis being on reducing the encroachment onto the commercial properties lining the roadways. All of the alternatives are shown on the following Summary of Value Engineering Alternatives table and detailed in Section Two of the report. The following highlights those alternatives having the greatest potential impact on the project.

Parcels 157, 160 and 155 are impacted the greatest by the proposed construction because there will be damages to these properties. Parcel 157 in the southwest quadrant of the intersection is a Shell Gasoline Station. The elevation of the station pavement is several feet above the road level and there is a power utility transmission pole adjacent to the right-of-way on SR 9. To protect the utility pole and limit encroachment onto the gasoline station property, a gravity retaining wall is being used. However, to install the wall requires a construction easement and damages to the property. Alt. No. ROW-3 suggests using an H-pile and lagging wall to avoid having to obtain the construction easement and incur damages to the property including possibly interfering with the underground gasoline storage tanks. This will save significant right-of-way as well as simplifying construction.

Similarly, Parcel 160 is a BP Gasoline Station and the construction will require moving the vent stacks for the underground gasoline storage tanks. By reducing the width of the lanes from 3.6 meters (12 ft) to 3.3 meters (11 ft) and holding the right-of-way line on the north side of SR 9, the right-of-way line on the south side of SR 9 can be moved 2.1 meters (7 ft) north, potentially missing the vent stacks as described in Alt. No. P-3/ROW-2. If this movement is insufficient to totally avoid the vent stacks, then consideration should be given to shifting the alignment slightly north. This would require some additional right-of-way from Parcel 159, which is still undeveloped and has a lower cost per acre than Parcel 160.

Parcel 155 is impacted because the profile of Bethelview Road is being lowered about 2 meters (6 ft) causing the driveway to the parking lot on this parcel to encroach on the parking spaces. By raising the profile of Bethelview Road, most of the encroachment is eliminated as shown in Alt. No. G-1/ROW-4, thus saving the damages to the property. If the lanes on Bethelview Road are reduced in width from 3.6 meters (12 ft) to 3.3 meters (11 ft), as proposed in Alt. No. P-4, then the impact to this parcel is further reduced.

STUDY RESULTS

GENERAL

The results of this value engineering study conducted on the SR 141/Bethelview Road @ SR 9 (Atlanta Highway) Intersection Improvements project portray the benefits that can be realized by GDOT, the owner, Forsyth County, the users and the GDOT design team. The results will directly affect the project's design and will require coordination among GDOT staff to determine the disposition of each alternative.

During the conduct of the study, many ideas for potential value enhance were conceived and evaluated by the team for technical merit, applicability to the project, implementability considering the project's status, and the ability to meet the owner's project value objectives. Research performed on those ideas considered to have potential to enhance the value of the project resulted in the development of individual alternatives identifying specific changes to the project as a whole, or individual elements that comprise the project. These may be in the form of VE alternatives (accompanied by cost estimates) or design suggestions (typically without cost estimates). For each alternative developed the following information is provided:

- A summary of the original design;
- A description of the proposed change to the project;
- Sketches and design calculations, if appropriate;
- A capital cost comparison and life cycle discounted present worth cost comparison of the alternative and original design (where appropriate);
- A descriptive evaluation of the advantages and disadvantages of selecting the alternative; and
- A brief narrative to compare the original design and the proposed change and provide a rationale for implementing the change into the project.

The capital cost comparisons used unit quantities contained in the project cost estimate prepared by the designers, whenever possible. If unit quantities were not available, published data bases, such as the one produced by the RS Means Company, or team member or owner data bases were consulted. A composite markup of 9%, as described in the Value Analysis and Conclusions section of the report, was used to generate an all-inclusive project cost for the construction items being compared.

Each design suggestion contains the same information as the VE alternatives, except that no cost information is usually included. Design suggestions are presented to bring attention to areas of the design that, in the opinion of the VE team, should be changed for reasons other than cost. Examples of these reasons include improved facility operation, ease of maintenance, ease of construction, safer working conditions, reduction in project risk, etc. 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.

Each alternative or design suggestion developed is identified with an alternative number (Alt. No.) track it through the value analysis process and thus facilitating referencing between the Creative Idea

Listing and Evaluation worksheets, the alternatives, and the Summary of Potential Cost Savings table. The Alt. No. includes a prefix that refers to a major project element listed below:

PROJECT ELEMENT	PREFIX
Right-of-Way	ROW
Pavement	P
Grading	G
Drainage	D

Summaries of the alternatives and design suggestions are provided on the Summary of Potential Cost Savings tables. The tables are divided into project elements for the convenience of the reviewer and are used to divide the results section. The complete documentation of the developed alternatives and design suggestions follow each of the Summary of Potential Cost Savings tables.

KEY ISSUES

This project is being developed to improve traffic operations by increasing capacity at the intersection to accommodate additional traffic generated by the widening of SR 141 to the south of the intersection and growth within the area. Future projects will widen Bethelview Road to the north and SR 9 to the east and west to accommodate the increase in traffic in this fast-growing area and add to the existing traffic problems at the intersection. Since the inception of the project in the 1990s, there has been significant commercial development in the intersection area with the exception of the northwest quadrant of the intersection. To achieve these goals it will be necessary to acquire a significant amount of right-of-way whose cost is greater than the construction cost. Several commercial properties will be impacted by the construction. In addition, the current configuration of the roads at the intersection has resulted in numerous rear-end, angle and sideswipe collisions.

STUDY OBJECTIVES

To assist GDOT achieve its project goals in a cost-effective manner, it convened this VE study. The study team was tasked with identifying specific changes to the current design that will enhance its value by improving functionality, saving cost or a combination of the two.

RESULTS OF THE STUDY

Research of the ideas identified as having potential for enhancing the value of the project resulted in the development of eight alternatives for consideration by the GDOT. These alternatives address the key issues described above and are detailed in the remainder of this section of the report. The alternatives with the greatest potential to impact project are highlighted below.

Parcels 157, 160 and 155 are impacted the greatest by the proposed construction because there will be damages to these properties. Parcel 157 in the southwest quadrant of the intersection is a Shell Gasoline Station. The elevation of the station pavement is several feet above the road level and there is a power utility transmission pole adjacent to the right-of-way on SR 9. To protect the utility pole

and limit encroachment onto the gasoline station property a gravity retaining wall is being used. However to install the wall requires a construction easement and damages to the property. Alt. No. ROW-3 suggests using an H-pile and lagging wall to avoid having to obtain the construction easement and incur damages to the property including possibly interfering with the underground gasoline storage tanks. This saves significant costs as well as simplifying construction.

Similarly, Parcel 160 is a BP Gasoline Station and the construction will require moving the vent stacks for the underground gasoline storage tanks. By reducing the width of the lanes from 3.6 meters (12 ft) to 3.3 meters (11 ft) and holding the right-of-way line on the north side of SR 9, the right-of-way line can be moved 2.1 meters (7 ft) north potentially missing the vent stacks as described in Alt. No. P-3/ROW-2. If this movement is insufficient to totally avoid the vent stacks, then consideration should be given to shifting the alignment slightly north. This would require some additional right-of-way from Parcel 159, however, this land is still undeveloped and its cost per acre is less than the gasoline station property.

Parcel 155 is impacted because the profile of Bethelview Road is being lowered about 2 meters (6 ft) causing the driveway to the parking lot on this parcel to encroach on the parking spaces. By raising the profile of Bethelview Road, most of the encroachment is eliminated as shown in Alt. No. G-1/ROW-4, thus saving the damages to the property. If the lanes on Bethelview Road are reduced in width from 3.6 meters (12 ft) to 3.3 meters (11 ft), as proposed in Alt. No. P-4, then the impact to this parcel is further reduced.

EVALUATION OF ALTERNATIVES AND DESIGN SUGGESTIONS

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 a concern about one part of it. Each area within an alternative or design suggestion that is acceptable should be considered for use in the final design, even if the entire alternative or design suggestion is not implemented. Variations of these alternatives and design suggestions by the owner or designer are encouraged.

All alternatives and design suggestions were developed independently of each other to provide a broad range of options to consider for implementation. Therefore, some of them are “mutually exclusive,” so acceptance of one may preclude the acceptance of another. In addition, some of the alternatives may be interrelated, so acceptance of one or more may not yield the total of the cost savings shown for each alternative. Design suggestions could also be interrelated thus precluding a part of one or more suggestions from being implemented if another design suggestion is also implemented.

The reader should evaluate all alternatives carefully in order to select the combination of ideas with the greatest beneficial impact on the project. Once this has been accomplished, the total cost savings resulting from the VE study can be calculated based on implementing a revised, all-inclusive design solution.

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 141/BETHELVIEW ROAD @ SR 9 (ATLANTA HIGHWAY)**
INTERSECTION IMPROVEMENTS
CSSTP-0007-00(999), P.I. No. 0007999
Forsyth County, Georgia

ALTERNATIVE NO.:
ROW-1

DESCRIPTION: **CONNECT TO OLD SR 141 USING A DRIVEWAY OPENING**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN: (sketch attached)

The original design ties into old SR 141 using full-depth roadway pavement with required right-of-way and easement at Sta. 3+635.

ALTERNATIVE: (sketch attached)

Use a driveway entrance to access Old SR 141.

ADVANTAGES:

- Reduces right-of-way and easement requirements

DISADVANTAGES:

- No acceleration lane for traffic entering SR 9

DISCUSSION:

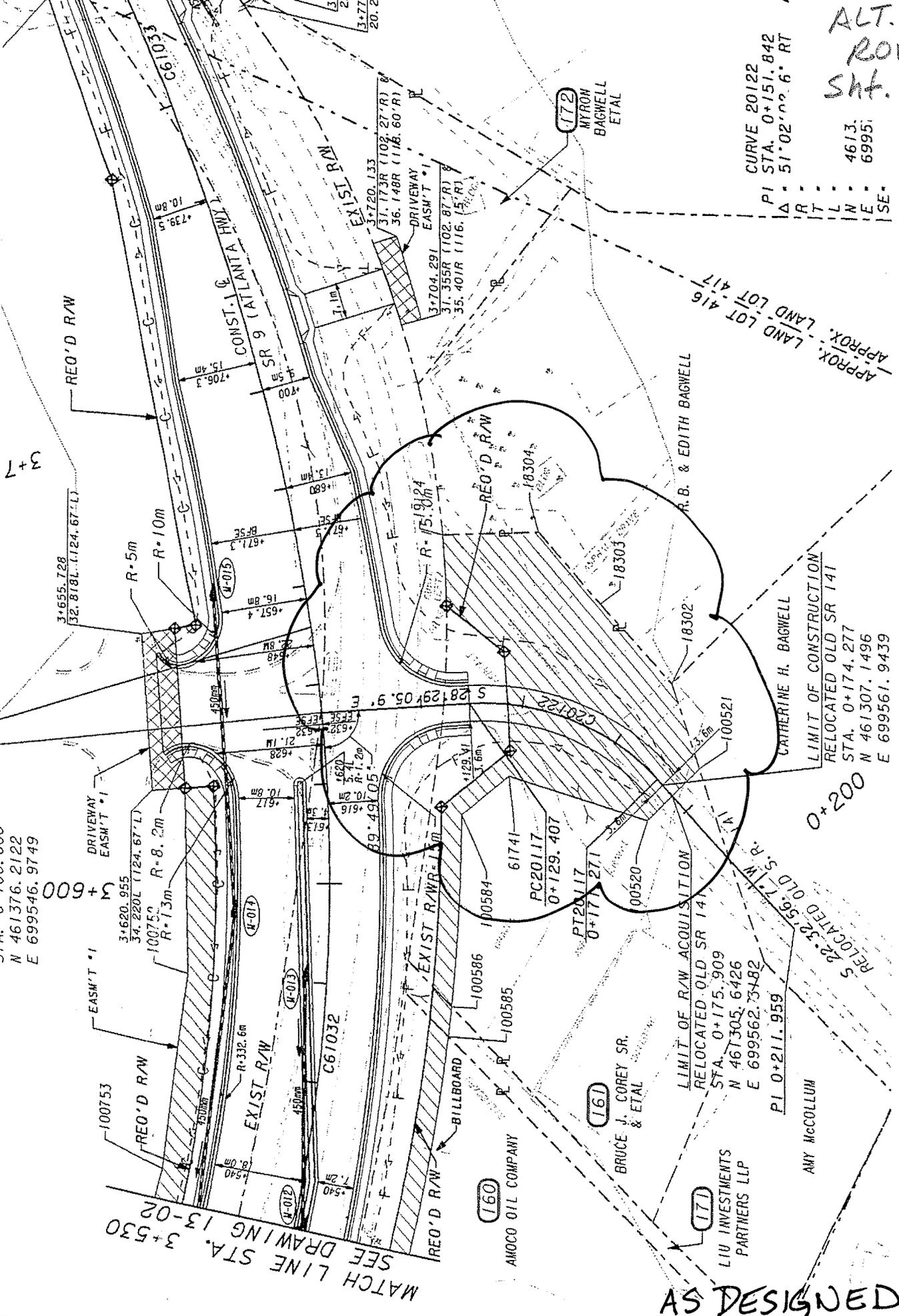
Existing Old SR 141 is an old gravel and asphalt driveway entrance to four commercial/industrial properties. Using a commercial driveway entrance in lieu of full-depth pavement at Sta. 3+635 will reduce right-of-way and easement requirements.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 282,396	—	\$ 282,396
ALTERNATIVE	\$ 2,583	—	\$ 2,583
SAVINGS	\$ 279,762	—	\$ 279,762

ALT. NO.
ROW-1
Sht. 2 of 5

CURVE 20122
PI STA. 0+151.842
Δ = 51°02'00.6" RT
R = 4613.
L = 6995.
E = .
SE = .

RATIO = 1:5
SCALE IN ME
0 10 20



3+7
3+655.728
32.818L (124.67'L)
R=5m
R=10m
R=8.2m
R=13m
R=312.6m

MATCH LINE STA. 3+530
SEE DRAWING 13-02

AS DESIGNED

PARSONS
INCORPORATED
5890 TRIANGLE PARKWAY, SUITE 100
NORCROSS, GA 30092

Health & Linchback Engineers
INCORPORATED
230 CANTON ROAD, BUILDING 200
MARIETTA, GEORGIA 30066-4393

BEGIN LIMIT OF ACCESS.....BLA
END LIMIT OF ACCESS.....ELA
LIMIT OF ACCESS
REQ'D R/W & LIMIT OF ACCESS
ESA - BOUNDARY

PROPERTY AND EXISTING R/W LINE
REQUIRED R/W LINE
CONSTRUCTION LIMITS
EASEMENT FOR CONSTR
& MAINTENANCE OF SLOPES
EASEMENT FOR CONSTR OF SLOPES
EASEMENT FOR CONSTR OF DRIVES

LIMIT OF CONSTRUCTION
RELOCATED OLD SR 141
STA. 0+174.277
N 461307.1496
E 699561.9439

LIMIT OF R/W ACQUISITION
RELOCATED OLD SR 141
STA. 0+175.909
N 461305.6426
E 699562.73482
PI 0+211.959

AMOCO OIL COMPANY

BRUCE J. COREY SR. & ETAL

LIU INVESTMENTS PARTNERS LLP

AMY MCCOLLUM

CATHERINE H. BAGWELL

R. B. & EDITH BAGWELL

MYRON BAGWELL ETAL

DRIVEWAY
EASM-T-1
3+720.133
31.173R (102.27'R)
36.148R (118.60'R)

3+704.291
31.355R (102.87'R)
35.401R (116.30'R)

61741
PC20117
0+129.407

PT20117
0+171.271

00520

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100811

100812

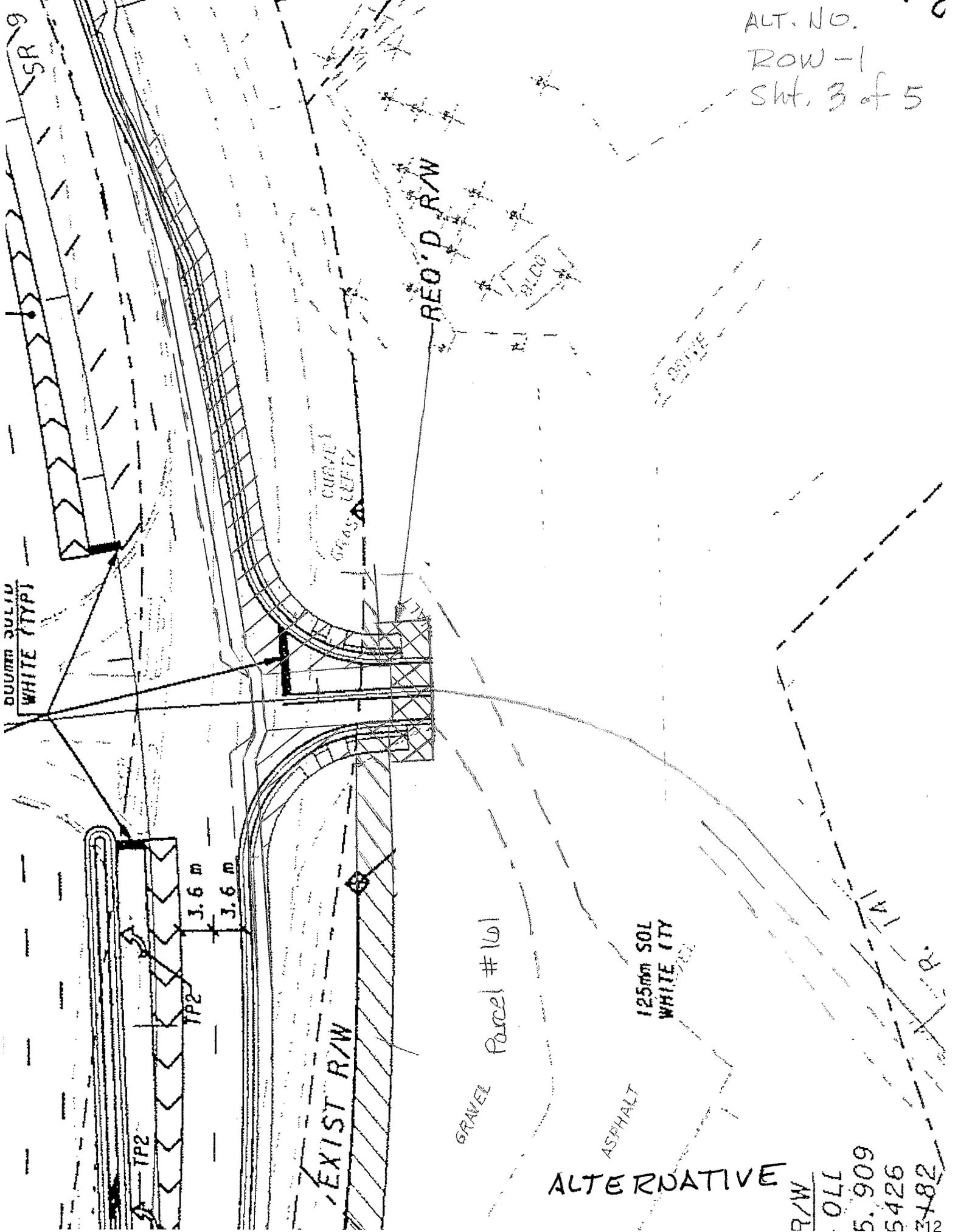
100813

100814

100815

100816

ALT. NO. 0
ROW - 1
Sht. 3 of 5



ALTERNATIVE

R/W
OLL
5.909
5426
3482

CALCULATIONS



PROJECT: **SR 141/BETHELVIEW RD @ SR 9 ATLANTA HIGHWAY**
INTERSECTION IMPROVEMENTS
CSSTP-0007-00(999); P.I. No. 0007999
Forsyth County, Georgia

ALTERNATIVE NO
ROW-1

SHEET NO 4 of 5

$$\text{Reduced Pavement: } 63\text{m} \times 7\text{m} = 441\text{ m}^2$$

$$\text{R/W Reduction: } 20.5\text{m} \times 12\text{m} = 246\text{ m}^2 \times 1.194\text{yd}^2/\text{m}^2 = 293.4\text{yd}^2 = 4840\text{yd}^2/\text{Ac}$$

$$\text{Easement Reduction: } 33\text{m} \times 45\text{m} = 1,485\text{ m}^2 \times 1.194\text{yd}^2/\text{m}^2 \quad \underline{0.06\text{ Ac}}$$
$$= 1,767\text{yd}^2 \times 9 = \underline{15,904\text{ Ft}^2}$$

$$\text{Sidewalk: } 11\text{m reduction in sidewalk length: } 11 \times 1.5\text{m} = 16.8\text{ m}^2$$

$$\text{Curb + Gutter: } 73\text{m} \times 2 = 146\text{m} - 34 = 112\text{m} \times .75\text{m} = 84\text{ m}^2$$

$$\text{Pav't Marking: } 4 \times 65\text{m} = 260\text{ m}$$

$$\text{Driveway: } 6.6\text{m} \times 19\text{m} = 125.4\text{ m}^2$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 141/BETHELVIEW ROAD @ SR 9 (ATLANTA HIGHWAY)**
INTERSECTION IMPROVEMENTS
CSSTP-0007-00(999), P.I. No. 0007999
Forsyth County, Georgia

ALTERNATIVE NO.:

ROW-3

DESCRIPTION: **USE AN ALTERNATIVE RETAINING WALL TO PROTECT**
THE TRANSMISSION POLE AT PARCEL 157 AND
RESTRICT ENCROACHMENT ON THE PROPERTY

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

A concrete gravity type retaining wall is to be installed along the north side of Parcel 157, from Sta. 3+315 to Sta. 3+395, the Shell Gasoline Station, to protect an existing electrical utility transmission pole. This necessitates obtaining permanent right-of-way from the property owner and a temporary construction easement for constructing the retaining wall. The temporary construction easement necessitates eliminating some parking on the site during the construction. Also at the corner of the parcel at the intersection of SR 141 and SR 9, a triangular piece of right-of-way is being obtained. This impacts the existing sign at this location.

ALTERNATIVE: (sketch attached)

Use a cantilevered retaining wall with steel H-piles and either concrete or wood lagging to protect the existing electrical utility transmission pole and do not perform any construction beyond the wall. Revise the right-of-way acquisition line at the corner to avoid impacting the existing sign.

ADVANTAGES:

- Avoids damages to the Shell Gasoline Station
- If wood is used for the retaining wall, it mimics an existing wood wall at the corner of the site

DISADVANTAGES:

- Must determine if the existing underground storage tanks are out of the way of the proposed retaining wall. However considering the location of the electrical utility transmission pole this assumption seems reasonable.

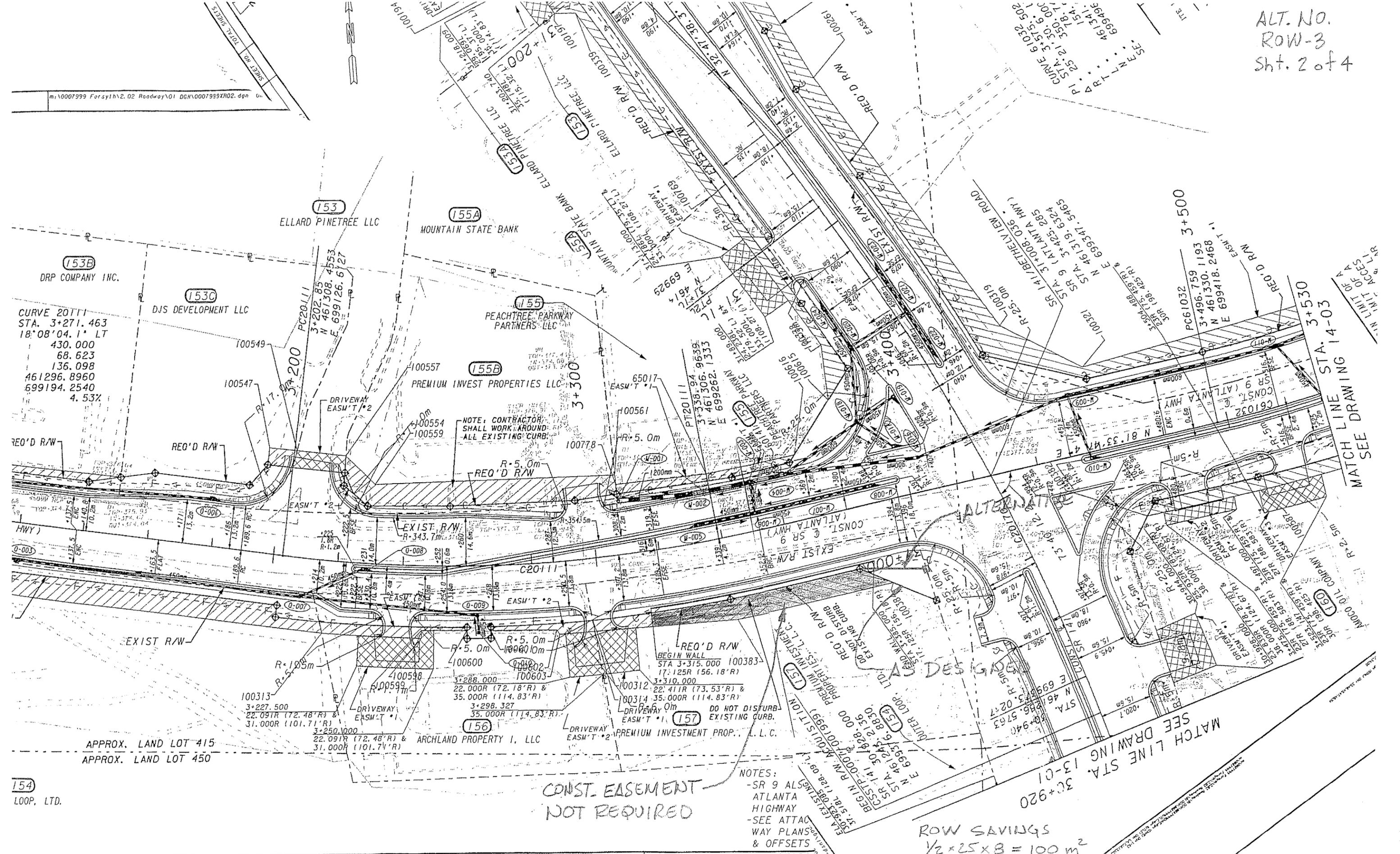
DISCUSSION:

This alternative is designed to avoid the costly impacts to the gasoline station located on Parcel 157. By installing a retaining wall that requires no construction behind the wall, no current parking is affected by the construction and the temporary construction easement is not necessary.

Modifying the right-of-way line at the corner of the site also avoids any impacts to the existing sign.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 442,403	—	\$ 442,403
ALTERNATIVE	\$ 70,370	—	\$ 70,370
SAVINGS (Original minus Alternative)	\$ 372,033	—	\$ 372,033

m:\0007999 Forsyth\2.02 Roadway\01 DGN\0007999X02.dgn



CURVE 20111
STA. 3+271.463
18°08'04.1" LT
430.000
68.623
136.098
461296.8960
699194.2540
4.53%

NOTE: CONTRACTOR SHALL WORK AROUND ALL EXISTING CURB.

REQ'D R/W
BEGIN WALL STA 3+315.000 100383
17.125R (56.18'R)
3+310.000
22.411R (73.53'R) &
35.000R (114.83'R)
3+298.327
35.000R (114.83'R)
DO NOT DISTURB EXISTING CURB.

APPROX. LAND LOT 415
APPROX. LAND LOT 450

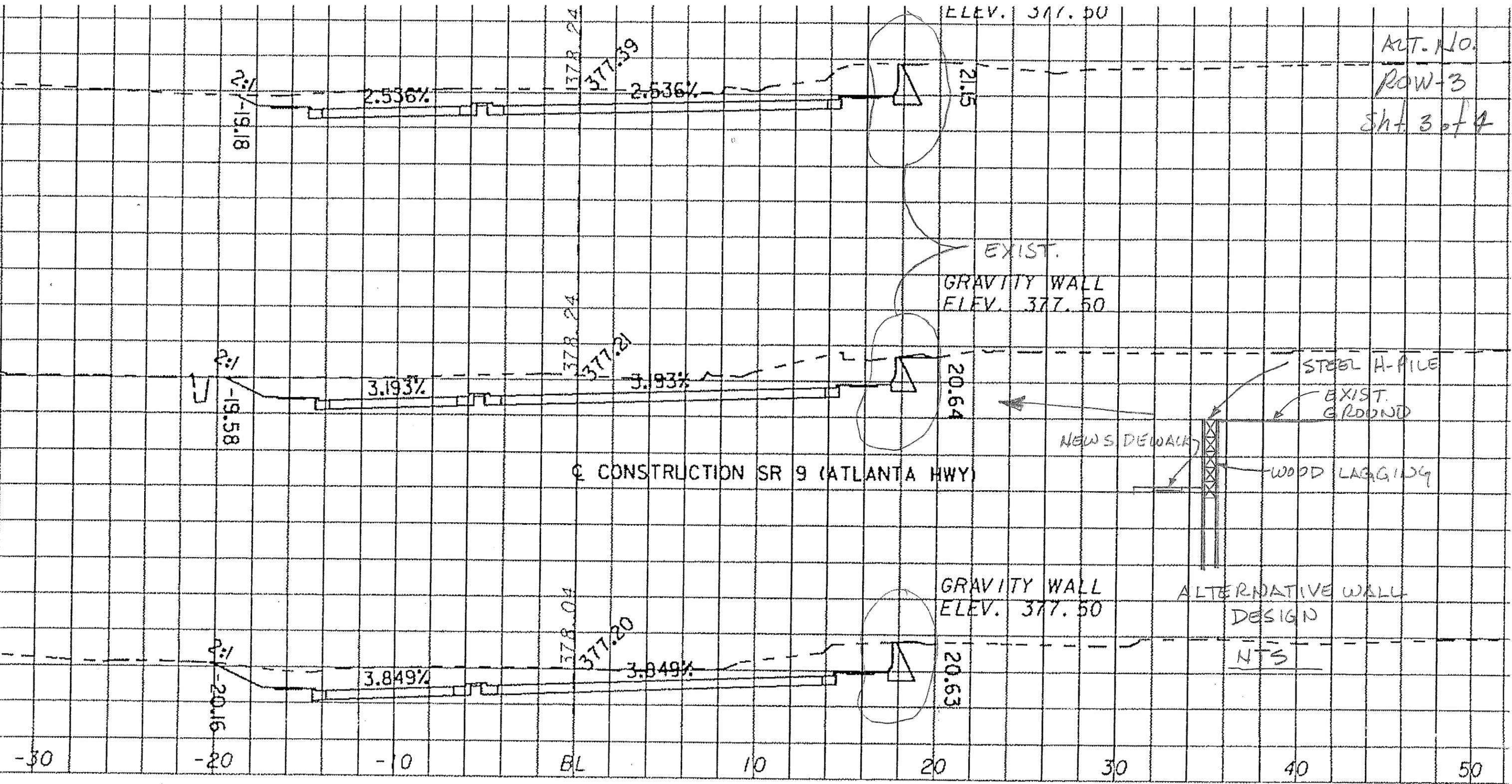
CONST. EASEMENT NOT REQUIRED

NOTES:
-SR 9 ALSO ATLANTA HIGHWAY
-SEE ATTACHED WAY PLANS & OFFSETS

ROW SAVINGS
 $\frac{1}{2} \times 25 \times 8 = 100 m^2$

154
LOOP, LTD.

ALT. NO.
ROW-3
Sht. 3 of 4



HL Heath & Lineback Engineers
INCORPORATED
2390 CANTON ROAD, BUILDING 200
MARIETTA, GEORGIA 30064-5343

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE OF CONSULTANT DESIGN

EARTHWORK CROSS SECTION

100

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 141/BETHELVIEW ROAD @ SR 9 (ATLANTA HIGHWAY)**
INTERSECTION IMPROVEMENTS
CSSTP-0007-00(999), P.I. No. 0007999
Forsyth County, Georgia

ALTERNATIVE NO.:
P-1

DESCRIPTION: **DELETE PAVEMENT FOR ONE LEFT TURN LANE ON**
SOUTHBOUND BETHELVIEW ROAD

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

Provide two left turn lanes on southbound Bethelview Road at the SR 9 intersection.

ALTERNATIVE: (sketch attached)

Provide one left turn lane on southbound Bethelview Road and make the median wider.

ADVANTAGES:

- Reduces construction requirements
- Increases green space
- Reduces storm water due to the reduction in pavement

DISADVANTAGES:

- None apparent

DISCUSSION:

The maximum daily hour volume (DHV) of traffic in the year 2032 during AM hours is expected to be 165 while during the PM hours it is expected to be no more than 215. The storage length of the proposed inside left turn lane (as designed) is 84 m – enough for at least 11 vehicles. By eliminating the inside lane, the storage length for the remaining left turn will be 114 m. This space will be able to store 15 vehicles. The signal timings will not be affected since the opposing direction will still have two left turn lanes with maximum traffic of 580 DHV in PM hours in year 2032.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 24,164	—	\$ 24,164
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 24,164	—	\$ 24,164

BEGIN R/W ACQUISITION
 CSSTP-0007-00(999)
 SR 141
 STA. 30+828.000
 N 461245.2136
 E 699376.8830

STA. 31+045.000
 R1-2(900)
 WIELD

(R1600)
 STA. 3+355.000

MATCH LINE
 SEE DRAWING 26-06
 STA. 3+350

REQ'D R/W
 DO NOT DISTURB
 EXISTING CURB.

Single left turn
 lane: 114 m long
 storage space

Wider
 DRIVEWAY
 EASH'T
 10.6m SEG x 1.9m GAP (TYP)
 REQ'D R/W

ALT: P-1
 Sheet 3 of 4

Alternative

APPROX.
 APPROX.

31+200.000
 23.430R (76.87'R) &
 37.000R (121.39'R)

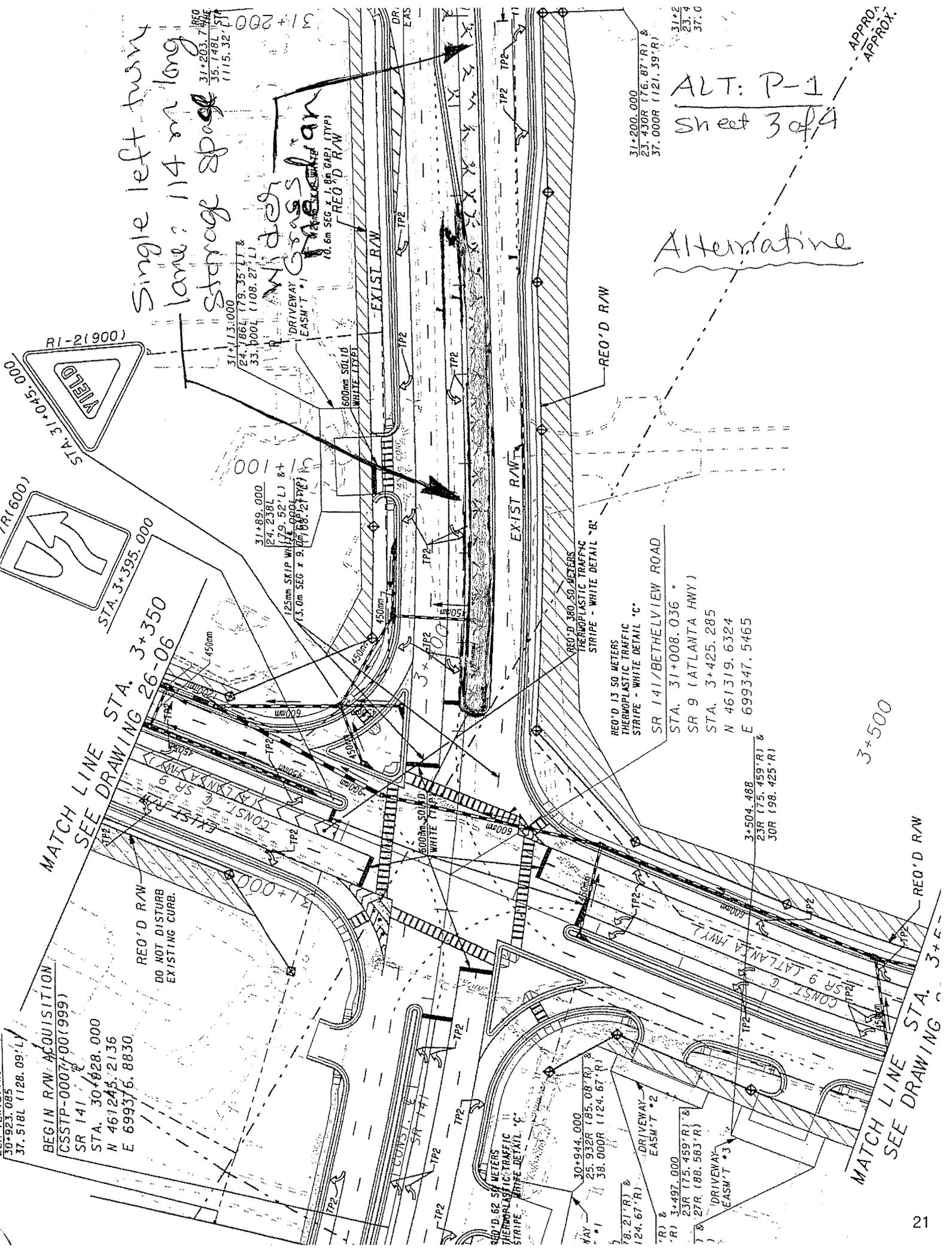
31+2
 23.4
 37.0

REQ'D 13.50 METERS
 THERMOPLASTIC TRAFFIC
 STRIPE - WHITE DETAIL 'C'
 SR 141/BETHELVIEW ROAD
 STA. 31+008.036
 SR 9 (ATLANTA HWY)
 STA. 3+425.285
 N 461319.6324
 E 699347.5465

3+504.488
 23R (75.459'R) &
 30R (98.425'R)

3+500

MATCH LINE
 SEE DRAWING 3+500
 STA. 3+500



VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 141/BETHELVIEW ROAD @ SR 9 (ATLANTA HIGHWAY)**
INTERSECTION IMPROVEMENTS
CSSTP-0007-00(999), P.I. No. 0007999
Forsyth County, Georgia

ALTERNATIVE NO.:
P-2

DESCRIPTION: **DELETE PAVEMENT FOR ONE LEFT TURN LANE ON**
WESTBOUND SR 9

SHEET NO.: **1 of 4**

ORIGINAL DESIGN: (sketch attached)

Provide two left turn lanes on westbound SR 9 at the intersection with SR 141/Bethelview Road.

ALTERNATIVE: (sketch attached)

Provide one left turn lane on westbound SR 9 and make the median wider.

ADVANTAGES:

- Reduces storm water due to the reduction in pavement area
- Increases green space
- Reduces construction requirements

DISADVANTAGES:

- None apparent

DISCUSSION:

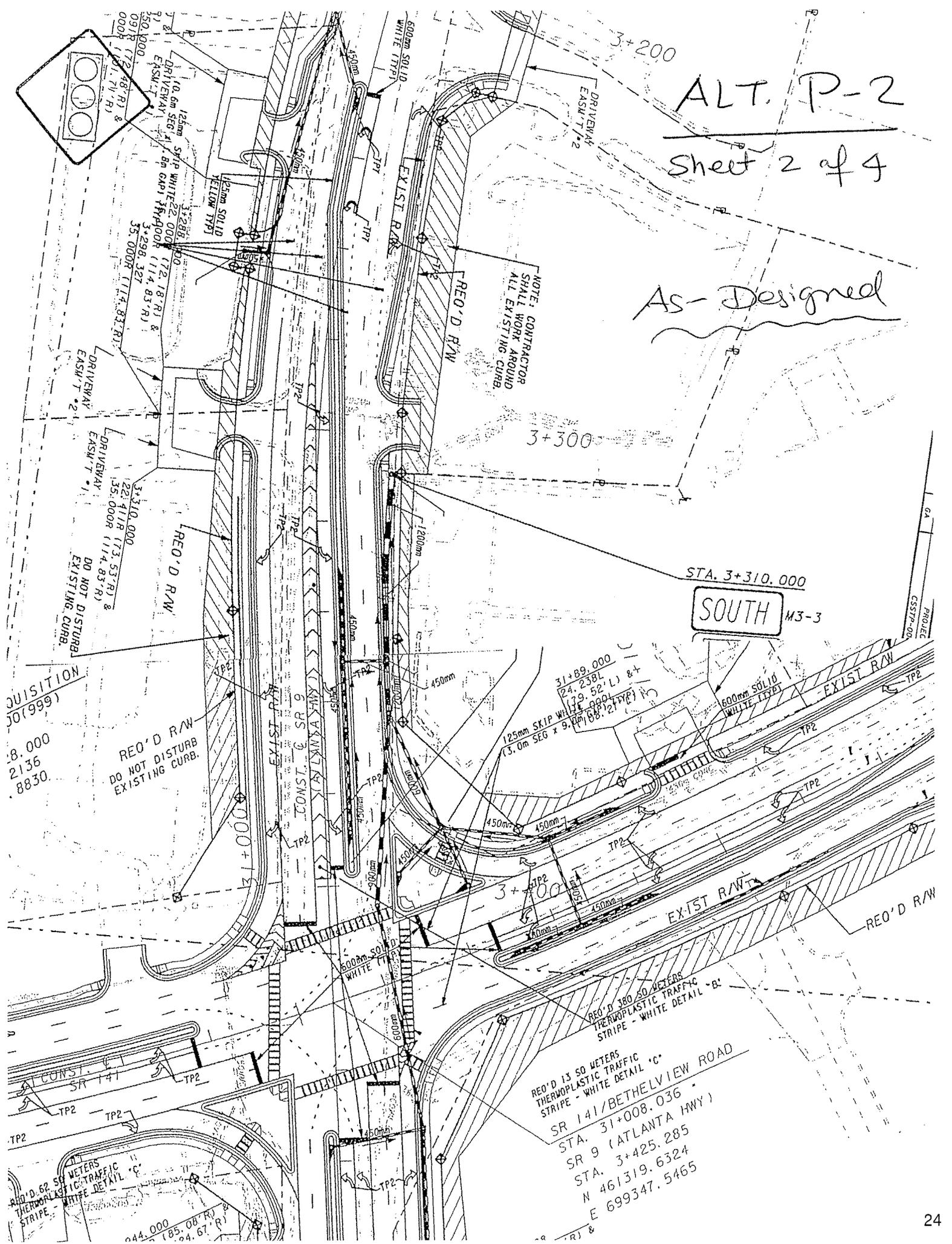
The maximum daily hour volume (DHV) of traffic in the year 2032 during AM hours is expected to be 100 while during the PM hours it is expected to be 155. The designed storage length is 120 m. By eliminating this turn lane and converting the Chevron striped area into a left turn lane, the storage length reduces to 92 meters, still enough for 12 vehicles. On the opposite side of the intersection, there will still be two left turn lanes for the heavy traffic accessing SR 141 and GA 400.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 34,521	—	\$ 34,521
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 34,521	—	\$ 34,521

ALT. P-2

Sheet 2 of 4

As-Designed



NOTE: CONTRACTOR SHALL WORK AROUND ALL EXISTING CURB.

STA. 3+310.000
SOUTH M3-3

ACQUISITION 30(999)
8.000
2136
8830

REQ'D R/W
DO NOT DISTURB EXISTING CURB.

REQ'D 380.50 METERS
THERMOPLASTIC TRAFFIC STRIPE - WHITE DETAIL 'B'

REQ'D 13.50 METERS
THERMOPLASTIC TRAFFIC STRIPE - WHITE DETAIL 'C'

SR 141/BETHELVIEW ROAD
STA. 31+008.036
SR 9 (ATLANTA HWY)
STA. 3+425.285
N 461319.6324
E 699347.5465

REQ'D 62.50 METERS
THERMOPLASTIC TRAFFIC STRIPE - WHITE DETAIL 'C'

ALT. P-2
Sheet 3 of 4

Alternate Design

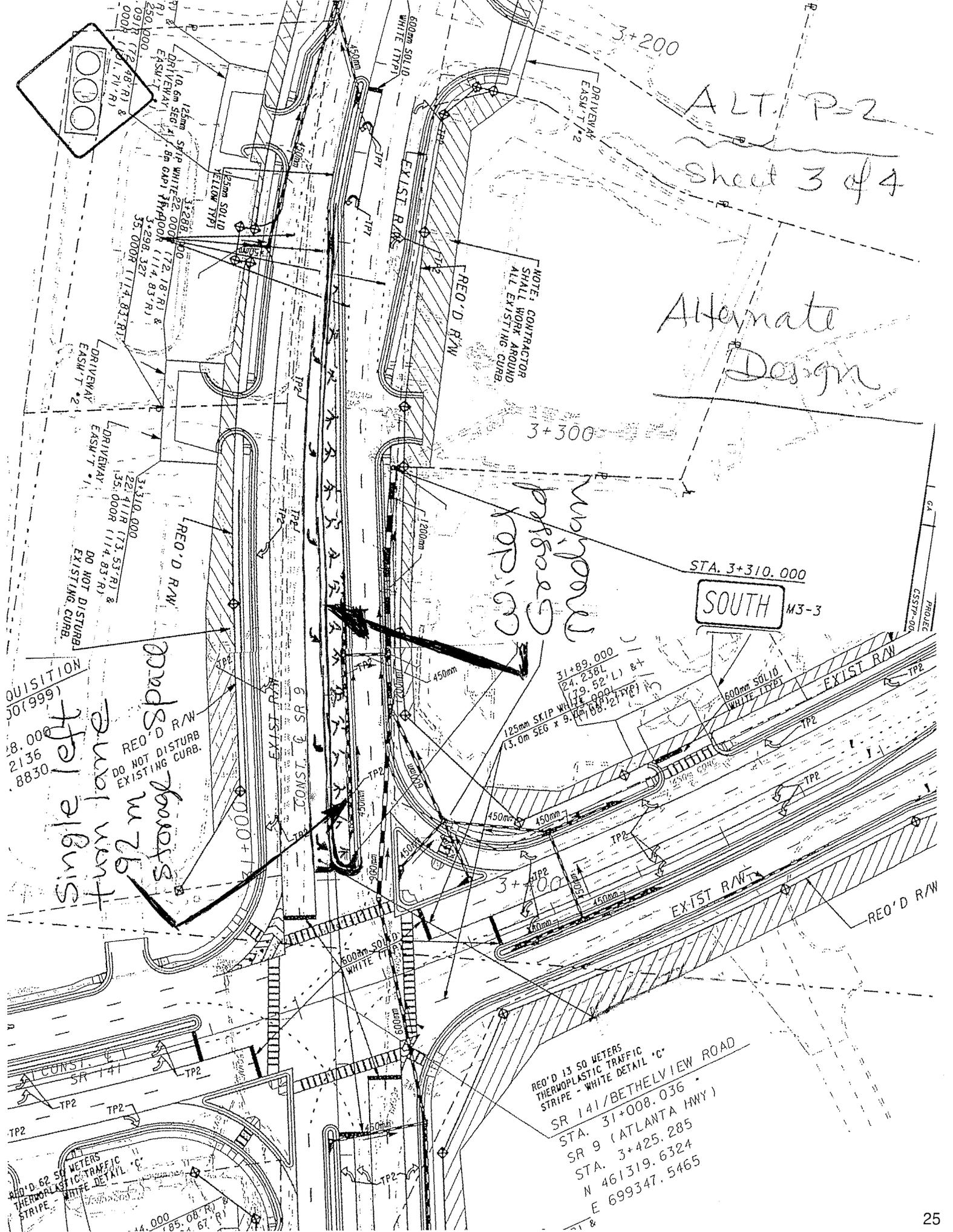
Widened
Grassed
Median

STA. 3+310.000

SOUTH M3-3

single left
turn lane
92 m
storage space

REQ'D 13.50 METERS
THERMOPLASTIC TRAFFIC
STRIPES - WHITE DETAIL 'C'
SR 141/BETHELVIEW ROAD
STA. 31+008.036
SR 9 (ATLANTA HWY)
STA. 3+425.285
N 461319.6324
E 699347.5465



VALUE ENGINEERING ALTERNATIVE



**PROJECT: SR 141/BETHELVIEW ROAD @ SR 9 (ATLANTA HIGHWAY)
INTERSECTION IMPROVEMENTS**
CSSTP-0007-00(999), P.I. No. 0007999
Forsyth County, Georgia

ALTERNATIVE NO.:
P-3/ROW-2

**DESCRIPTION: USE 3.3 METER LANES IN LIEU OF 3.6 METER LANES ON
SR 9 EAST OF THE INTERSECTION AND MOVE THE
RIGHT-OF-WAY LINE AT THE BP GASOLINE STATION TO
THE NORTH**

SHEET NO.: 1 of 5

ORIGINAL DESIGN: (sketch attached)

3.6-meter-wide through and turn lanes are used on SR 9 east of the intersection with SR 141/Bethelview Road from Sta. 3+425 to Sta. 3+863, which impacts the BP Gasoline Station (Parcel #160). The impacts include the acquisition of permanent and easement right-of-way and the movement of the vent stacks for the underground gasoline storage tanks.

ALTERNATIVE: (sketch attached)

Narrow all of the lanes to 3.3-meters-wide to match the lane widths on the west side of the intersection from Sta. 3+425 to Sta. 3+863. Hold the north right-of-way line along Parcel #159 and move the right-of-way line north along Parcel #160. Revise the new right-of-way line at the corner of the parcel to minimize the impact to the water retention pond.

ADVANTAGES:

- Saves pavement installation and maintenance; .3 meters (1 ft) per lane or a total of 2.1 meters (7 ft) for all the lanes
- Avoids the major impacts to the BP Gasoline Station, disturbance to vent stacks and right-of-way

DISADVANTAGES:

- None apparent

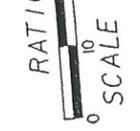
DISCUSSION:

This alternative will avoid the major impacts to the BP Gasoline Station by moving the right-of-way line to the north and potentially eliminating the disturbance of the vent stacks. If the 2.1 meter (7 ft) movement is not sufficient to avoid impacting the vent stacks consider moving the center line slightly north to achieve this goal. This would require that some additional land be purchased from Parcel #159 in lieu of from Parcel #160, however this land is only \$240,000 per acre (before mark-ups) compared with \$575,000 (before mark-ups) per acre.

Note that the maximum truck traffic is only 4% in this area.

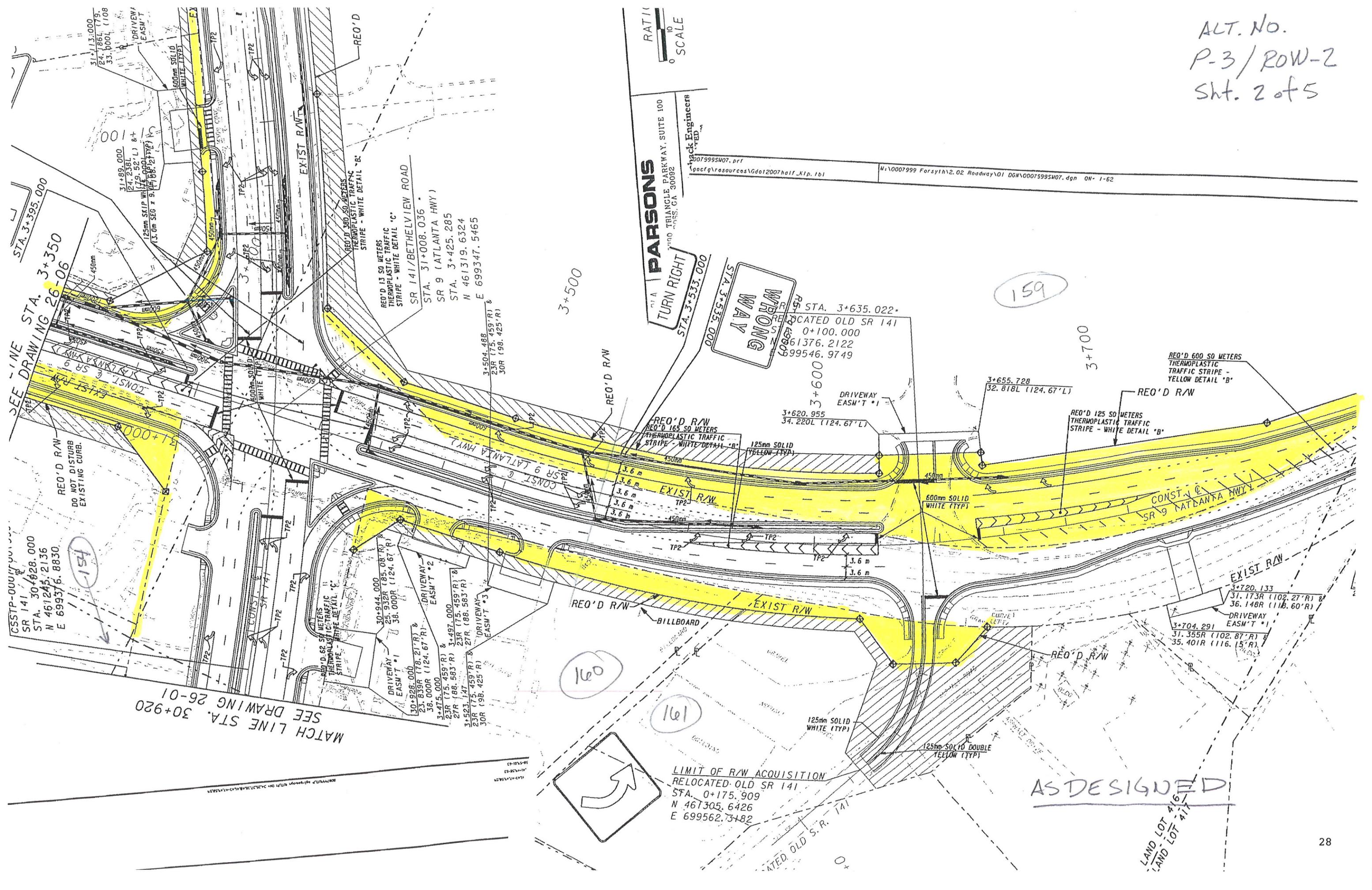
COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 435,542	—	\$ 435,542
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 435,542	—	\$ 435,542

ALT. No.
P-3/ROW-2
Sht. 2 of 5



PARSONS
100 TRIANGLE PARKWAY, SUITE 100
DUNWOODY, GA 30092
Pack Engineers
P.O. BOX 1000
DUNWOODY, GA 30092

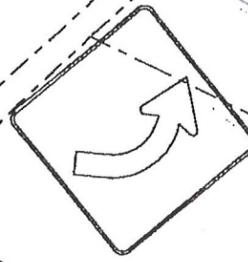
0079995W07.pr
pacfgresources\Gdot2007half_K1p.tbl
M:\0007999 Forsyth\2.02 Roadway\01 DGN\00079995W07.dgn ON- 1-62



SEE DRAWING 26-06
STA. 3+350

SR 141
STA. 30+828.000
STA. 46+245.2136
N 461319.6324
E 699347.5465

MATCH LINE STA. 30+920
SEE DRAWING 26-01



LIMIT OF R/W ACQUISITION
RELOCATED OLD SR 141
SFA. 0+175.909
N 461305.6426
E 699562.7382

AS DESIGNED

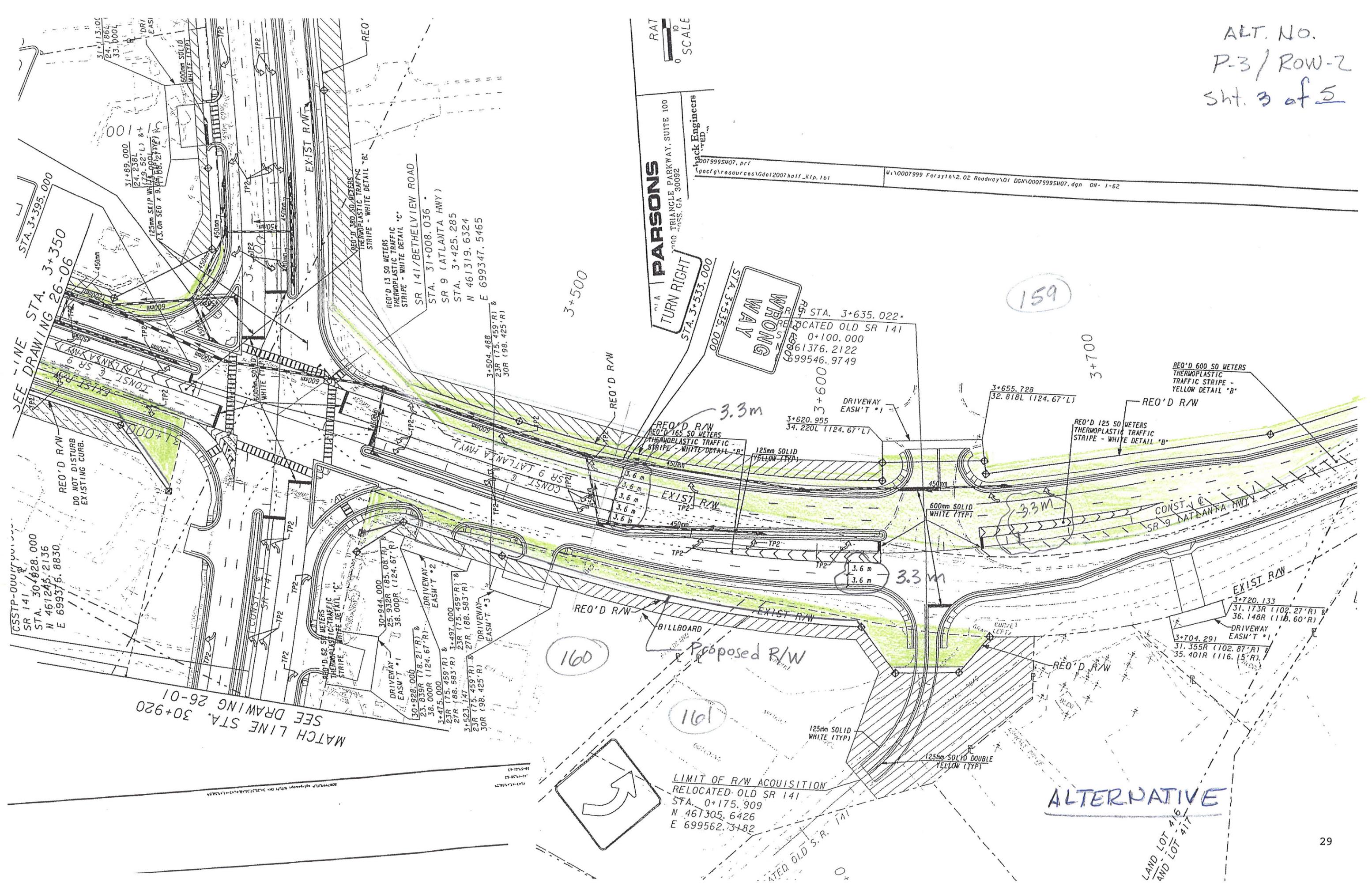
LAND LOT 416
LAND LOT 417

ALT. NO.
P-3 / ROW-2
Sht. 3 of 5



PARSONS
100 TRIANGLE PARKWAY, SUITE 100
DUNWOODY, GA 30092

Black Engineers
1007999SU07.dwg
\\pcfcg\resources\Gdot2007\half_klp.tbl
\\v\0007999\Forsyth\2.02_Roadway\01_DGN\007999SU07.dgn ON: 1-62



SEE LINE DRAWING STA. 3+395.000
DRAWING 26-06

SR 141
STA. 30+928.000
N 461245.2136
E 699376.8830

MATCH LINE STA. 30+920
SEE DRAWING 26-01

REQ'D 13 SO METERS
THERMOPLASTIC TRAFFIC
STRIPE - WHITE DETAIL 'C'
SR 141/BETHELVIEW ROAD
STA. 31+008.036
SR 9 (ATLANTA HWY)
STA. 3+425.285
N 461319.6324
E 699347.5465

TURN RIGHT
STA. 3+533.000

WRONG WAY
STA. 3+535.000

REQ'D 600 SO METERS
THERMOPLASTIC TRAFFIC
STRIPE - WHITE DETAIL 'B'
RELOCATED OLD SR 141
STA. 0+100.000
N 461376.2122
E 699546.9749

159

3+700

REQ'D 600 SO METERS
THERMOPLASTIC
TRAFFIC STRIPE -
YELLOW DETAIL 'B'

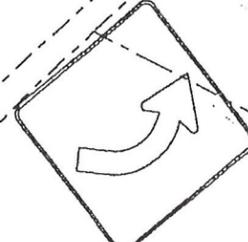
REQ'D R/W

REQ'D 125 SO METERS
THERMOPLASTIC TRAFFIC
STRIPE - WHITE DETAIL 'B'

CONST. @
SR 9 (ATLANTA HWY)

160

161



LIMIT OF R/W ACQUISITION
RELOCATED OLD SR 141
STA. 0+175.909
N 461305.6426
E 699562.73182

ALTERNATIVE

LAND LOT 416
AND LOT 417

CALCULATIONS



PROJECT:

SR 141/BETHELVIEW RD @ SR 9 ATLANTA HIGHWAY
INTERSECTION IMPROVEMENTS
CSSTP-0007-00(999); P.I. No. 0007999
Forsyth County, Georgia

ALTERNATIVE NO

P-3/ROW-2

SHEET NO

4 of 5

Pavement

$$\begin{aligned} .3 \times 4 \times 340 &= 408 \text{ m}^2 \\ .3 \times 2 \times 110 &= 66 \\ .3 \times 1 \times 270 &= 81 \\ .3 \times 1 \times 200 &= \underline{60} \\ &615 \text{ m}^2 \end{aligned}$$

RIGHT-OF-WAY

$$\begin{aligned} .3 \times 7 \times 145 &= 305 \text{ m}^2 \\ \frac{1}{2} \times 4 \times 17 &= \underline{34} \end{aligned}$$

$$\frac{339 \text{ m}^2 \times 10.76 \frac{\text{ft}^2}{\text{m}^2}}{43,560 \text{ ft}^2/\text{acre}} = .084 \text{ acres}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 141/BETHELVIEW ROAD @ SR 9 (ATLANTA HIGHWAY)**
INTERSECTION IMPROVEMENTS
CSSTP-0007-00(999), P.I. No. 0007999
Forsyth County, Georgia

ALTERNATIVE NO.:
P-4

DESCRIPTION: **USE 3.3 METER THROUGH TRAVEL LANES ON**
BETHELVIEW ROAD NORTH OF THE INTERSECTION

SHEET NO.: **1 of 3**

ORIGINAL DESIGN:

Bethelview Road is designed with 3.6-meter-wide (12 ft) through travel lanes from Sta. 31+040 to Sta. 31+500.

ALTERNATIVE: (sketch attached)

Use 3.3-meter-wide (11 ft) lanes in lieu of 3.6-meter-wide lanes from Sta 31+040 to Sta. 31+500.

ADVANTAGES:

- Reduces pavement area and long-term maintenance
- Reduces amount of right-of-way to acquire
- Reduces storm water volume

DISADVANTAGES:

- None apparent

DISCUSSION:

Reducing travel lane widths for Bethelview Road from 3.6 meters wide (12 ft) to 3.3 meters wide (11 ft) lanes will not impact the safety of the traveling public and will reduce pavement and right-of-way requirements while increasing the green space.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 151,155	—	\$ 151,155
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 151,155	—	\$ 151,155

CALCULATIONS



PROJECT: **SR 141/BETHELVIEW ROAD @ SR 9 (ATLANTA HIGHWAY) INTERSECTION IMPROVEMENTS**
CSSTP-0007-00(999); P.I. No. 0007999
Forsyth County, Georgia

ALTERNATIVE NO. P-4

P-4

SHEET NO

2 of 3

Pavement: Sta. 31+040 to Sta. 31+500 = 460 m

$$460 \text{ m} \times 1.2 \text{ m} = \underline{552 \text{ m}^2}$$

Parcels 155, 155A, 252A, 252, 253A and 253:

$$332 \text{ m} \times 0.6 \text{ m} = 199.2 \text{ m}^2 \times 1.19 \text{ yd}^2/\text{m}^2 = 237 \text{ yd}^2 \div 4840 \text{ yd}^2/\text{Ac} = \underline{0.05 \text{ Ac}}$$

Parcels 153A and 153:

$$128 \text{ m} \times 0.6 \text{ m} = 77 \text{ m}^2 \times 1.19 \text{ yd}^2/\text{m}^2 = 91 \text{ yd}^2 \div 4840 \text{ yd}^2/\text{Ac} = \underline{0.02 \text{ Ac}}$$

Parcel 159:

$$460 \text{ m} \times 1.19 \text{ yd}^2/\text{m}^2 = 547 \text{ yd}^2 \div 4840 \text{ yd}^2/\text{Ac} = \underline{0.11 \text{ Ac}}$$

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 141/BETHELVIEW ROAD @ SR 9 (ATLANTA HIGHWAY)**
INTERSECTION IMPROVEMENTS
CSSTP-0007-00(999), P.I. No. 0007999
Forsyth County, Georgia

ALTERNATIVE NO.:
G-1/ROW-4

DESCRIPTION: **BALANCE CUT/FILL ALONG BETHELVIEW FROM**
APPROXIMATELY STA. 30+900 TO STA. 31+300

SHEET NO.: 1 of 7

ORIGINAL DESIGN:

The current design shows a 2 m cut at the driveway entrance at Sta. 31+101 left and causes right-of-way impacts.

ALTERNATIVE:

Raise profile to reduce cut within station limits.

ADVANTAGES:

- Reduces right-of-way impacts
- Reduces earthwork needed
- Modifies driveway to Parcel #155A to avoid major improvements

DISADVANTAGES:

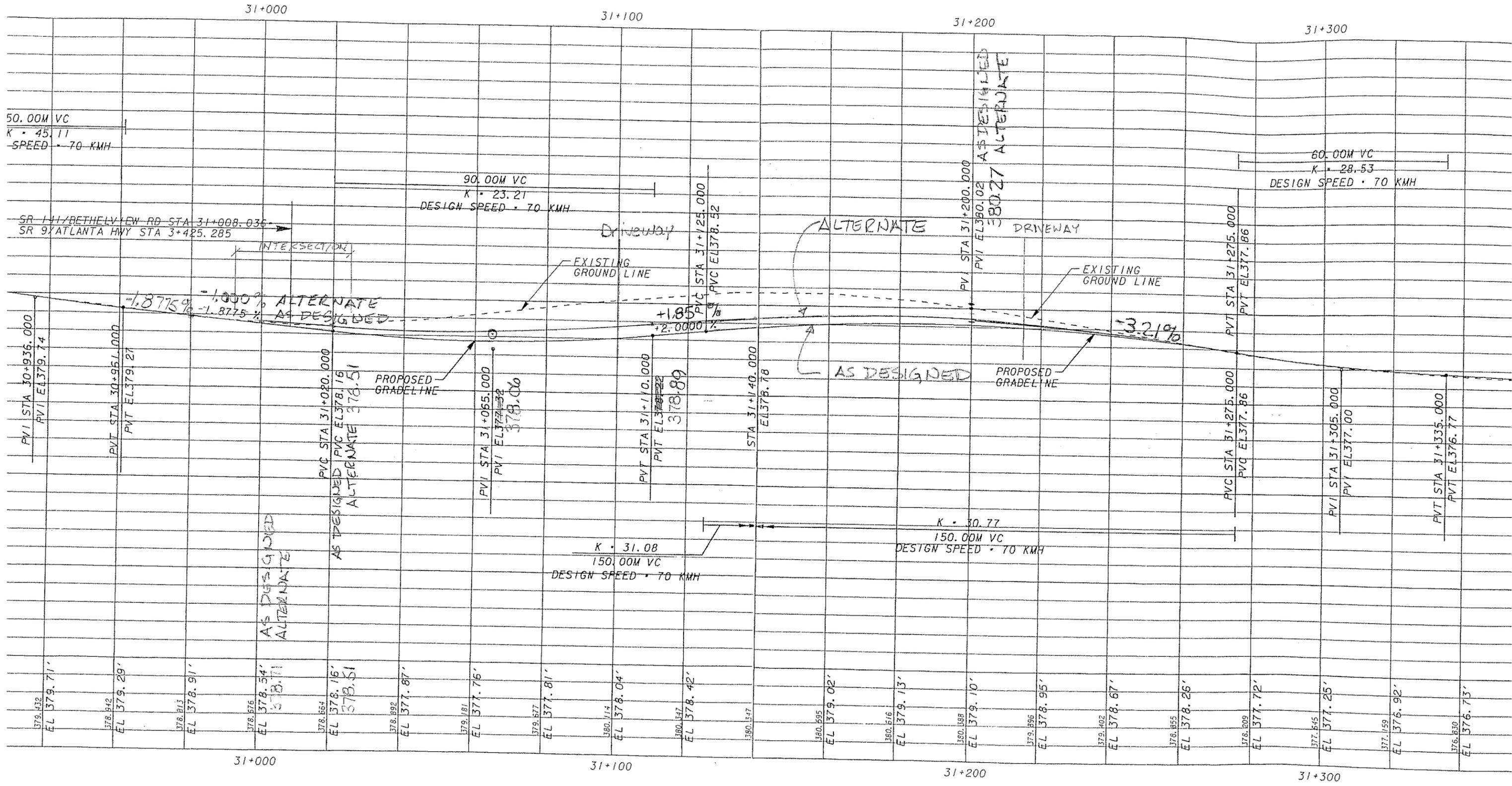
- None apparent

DISCUSSION:

Raising the profile and reducing the cut within the station limits will eliminate the right-of-way limits needed at Parcel #155 as well as reduce earthwork requirements.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 348,650	—	\$ 348,650
ALTERNATIVE	\$ 0	—	\$ 0
SAVINGS (Original minus Alternative)	\$ 348,650	—	\$ 348,650

ALT. NO.
G-1/ROW-4
Sheet 2 of 7



PARSONS
5390 TRIANGLE PARKWAY, SUITE 100
NORCROSS, GA 30092

HL Heath & Lineback Engineers
INCORPORATED
2390 CANTON ROAD, BUILDING 200
MARIETTA, GEORGIA 30066-5393

HORIZONTAL SCALE: 1:500
VERTICAL SCALE: 1:100

REVISION DATES	

STATE OF GEORGIA
DEPARTMENT OF TRANSPORT
OFFICE: CONSULTANT DESIGN

MAINLINE PROFILE

SR 141 WIDENING PROJECT

SR 141/BETHELVIEW RD

PARSONS
5390 TRIANGLE PARKWAY, SUITE 100
NORCROSS, GA 30092

HL Heath & Lineback Engineers
INCORPORATED

ALT. NO.
G-1/ROW-4
Sht. 3 of 7

155A

MOUNTAIN STATE BAY

31+113.000
24.186L (179.35'L) &
33.000L (108.27'L)

DRIVEWAY
EASMT • 1

100769

R=3m

EXIST RW

E 699299.9840
N 461406.2119
31+106.899
PT20170

31+89.000
24.238L
(179.52'L) & # 100
33.000L
(108.27'L)

100616
100615

100338

N-024

N-020

EASMT • 2

N-023

EXIST RW

N-021

N-022

N-020

N-021

N-022

N-020

N-021

N-022

3+350
14-02

N-003

155

PEACHTREE PARKWAY
PARTNERS LLC

N-004

50141

EASMT • 1

450mm

SR 9
ATLANTA HWY

N-007

N-008

N-009

N-010

N-011

N-012

N-013

N-014

N-015

N-016

N-017

N-018

N-019

N-020

N-021

N-022

N-023

N-024

N-025

N-026

N-027

N-028

N-029

N-030

N-031

N-032

N-033

N-034

AS DESIGNED

ALT. NO.
G-1/ROW-4
Sht. 4 of 7

155A

MOUNTAIN STATE BAY

31+113.000
24.186L (179.35'L) &
33.000L (108.27'L)

DRIVEWAY
EASMT • 1

100769

31+106.899
N 461406.2119
E 699299.9840
PT20170

100

31+89.000
24.238L
(179.52'L) & 7
33.000L
(110.00'L)

END OF
REVISED
DRIVEWAY

100338

EASMT • 2

3*350
14-02

155

PEACHTREE PARKWAY
PARTNERS LLC

100616
100615

10018

1028
12.9R
R=0.9m

1019

1028
12.9R
R=0.9m

3*400

1046
3.6R
R=1.2R

1028
12.9R
R=0.9m

EXIST RW

18.0m
+130
RC +135
2.4m
+140
RC +140
7.2m

15.6m
+090

15.6m
+054

450mm
450mm

2.4m
+046

12.0m
+040

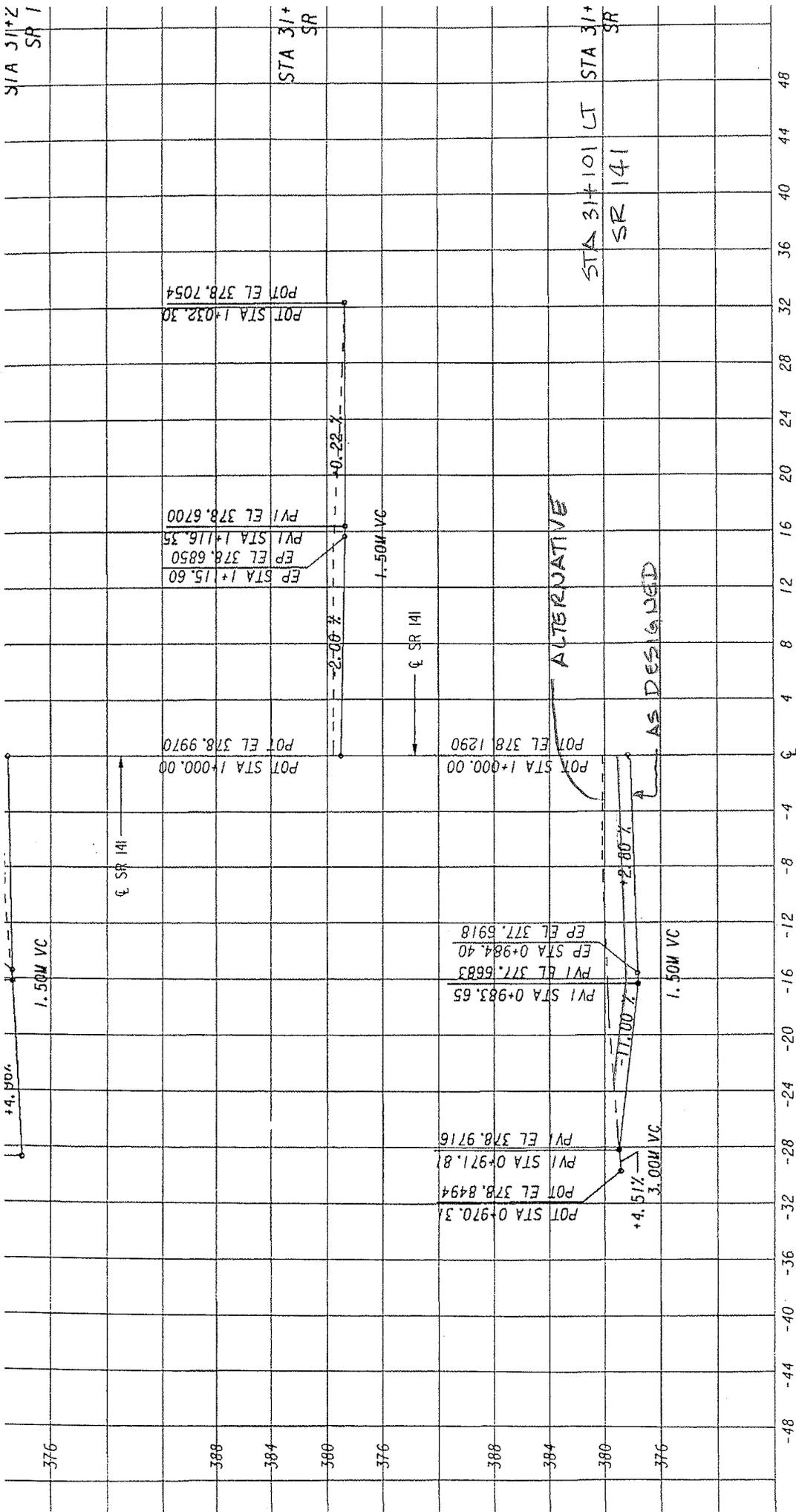
7.2m
+046

12.0m
+040

ALTERNATIVE
EASEMENT LINE

AS DESIGNED EASEMENT LINE

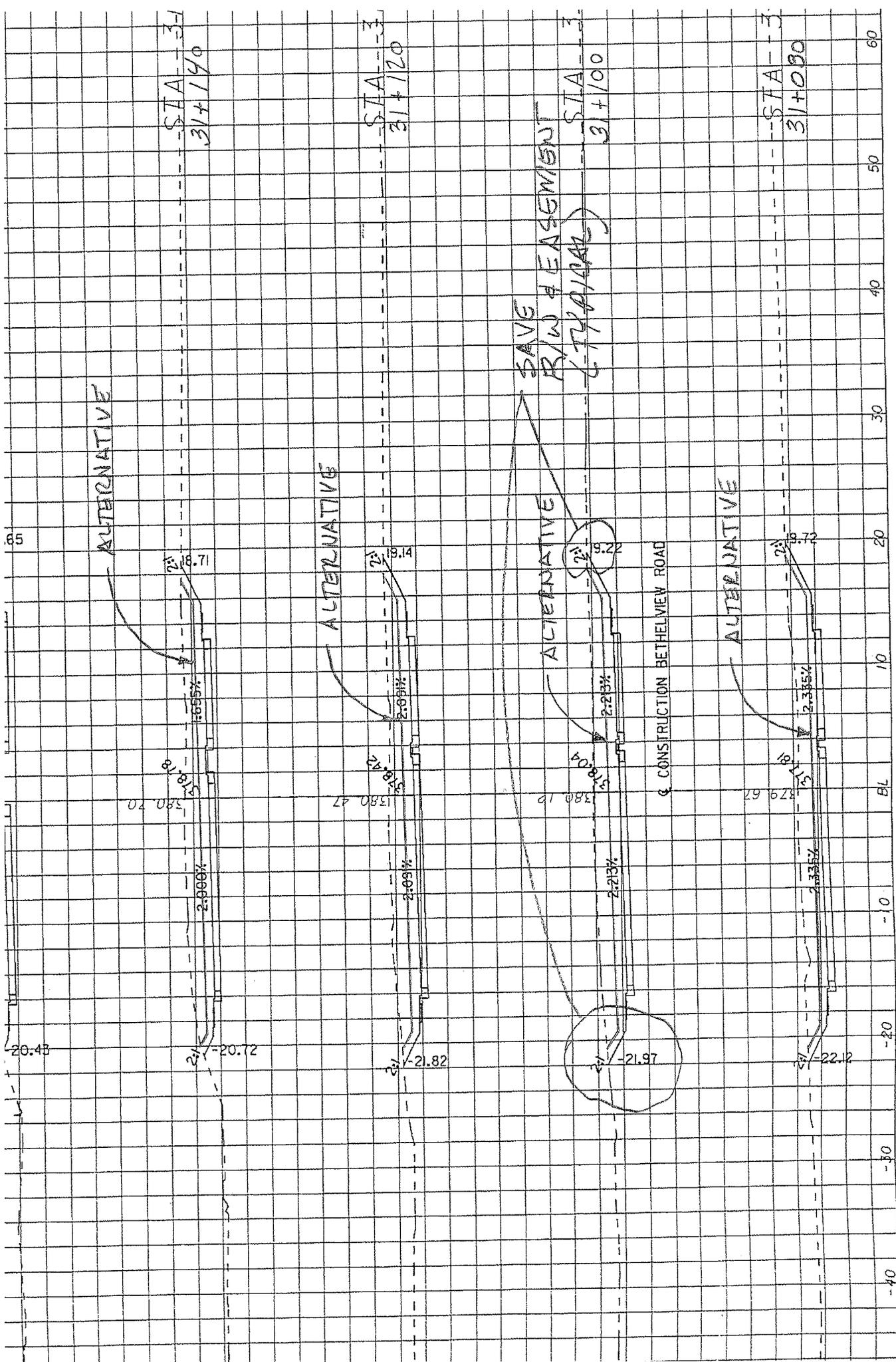
100710



PARSONS 5390 TRIANGLE PARKWAY, SUITE 100 NORCROSS, GA 30092	HL Heath & Lineback Engineers INCORPORATED 230 CANTON ROAD, BUILDING 200 MARIETTA, GEORGIA 30066-5393	HORIZONTAL SCALE: 1:200 VERTICAL SCALE: 1:200		DE OFFICE
		REVISION DATES		SR 14 COUNT

ALT. No.
G-1/ROW-4
Sht. 5 of 7

ACT. NO.
G-1/ROW-4
Sht. 6 of 7



EARTHWORK CROSS SECTIONS

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE OF CONSULTANT DESIGN

Heath & Lineback Engineers
INCORPORATED
230 CANTON ROAD, BUILDING 204
MARIETTA, GEORGIA 30064-1371

PARSONS
5300 BLANCKE PARKWAY, SUITE 100
DORCROSS, GA 30092

VALUE ENGINEERING ALTERNATIVE



PROJECT: **SR 141/BETHELVIEW ROAD @ SR 9 (ATLANTA HIGHWAY)**
INTERSECTION IMPROVEMENTS
CSSTP-0007-00(999), P.I. No. 0007999
Forsyth County, Georgia

ALTERNATIVE NO.:

D-1

DESCRIPTION: **USE HDPE PIPES IN LIEU OF RCP FOR ALL STORM SEWERS**

SHEET NO.: **1 of 5**

ORIGINAL DESIGN:

The current design uses reinforced concrete pipe (RCP) for the storm sewer network.

ALTERNATIVE:

Use high density polyethylene (HDPE) pipes for all storm sewers.

ADVANTAGES:

- Lower Manning's coefficient ($n = 0.009$) means more flow compared to RCPs whose $n = 0.013$ for the same pipe area
- HDPE pipes are easier to carry and install

DISADVANTAGES:

- Deviation from the standard
- Requires pre-approval

DISCUSSION:

HDPE pipe comes in 20 ft (6 meter) lengths versus RCP, which comes in 8 ft (2.44 meter) lengths. Thus there are fewer pieces to handle. The reduction in construction time is somewhat balanced by the requirement of 6 in (150 mm) in foundation material. GDOT already approves HDPE pipes for longitudinal storm drains. For cross-drains, a design exception will be required.

To keep prices competitive, GDOT might consider bidding pipes with either RCP or HDPE material. HDPE pipe is used in the City of San Diego and other locations under all major roads.

COST SUMMARY	INITIAL COST	PRESENT WORTH RECURRING COSTS	PRESENT WORTH LIFE-CYCLE COST
ORIGINAL DESIGN	\$ 264,315	—	\$ 264,315
ALTERNATIVE	\$ 169,955	—	\$ 169,955
SAVINGS (Original minus Alternative)	\$ 94,361	—	\$ 94,361

CALCULATIONS



PROJECT: **SR 141/BETHELVIEW RD @ SR 9 ATLANTA HIGHWAY
INTERSECTION IMPROVEMENTS**
CSSTP-0007-00(999); P.I. No. 0007999
Forsyth County, Georgia

ALTERNATIVE NO
D-1

SHEET NO 2 of 5

Type 2 Backfill material for HDPE pipe,
6" (150 mm) thickness.

450 mm HDPE - 1,210 LM

$$\frac{450}{1,000} \times \frac{150}{1,000} \times 1,210 = 81.675 \text{ m}^3$$

600 mm HDPE - 199 LM

$$\frac{600}{1,000} \times \frac{150}{1,000} \times 199 = 17.91 \text{ m}^3$$

900 mm HDPE - 42 LM

$$\frac{900}{1,000} \times \frac{150}{1,000} \times 42 = 5.67 \text{ m}^3$$

1,200 mm HDPE - 53 LM

$$\frac{1,200}{1,000} \times \frac{150}{1,000} \times 53 = 9.54 \text{ m}^3$$

450 mm HDPE side beam - 12 LM

$$\frac{450}{1,000} \times \frac{150}{1,000} \times 12 = 0.81 \text{ m}^3$$

$$\text{Total Backfill} \rightarrow 81.67 + 17.91 + 5.67 + 9.54 + 0.81 \\ = 115.60 \text{ m}^3$$

CALCULATIONS



PROJECT:

SR 141/BETHELVIEW ROAD @ SR 9 (ATLANTA
HIGHWAY) INTERSECTION IMPROVEMENTS

CSSTP-0007-00(999); P.I. No. 0007999

Forsyth County, Georgia

ALTERNATIVE NO.

D-1

SHEET NO

3 of 5

HOPE Unit Costs:

	<u>Material</u>	+	<u>Installation</u>	=	<u>Total</u>
450 mm :	\$24.0	+	\$59.0	=	\$89.0
600 mm :	\$38.7	+	\$78.7	=	\$117.4
900 mm :	\$55.1	+	\$98.4	=	\$153.5
1,200 mm :	\$73.8	+	\$118.2	=	\$192.0

Alt. D-1
4/5

pH
Resistance
Project No.: NHS-0002-00(923)

6.7
1989

County: Chatham

P.I. No.: 0002923

Pipe Culvert Material Alternates For Coastal Plain Region

TYPE OF PIPE INSTALLATION		CONCRETE	CORRUGATED STEEL AASHTO M-36		CORRUGATED ALUMINUM AASHTO M-196	PLASTIC				
			ALUMINUM COATED (TYPE 2) CORR. STEEL	PLAIN ZINC COATED	PLAIN UNCOATED ALUMINUM	CORR. POLY-ETHYLENE AASHTO M-252	CORR. POLY-ETHYLENE SMOOTHED LINED AASHTO M-294 TYPE "S"	POLY VINYL CHLORIDE (PVC) PROFILE WALL AASHTO M-304	POLY VINYL CHLORIDE (PVC) CORRUGATED SMOOTH INTERIOR ASTM F-949	
STORM DRAIN	LONGITUDINAL INTERSTATE AND TRAVEL BEARING	X								
	LONGITUDINAL NON-INTERSTATE AND NON-TRAVEL BEARING	X			X		X	X	X	
	GRADE ≤ 10%	ADT < 250	X			X		X	X	X
		250 < ADT < 1500	X			X				X
		ADT > 1500	X							
	GRADE > 10%	ADT < 250				X		X	X	X
		ADT > 250				X				X
	SIDE DRAIN		X			X		X	X	X
PERMANENT SLOPE DRAIN			X	X	X		X	X	X	
PERFORATED UNDERDRAIN			X	X	X	X	X		X	

NOTE:

1. Allowable materials are indicated by an "X".
2. Structural requirements of storm drain pipe will be in accordance with Georgia Standard 1030-D or 1030-P, whichever is applicable, and the Standard Specifications.
3. Graded aggregate backfill shall be used in cross drain applications for all plastic pipes (AASHTO M-294, HDPE pipe; AASHTO M-304, PVC pipe; ASTM F-949, PVC pipe).

Rev. 10-04-05

PROJECT DESCRIPTION

The intersection of SR 141/Bethelview Road and SR 9/Atlanta Highway, CSSTP-0007-00(999), P.I. No. 0007999 was originally the northernmost terminus for GDOT P.I. No. 121980 (SR 141 from 0.6 miles north of the Fulton County line to SR 9), the widening of SR 141 from two lanes to four lanes. The intersection improvements to SR 141 @ SR 9 were originally included in the scope of P.I. No. 121980, but were split out in order to expedite the SR 141 widening project to the south, which has been completed.

Currently, each approach of this intersection consists of one designated left turn lane and one through lane with the exception of the south approach which has already been widened to include a right turn lane, one through lane, a blanked out lane and a left turn lane. SR 141 is four lanes south of the intersection, Bethelview Road is two lanes north of the intersection, and SR 9 is two lanes both east and west of the intersection. Both SR 141/Bethelview Road and SR 9 are classified as urban minor arterials.

Capacity improvement projects are planned to the east, west and north of this intersection.

Project Need and Purpose

The need for this project is to accommodate the widening of SR 141 in order to fully utilize the capacity improvement to SR 141 and to improve the capacity of the intersection to meet existing and future traffic demand. There is also a need to reduce angle, rear-end and sideswipe collisions.

The purpose of this project is to improve the intersection to accommodate the widening of SR 141 south of the intersection and to reduce congestion for existing and future traffic volumes. Additionally, this project's purpose is to enhance safety.

Project Description

This project, CSSTP-0007-00 (999), P.I. No. 0007999, will upgrade the intersection of SR 141/Bethelview Road and SR 9 to increase capacity to meet acceptable levels of service in the 2032 design year and improve safety by reducing crash rates at this location. Improvements will include:

- Widening Bethelview Road to two through lanes in each direction separated by a raised median north of the intersection to match SR 141 south of the intersection
- Lowering the profile of Bethelview Road just north of the intersection to improve sight distances and storm water drainage
- Providing SR 141 and Bethelview Road with two left turn lanes, a right turn lane and free right turn pockets at the intersection and a southbound right turn lane to access businesses to the west to about 600 ft north of the intersection
- Widening SR 9 to two through lanes in each direction separated by a raised median from 485 ft west of the intersection to 439 ft east of the intersection
- Providing SR 9 with two left turn lanes in each direction, a right turn lane in each direction and free right turn pockets at the intersection

- Providing 4-ft-wide bicycle lanes on SR 9 west of the intersection
- Replacing the existing traffic signal with one to accommodate the new lane configuration
- Adding piped storm water drainage throughout the project area
- Installing a 70-ft-long concrete gravity retaining wall on SR 9 along the Shell Gasoline Station property to protect an existing power utility transmission pole
- Providing 5-ft-wide concrete sidewalks on both sides of each road for the full extent of the project

The project is proposed to be constructed in two phases.

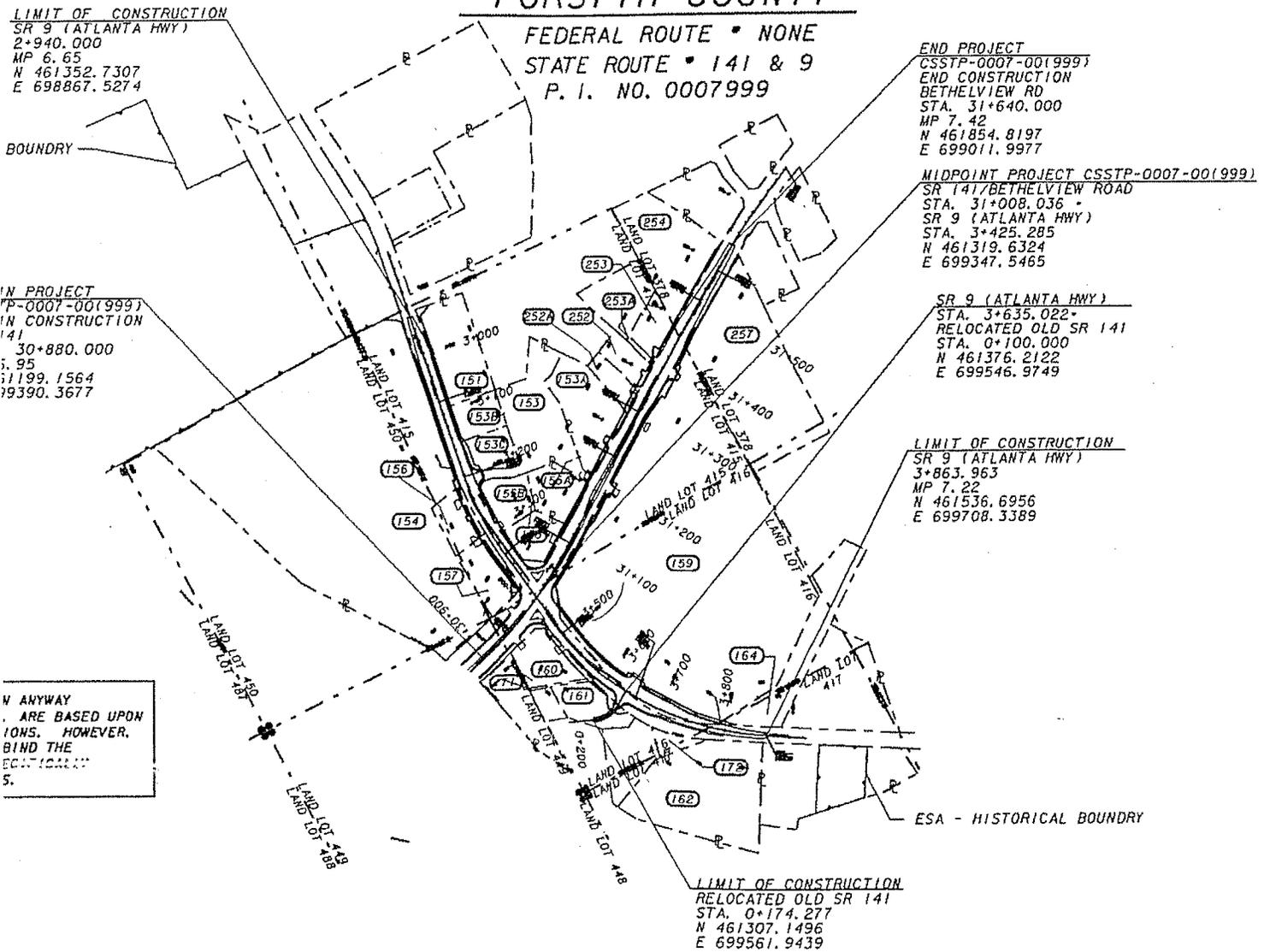
The total cost of the project is approximately \$11.8 million, including \$6 million for right-of-way, \$5.4 million for construction, and \$0.4 million for reimbursable utilities.

A map of the area follows.

DEPARTMENT OF TRANSPORTATION STATE OF GEORGIA

PLAN AND PROFILE OF PROPOSED SR 141/BETHELVIEW ROAD @ SR 9 (ATLANTA HIGHWAY) INTERSECTION IMPROVEMENT

FEDERAL AID PROJECT CSSTP-0007-00(999) FORSYTH COUNTY



LIMIT OF CONSTRUCTION
SR 9 (ATLANTA HWY)
2+940.000
MP 6.65
N 461352.7307
E 698867.5274

FEDERAL ROUTE • NONE
STATE ROUTE • 141 & 9
P. I. NO. 0007999

END PROJECT
CSSTP-0007-00(999)
END CONSTRUCTION
BETHELVIEW RD
STA. 31+640.000
MP 7.42
N 461854.8197
E 699011.9977

MIDPOINT PROJECT CSSTP-0007-00(999)
SR 141/BETHELVIEW ROAD
STA. 31+008.036
SR 9 (ATLANTA HWY)
STA. 3+425.285
N 461319.6324
E 699347.5465

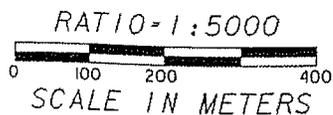
IN PROJECT
P-0007-00(999)
IN CONSTRUCTION
141
30+880.000
MP 6.95
N 461199.1564
E 69390.3677

SR 9 (ATLANTA HWY)
STA. 3+635.022
RELOCATED OLD SR 141
STA. 0+100.000
N 461376.2122
E 699546.9749

LIMIT OF CONSTRUCTION
SR 9 (ATLANTA HWY)
3+863.963
MP 7.22
N 461536.6956
E 699708.3389

LIMIT OF CONSTRUCTION
RELOCATED OLD SR 141
STA. 0+174.277
N 461307.1496
E 699561.9439

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VALUE ANALYSIS AND CONCLUSIONS

GENERAL

This section describes the value analysis (VA) procedure used during the VE study conducted for GDOT by Lewis & Zimmerman Associates, Inc. on the CSSTP-0007-00 (999), P.I. No. 0007999, SR 141/Bethelview Road @ SR 9 (Atlanta Highway) Intersection Improvements project in Forsyth County. The workshop was performed at the preliminary design completion stage. Parsons and Heath & Lineback Engineers Incorporated were selected by GDOT to assist with the development of the project to this stage and now GDOT is taking over the design. GDOT has provided information for the VE team to use as the basis of the study.

A systematic approach was used in the VE study, which was divided into three parts: (1) Preparation Effort, (2) Workshop Effort, and (3) Post-Workshop Effort. A task flow diagram outlining each of the procedures included in the VE study is attached for reference.

Following this description of the VA procedure, separate narratives and supporting documentation identify the following:

- VE workshop participants
- Economic data
- Cost model
- Function analysis
- Creative ideas and evaluations

PREPARATION EFFORT

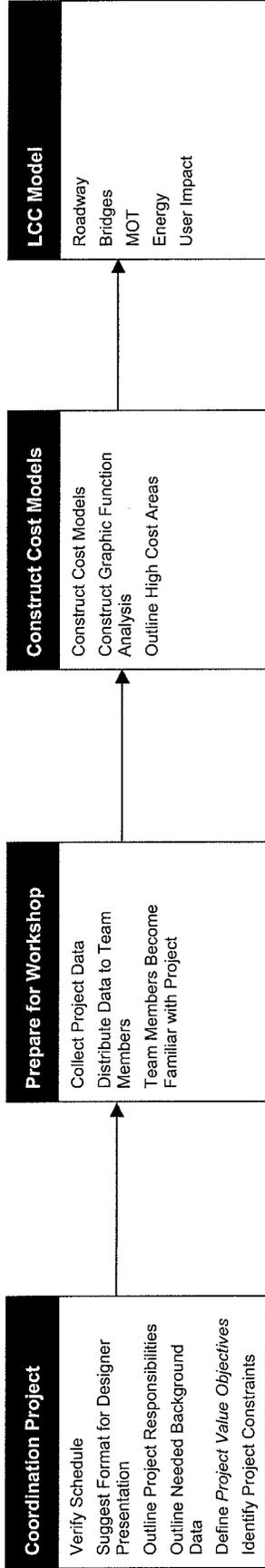
Preparation for the workshop consisted of scheduling workshop participants and tasks and gathering necessary project documents for team members to review before attending the workshop. Documents such as those listed below were used as the basis for generating VE alternatives and for determining the cost implications of the selected VE alternatives:

- SR 141/Bethelview Road @ SR 9 (Atlanta Highway) Intersection Improvements CSSTP-0007-00 (999), P.I. No. 0007999, Preliminary Design Drawings, dated 8/19/2009, prepared by Parsons and Heath & Lineback Engineers Incorporated
- Flexible Pavement Design Analysis, dated September 8, 2009, prepared by GDOT
- Soil Survey Report, STP-104-1(39) Forsyth County, Georgia, P.I. No. 121980 Widening of Peachtree Parkway/SR 141 from South of Granite Road To GA 400, prepared by GDOT, dated November 21, 1997.
- Need and Purpose, Project ID No. 0007999, Project CSSTP-0007-00 (999), Forsyth County, SR 141/Bethelview Road @ SR 9 (Atlanta Highway) Intersection Improvements
- Estimate Report for file "0007999_2009-08-06_VE", prepared by GDOT, dated 8/19/2009
- Updated Preliminary Right of Way Cost Estimate, dated January 12, 2009, prepared by GDOT

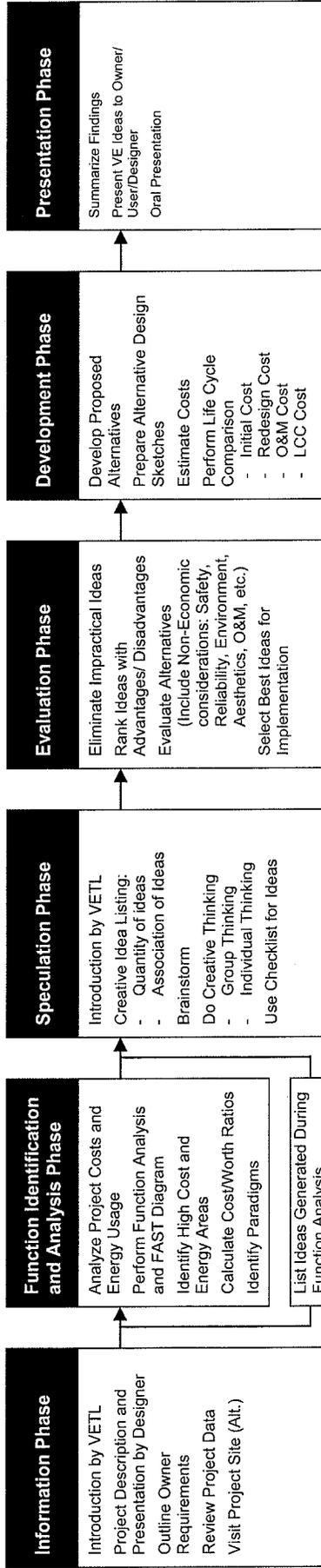


Value Engineering Study Task Flow Diagram

Preparation Effort



Workshop Effort



Post-Workshop Effort



- FR-104-1(39) Forsyth County, P.I. No. 121980, Widening of SR 141, Approved Concept Report, dated August 13, 1990, prepared by GDOT

Information relating to the project's purpose and need, owner concerns, project stakeholder concerns, design criteria, project constraints, funding sources and availability, regulatory agency approval requirements, and the project's schedule and costs is very important as it provides the VE team with insight about how the project has progressed to its current state.

Project cost information provided by the designers is used by the VE team as the basis for a comparative analysis with similar projects. To prepare for this exercise, the VE team leader used the Estimate Report for file "0007999_2009-08-06_VE", prepared by GDOT, dated 8/19/2009 to develop a cost models for the project. The model was used to distribute the total project cost among the various elements of the project. The VE team used this model to identify the high-cost elements that drive the project and the element providing little or no value so that the team could focus on reducing or eliminating their impact.

VALUE ENGINEERING WORKSHOP EFFORT

The VE workshop was a three and one-half-day effort beginning with an orientation/kickoff meeting on Monday, September 14, 2009, and concluding with the final VE Presentation on Thursday, September 17, 2009. During the workshop, the VE Job Plan was followed in compliance with the U.S. Federal Highway Administration guidelines for conducting a VE study. The Job Plan guided the search for alternatives to mitigate or eliminate high-cost drivers, secondary functions providing little or no value, and potential project risks. Alternatives to specifically address the owner's project concerns and enhance value by improving operations, reducing maintenance requirements, enhancing constructability, and providing missing functions were also considered. The Job Plan includes six phases:

- Information Phase
- Function Identification and Analysis Phase
- Creative/Speculation Phase
- Evaluation of Creative Ideas Phase
- Alternative Development Phase
- Presentation Phase

Information Phase

At the beginning of the study, the decisions that have influenced the project's design and proposed construction methods have to be reviewed and understood. For this reason, the workshop began with a presentation of the project by GDOT to the team. The presentation highlighted the information provided in the documentation reviewed by the VE team before the workshop and expanded on it to include a history of the project's development and any underlying influences that caused the design to develop to its current state. During this presentation, VE team members were given the opportunity to ask questions and obtain clarification about the information provided.

Function Identification and Analysis Phase

Having gained some information on the project, the VE team proceeded to define the functions provided by the project, identifying the costs to provide these functions, and determining whether the value provided by the functions has been optimized. 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. Elements performing support functions add cost to the project but have a relatively low worth to the basic function.

Function is defined as the intended use of a physical or process element. The team attempted to identify functions in the simplest manner using measurable noun/verb word combinations. To accomplish this, the team first looked at the project in its entirety and randomly listed its functions, which were recorded on Random Function Analysis Worksheets (provided in the Function Identification and Analysis section). Then the individual function(s) of the major components of the project depicted on the cost models were identified.

After identifying the functions, the team classified the functions according to the following:

<u>Abbreviation</u>	<u>Type of Function</u>	<u>Definition</u>
HO	Higher Order	The primary reason the project is being considered or project goal.
B	Basic	A function that must occur for the project to meet its higher order functions.
S	Secondary	A function that occurs because of the concept or process selected and may or may not be necessary.
R/S	Required Secondary	A secondary function that may not be necessary to perform the basic function but must be included to satisfy other requirements or the project cannot proceed.
G	Goal	Secondary goal of the project.
O	Objective	Criteria to be met
LO	Lower Order	A function that serves as a project input.

Higher order and basic functions provide value, while secondary functions tend to reduce value. The goal of the next job phase is to reduce the impact of secondary functions and thereby enhance project value.

To further clarify the impact of the various functions, the team assigned costs to provide the functions or group of functions indicated by a specific project element using the cost estimate and cost models. Where possible, they seek to find the lowest cost, or worth, to perform the function. This is accomplished using published data from other sources or team knowledge obtained from working on other similar projects to establish cost goals and then comparing them to the current costs. By identifying the cost and worth of a function or group of functions, cost/worth ratios were calculated. Cost/worth ratios greater than one indicated that less than optimum value was being provided. Those project functions or elements with high cost/worth ratios became prime targets for value improvement.

As well as looking at areas with high cost/worth ratios, the team used the cost models previously prepared to seek out the areas where most of the project funds are being applied. Because of the absolute magnitude of these high-cost elements or functions, they also became initial targets for value enhancement.

Overall, these exercises stimulated the VE team members to focus on apparently low value areas and initially channel their creative idea development in these places.

Creative/Speculation Phase

This VE study phase involved the creation and listing of ideas. Starting with the functions or project elements with high cost/worth ratios, a high absolute cost compared to other elements in the project, and secondary functions providing little or no value and using the classic brainstorming technique, the VE team began to generate as many ideas as possible to provide the necessary functions at a lower total life cycle cost, or to improve the quality of the project. Ideas for improving operation and maintenance, reducing project risk, and simplifying constructability were also encouraged. At this stage of the process, the VE team was looking for a large quantity of ideas and free association of ideas. A Creative Idea Listing worksheet was generated and organized by the function or project element being addressed.

GDOT may wish to review these creative lists since they may contain ideas that were not pursued by the VE team but can be further evaluated for potential use in the design.

Evaluation Phase

Since the goal of the Creative/Speculation Phase was to conceive as many ideas as possible without regard for technical merit or applicability to the project goals, the Evaluation Phase focused on identifying those ideas that do respond to the project value objectives and are worthy of additional research and development before being presented to the owner. The selection process consisted of the VE team evaluating the ideas originated during the Creative/Speculation Phase based on GDOT's value objectives identified through conversations during the opening presentation. Based on the team's understanding of the owner's value objectives, each idea was compared with the present design concept, and the advantages and disadvantages of each idea were discussed. How well an idea met the design criteria was also reviewed.

Based on the results of these reviews, the VE team rated the idea by consensus using a scale of 1 to 5, with 5 or 4 indicating an idea with the greatest potential to be technically sound and provide cost savings or improvements in other areas of the project, 3 indicating an idea that provides marginal value but could be used if the project was having budget problems, 2 indicating an idea with a major technical flaw, and 1 indicating an idea that does not respond to project requirements. Generally, ideas rated 4 and 5 are pursued in the next phase and presented to the owner during the Presentation Phase.

The team also used the designation "DS" to indicate a design suggestion, which is an idea that may not have specific quantifiable cost savings but may reduce project risk, improve constructability, help to minimize claims, enhance operability, ease maintenance, reduce schedule time, or enhance project value in other ways. Design suggestions could also increase a project's cost but provide value in areas not currently addressed. These are also developed in the next phase of the VE process.

Development Phase

In this phase, each highly rated idea was expanded into a workable solution designated as a VE alternative. The development consisted of describing the current design and the alternative solution, preparing a life cycle cost comparison where applicable, describing the advantages and disadvantages of the proposed alternative solution, and writing a brief narrative to compare the original design to the proposed change and provide a rationale for implementing the idea into the design. Sketches and design calculations, where appropriate, were also prepared in this part of the study. The VE alternatives are included in the Study Results section of this report.

Design suggestions include the same information as the alternatives except that no cost analysis is performed. They too are included in the Study Results section.

Presentation Phase

The goals of the last phase of the workshop were to summarize the results of the study, to prepare draft Summary of Potential Cost Savings worksheets to hand out at the presentation, and to present the key VE alternatives to GDOT. The presentation was held on Thursday, September 17, 2009, at the GDOT Headquarters office in Atlanta, Georgia. The purpose of the meeting was to provide the attendees with an overview of the suggestions for value enhancement resulting from the VE study and afford them the opportunity to ask questions to clarify specific aspects of the alternatives presented. Procedures for implementing the results of the study were discussed, and arrangements were made for the reviewers of the VE report to contact the VE team in order to obtain further clarifications, if necessary. Draft copies of the Summary of Potential Cost Savings worksheets were given to the owner and design team to facilitate a timely review and speedy implementation of the selected ideas.

POST-WORKSHOP EFFORT

The post-workshop portion of the VE study consisted of the preparation of this VE Study Report. Personnel from GDOT will analyze each alternative and prepare a response, recommending incorporation of 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.

Upon completing their reviews, GDOT will decide which alternatives to implement.

VALUE ENGINEERING WORKSHOP PARTICIPANTS

The VE team was organized to provide specific expertise in the unique project elements involved with the SR 141/Bethelview Road @ SR 9 (Atlanta Highway) Intersection Improvements project. The multidisciplinary team comprised professionals with highway design and construction experience and a working knowledge of VE procedures. The following lists the VE team members:

<u>Participant</u>	<u>Specialization</u>	<u>Affiliation</u>
Joe Leoni, PE	Highway Design	ARCADIS US, Inc.
Paresh J. Parikh	Constructability	Delon Hampton Associates
Howard B. Greenfield, PE, CVS	VE Team Leader	Lewis & Zimmerman Associates

DESIGNER'S PRESENTATION

An overview of the project was presented on Monday, September 14, 2009, by representatives from GDOT. The purpose of this meeting, in addition to being an integral part of the Information Phase of the VE study, was to bring the VE team up-to-speed regarding the overall project specifics. Additionally, the meeting afforded the owner and design team the opportunity to highlight in greater detail those areas of the project requiring additional or special attention. An attendance list for the meeting is attached.

VALUE ENGINEERING TEAM'S PRESENTATION

A VE presentation was conducted by the VE team on Thursday, September 17, 2009 at the GDOT Headquarters office in Atlanta, Georgia to review VE alternatives with the owner and representatives from the design team. Copies of the Draft Summary of Potential Cost Savings worksheet were provided to the attendees. Attendees checked off their names on the attendance list from the opening presentation.

VE STUDY SIGN-IN SHEET

Project No.: CSSTP-0007-00(999) STP00-0104-01(039) County: Forsyth PI No.: 0007999, & 121980- Date: Sept. 14-17, 2009

NAME	EMPLOYEE ID NO.	DOT OFFICE OR COMPANY	PHONE NUMBER	EMAIL ADDRESS
✓ Lisa L. Myers	00244168	Engineering Services	404-631-1770	lmyers@dot.ga.gov
✓ Matt Sanders	00284154	Engineering Services	404-631-1752	msanders@dot.ga.gov
James K. Magnus	00208161	Construction	404-631-1971	jmagnus@dot.ga.gov
Ken Werho	00258268	Traffic Operations	404-635-8144	kwerho@dot.ga.gov
Ron Wishon	00208180	Engineering Services	404-631-1753	rwishon@dot.ga.gov
✓ Howard Greenfield		Lewis & Zimmerman	301-984-9510x26	hgreenfield@lza.com
✓ Dominic Saulino		HNTB	404-946-5745	dsaulino@hntb.com
✓ Parash Parikh		Delonkhan	404-419-8434	Parash@delonkhan.com
Michelle Brock	00254403	BLVD-GNDT	770-718-5043	mbrock@dot.ga.gov
✓ SAM WOODS	00874211	GPOT ROAD	631-1628	swoods@dot.ga.gov
✓ David Acree	00343471	GPOT ROAD	631-1627	dacree@dot.ga.gov
✓ Robert Elam	00937201	GPOT Road	631-1621	relam@dot.ga.gov
✓ Jim Simpson	00255896	" "	631-1605	jisimpson@dot.ga.gov
✓ WINESHA PERHAM	00684767	GPOT ROAD	631-1587	wperham@dot.ga.gov
STANLEY HILL	00232993	GPOT/OPP	631-1560	sthill@dot.ga.gov
✓ MARY HURNEY		FHWY-149 DIV	(502) 223-6775	Mary.Hurney@dot.ga.gov
EMMANUELA WILKINSON		GPOT/OPF	4-699-6967	emwil@dot.ga.gov
Brent Stang	00286676	Road Design	4-631-1600	bstang@dot.ga.gov

✓ = Attended both days (Project Overview & Presentation) 17 Attended Project Overview 12 Attended Project Presentation

ECONOMIC DATA

The comparisons of life cycle costs between the VE alternatives and the current design solutions were performed on the basis of discounted present worth. To accomplish this, the VE team developed economic criteria to use in its calculations based on information gathered from GDOT and the design team. The following parameters were used when calculating discounted present worth:

Year of Analysis:	2009
Construction Start Date:	Unknown
Construction Completion Date:	Unknown
Planning Period (n):	20
Discount Rate (i):	3%

When computing capital costs, direct material, labor and equipment costs are marked up using a composite markup of 9% that includes:

Engineering and Inspection	5%
Construction Contingency	4%

When computing right-of-way costs, a multiplier of 73.4% is used to account for the following:

C/O, Condemnation Increase & Legal Cost (50% of right-of-way cost)
 Service Fees and Appraisal Cost (25 Par x \$7,500)
 Condemnation Cost (25 Par x 15% x \$7,500)
 Incidentals (25 Par x \$2,000)

The following square meter cost was developed by the VE team for all pavement work based on the values provided in the cost estimate:

1-1/2 in of 12.5 mm Asphalt Concrete Superpave = 90 Kg = 0.09 mg x \$90 =	\$8.10/m ²
2 in of 19 mm Asphalt Concrete Superpave = 120 Kg = 0.12 mg x \$90	= \$10.80
7 in of 25 mm Asphalt Concrete Superpave = 420 Kg = 0.42 mg x \$90	= \$37.80
12 in of Graded Aggregate Base Course = .72 x \$21.40	= <u>\$15.41</u>
Total	= \$72.11/m ²

COST MODEL

The VE team prepared a Pareto Chart, or Cost Histogram, for the project that follows this page. This Cost Histogram displays the major construction elements identified in the cost estimate prepared by the designer in descending order of magnitude and thus identifies the high cost areas in the project. The high cost elements provide the VE team with one focus for its work during the study.

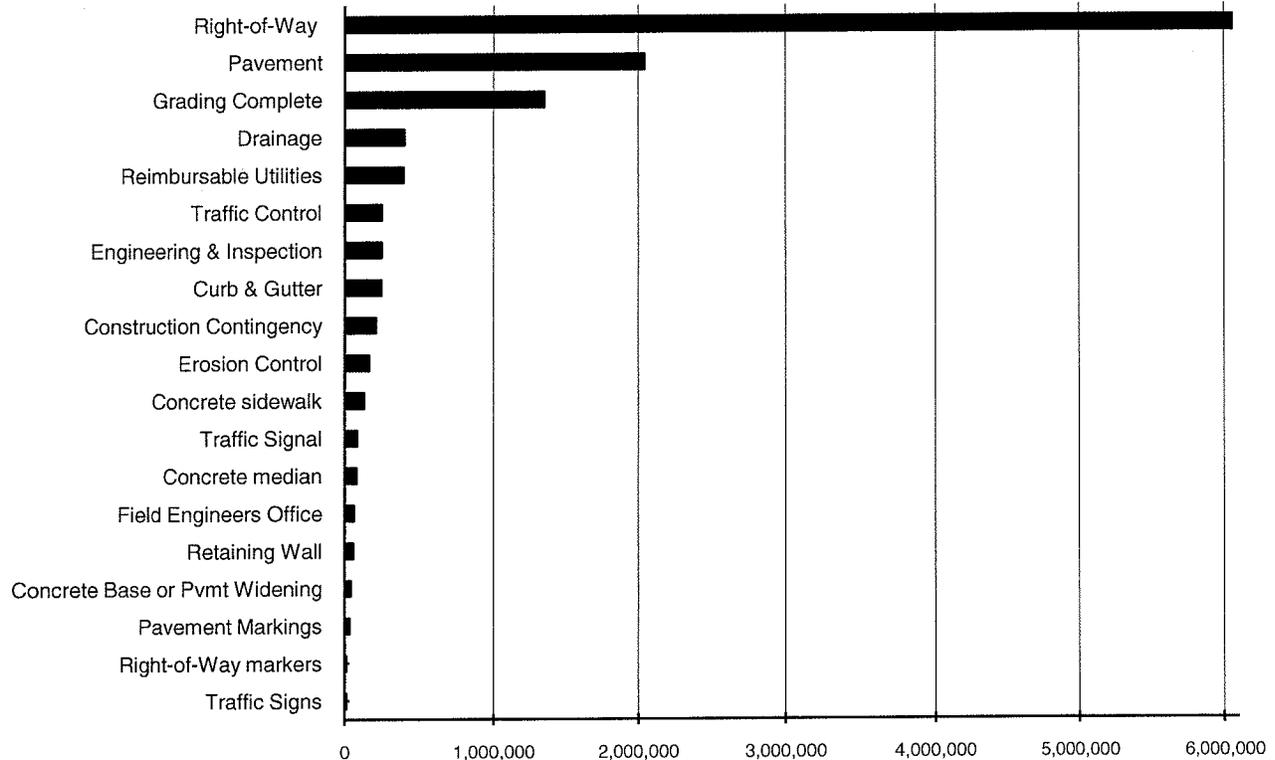
The right-of-way cost is \$6.0 million compared to the project's construction cost of approximately \$5.4 million. Thus the team focused its efforts on reducing the right-of-way cost. With respect to the construction costs, traffic control, pavement, and drainage are the real cost drivers of the project.

COST HISTOGRAM



PROJECT: SR 141 BETHELVIEW ROAD @ SR 9 (ATLANTA HIGHWAY) INTERSECTION IMPROVEMENTS

PROJECT ELEMENT	COST	PERCENT	CUM. PERCENT
Right-of-Way	6,052,800	51.16%	51.16%
Pavement	2,039,326	17.24%	68.40%
Grading Complete	1,343,917	11.36%	79.76%
Drainage	396,132	3.35%	83.11%
Reimbursable Utilities	390,000	3.30%	86.40%
Traffic Control	250,000	2.11%	88.52%
Engineering & Inspection	246,699	2.09%	90.60%
Curb & Gutter	245,137	2.07%	92.67%
Construction Contingency	207,227	1.75%	94.43%
Erosion Control	164,900	1.39%	95.82%
Concrete sidewalk	129,757	1.10%	96.92%
Traffic Signal	83,134	0.70%	97.62%
Concrete median	78,566	0.66%	98.28%
Field Engineers Office	60,000	0.51%	98.79%
Retaining Wall	57,046	0.48%	99.27%
Concrete Base or Pvmt Widening	38,143	0.32%	99.59%
Pavement Markings	29,953	0.25%	99.85%
Right-of-Way markers	9,322	0.08%	99.93%
Traffic Signs	8,645	0.07%	100.00%
TOTAL	\$ 11,830,704	100.00%	



Costs in graph are not marked-up.

FUNCTION ANALYSIS

A function analysis was performed to (1) understand the project purpose and need, (2) define the requirements for each project element, (3) ensure a complete and thorough understanding by the VE team of the basic function(s) needed to attain the given project purpose and need, (4) identify other public goals, and (5) identify secondary functions that should be addressed by the VE team. The Random Function Analysis worksheet completed by the team for the project in its entirety and the various elements follow.

CREATIVE IDEA LISTING AND EVALUATION OF IDEAS

During the Creative/Speculation Phase, numerous ideas were generated for the project using conventional brainstorming techniques. These ideas were recorded and are shown with their corresponding ranking on the attached Creative Idea Listing Worksheets. For the convenience of tracking an idea through the VA process, the ideas were grouped into the following project elements and numbered according to the order in which they were conceived. The following letter prefixes were used to identify the project elements.

PROJECT ELEMENT	PREFIX
Right-of-Way	ROW
Pavement	P
Grading	G
Drainage	D

The ideas were ranked on a qualitative scale of 1 to 5 on how well the VE team believed the idea met the project purpose and need criteria. To assist the team in evaluating the creative ideas, the advantages and disadvantages of each new idea compared to the existing design solution were discussed based on the owner's value objectives for the project. The following are the top value objectives for this project:

- Enhance functionality
- Improve safety
- Maintain access during construction
- Reduce business impacts
- Reduce user impacts

After discussing each idea, the team evaluated the ideas by consensus. This produced eight ideas rated 4 or 5 or design suggestions to research and develop into formal VE alternatives to be included in the Study Results section of the report. Highly rated ideas that were not developed further may have been combined with another related idea or discarded as a result of additional research indicating the concept as not being cost effective or technically feasible. The reader is encouraged to review the Creative Idea Listing and Evaluation worksheet since it may suggest additional ideas that can be applied to the design.

CREATIVE IDEA LISTING



PROJECT: SR 141/BETHELVIEW ROAD @ SR 9 (ATLANTA HIGHWAY) INTERSECTION IMPROVEMENTS CSSTP-0007-00 (999), P.I. No. 0007999 <i>Forsyth County, Georgia</i>	SHEET NO.: 1 of 1
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NO.	IDEA DESCRIPTION	RATING
RIGHT-OF-WAY		
ROW-1	Convert Old SR 141 to a driveway opening	5
ROW-2	Move away from impact at Parcel #160, BP Gasoline Station	Combine w/P-3
ROW-3	Move away from impact at Parcel #157, Shell Gasoline Station	5
ROW-4	Move away from impact at Parcel #155	Combine w/G-1
ROW-5	Use retaining walls to avoid construction easements and acquisitions	5
PAVEMENT		
P-1	Delete pavement for one left turn lane on southbound Bethelview Road	4
P-2	Delete pavement for one left turn lane on westbound SR 9	4
P-3	Use 3.3-meter-wide lanes in lieu of 3.6-meter-wide lanes on SR 9 east of the intersection	5
P-4	Use 3.3-meter-wide lanes in lieu of 3.6-meter-wide lanes on Bethelview Road north of the intersection	5
GRADING		
G-1	Balance cut and fill on Bethelview Road from Sta. 30+900 to 31+300	5
DRAINAGE		
D-1	Use HDPE pipe in lieu of reinforced concrete pipe for storm water lines	5
BIKE LANE		
B-1	Remove the bike lane	3
SIDEWALKS		
S-1	Delete sidewalks	3
S-2	Remove selective sidewalks and just replace the existing sidewalks	3

Rating: 1→2 = Not to be developed 3→4 = Varying degrees of development potential 5 = Most likely to be developed
 DS = Design suggestion ABD = Already being done