

To: \_\_\_\_\_  
Turnpike Design Engineer

Date: March 12, 2007

Financial Project ID: 419570-3-52-01 New Const ( ) RRR (X)  
Federal Aid Number: N/A  
Project Name: Resurfacing and Design Criteria Upgrades (Orange County) - Northbound Only  
State Road Number: 91 Co/Sec/Sub: 75470000  
Begin Project MP: 249.2 End Project MP: 255.0  
Full Federal Oversight Yes ( ) No (X)  
Request for Design Exception (X), Design Variation ( )

(For Design Exception of Variations Requiring Central Office Approval)  
Resubmittal: Yes ( ) No (X) Original Ref#: \_\_\_\_\_

A design exception is requested for the following element(s):

- ( ) Design Speed      ( ) Lane Widths      (X) Shoulder Widths      ( ) Bridge Widths
- ( ) Structural Capacity      ( ) Vertical Clearance      ( ) Grades      ( ) Cross Slope
- ( ) Superelevation      ( ) Horiz. Alignment      ( ) Vertical Alignment      ( ) Stopping Sight Distance
- ( ) Horiz. Clearance      ( ) Other

The purpose of this project is to mill and resurface the Turnpike (Section 75470) in order to improve ride quality, safety, and to extend the longevity of this crucial roadway. In addition to the milling and resurfacing activities, the project also includes the safety and design criteria upgrades throughout its limits. The project begins just north of the Osceola Parkway interchange at MP 249.2, extending northward to milepost 255.0 at the Orlando South (SR 528/US 441) interchange for a distance of approximately 5.8 miles. The project only encompasses the northbound lanes of the Turnpike mainline.

As part of the design criteria upgrades proposed for this project, two existing underpass locations (CR 527/Old Dixie Highway and Taft-Vineland Road) are proposed to be upgraded to eliminate a condition where guardrail is installed directly attached to the bridge piers. This proposed remedy, which would include the installation of a crashworthy TL-5 concrete barrier at the face of the piers, would result in creating a shoulder width that does not meet AASHTO criterion and is even less standard than the existing condition, hence requiring a design exception.

Recommended by:

\_\_\_\_\_ Date: \_\_\_\_\_

Responsible Professional Engineer

Approvals:

\_\_\_\_\_ Date: \_\_\_\_\_ District Structures Design Engineer \_\_\_\_\_ Date: \_\_\_\_\_

\_\_\_\_\_ Date: \_\_\_\_\_ State Structures Design Engineer \_\_\_\_\_ Date: \_\_\_\_\_

\_\_\_\_\_ Date: \_\_\_\_\_ FHWA Division Administrator \_\_\_\_\_ Date: \_\_\_\_\_

Design Exception  
Presented to:  
Florida's Turnpike Enterprise

For:  
SR 91 (Turnpike Mainline) Rehabilitation Project  
From MP 249.2 to 255.0 (Northbound)

FPIDs: 419570-1-32-01, 419570-2-32-01, 419570-3-52-01

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Included Exception: Shoulder Width

Prepared by:  
Recommended by:

\_\_\_\_\_

FL PE License

Date:



A **tyco** International Ltd. Company

Earth Tech Consulting, Inc.  
30 S. Keller Road, Suite 500  
Orlando, FL 32810  
407/660-1719 (phone)  
407/660-0250 (fax)

Certificate of Authorization No: 8115

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### Project Description.

The purpose of this project is to mill and resurface the Turnpike (Section 75470) in order to improve ride quality, safety, and to extend the longevity of this crucial roadway. In addition to the milling and resurfacing activities, the project also includes the safety and design criteria upgrades throughout its limits. The project begins just north of the Osceola Parkway interchange at MP 249.2, extending northward to milepost 255.0 at the Orlando South (SR 528/US 441) interchange for a distance of approximately 5.8 miles. The project only encompasses the northbound lanes of the Turnpike mainline.

There are no interchanges within the limits of the project, though the southern and northern termini do include minor ramp work prior to the physical gore. The existing typical section consists of two 12' lanes bordered by a 10' paved outside shoulder and a 4' paved inside shoulder. Median guardrail is present throughout the project limits, and is placed adjacent to the southbound travel lanes, mostly outside the area of influence of this project. There are official U-turns provided for within the median at approximate 1-mile intervals, and the limits do encompass a contraflow crossover that is used during evacuation activities. The design speed throughout the project is 70 MPH.

As part of the design criteria upgrades proposed for this project, two existing underpass locations (CR 527/Old Dixie Highway and Taft-Vineland Road) are proposed to be upgraded to eliminate a condition where guardrail is installed directly attached to the bridge piers as shown in the pictures below. This proposed remedy, which would include the installation of a crashworthy TL-5 concrete barrier at the face of the piers, would result in creating a shoulder width that does not meet AASHTO criterion and is even less standard than the existing condition, creating the need for a design exception.

The design criteria used for this project is based upon the current (2006) FDOT Plans Preparation Manual and A Policy on Geometric Design of Highways and Streets (Table 2.3.1), American Association of State Highway and Transportation Officials (AASHTO), dated 2004 (Pages 314-315).

### Description of Design Exception.

As noted in the table, FDOT's PPM (Chapter 2) criteria of 12.0' minimum shoulder width is not met at either underpass location, nor is the less stringent AASHTO criterion of 10.0' (Pages 314-315) met after the installation of the TL-5 Barrier. Once outside the limits of the underpass, however, adequate shoulder widths are existing, and will be maintained as part of the project's design.

Milepost	Location	Existing Condition	Turnpike/ FDOT Standard	AASHTO Standard	Proposed Condition (With TL-5 Barrier)
250.300 (RCI MP 0.812)	CR 527 (Old Dixie Highway)	9.7' Offset to face of Guardrail (10.0' to face of pier)	12.0'	10.0'	8.5' Offset to face of TL-5 Barrier
254.600 (RCI MP 5.154)	Taft- Vineland Road	9.7' Offset to face of Guardrail (10.0' to face of pier)	12.0'	10.0'	8.5' Offset to face of TL-5 Barrier

Photos of the substandard locations are shown below.



CR 527 Underpass



Taft-Vineland Underpass

It should be noted that the existing condition, while providing increased shoulder width over the proposed, is inherently flawed, as the guardrail installation against the piers provides inadequate shielding for this clear zone hazard. By installing the rail directly to the bridge piers, the deflection envelope necessary for the guardrail to properly function is non-existent, eliminating its redirective capabilities. By installing a concrete TL-5 barrier, this redirective shielding is provided, creating an overall safer installation by properly shielding a significant clear zone hazard (planned improvements are detailed within the attachments to this Exception). This methodology is consistent with treatments elsewhere on the Turnpike Mainline, and creates no incompatibilities between roadway sections.

#### **Operational Impacts.**

The traffic data for this section of the project is as follows:

AADT (2009 – Opening year):	62,800
AADT (2029 – Design year):	103,900
D24:	50%
T24:	15.01%

Reducing the shoulder width by 1.2' (edge of pavement to face of barrier) at these underpasses is not expected to have any impact to operational characteristics of the roadway. Currently, this section of the Turnpike is scheduled for widening in the year 2020 (design is scheduled for 2018), at which point this shoulder width concern would likely be eliminated by reconstruction of the overpass bridge.

#### **Safety.**

A summary of nine years' crash history (1997-2005) for this section of roadway indicates that the currently deficient shoulder widths have not contributed to any crashes at either of the above-mentioned locations (MP near the structures are highlighted within the attached data for easy reference). The crashes in the vicinity of these structures were of the following types, none of which should be attributable to the reduced shoulder width:

- Ran off road into water
- Motor Vehicle hit tree/shrubbery
- Collision with Motor Vehicle in Transport

Since retrofit with a TL-5 barrier will cause only a minor reduction in existing shoulder width (1.2'), no additional crashes are anticipated as a result of this proposed improvement.

Safety at these locations will, in fact, be significantly improved, as the currently deficient guardrail installation will not deflect as intended, eliminating its redirective capabilities. In contrast, the TL-5 barrier will provide redirection to any vehicles impacting the barrier, theoretically reducing the severity of a crash, and providing increased protection to the bridge structure itself.

#### **Benefit/Cost Analysis.**

As no crashes have been experienced at the subject locations under the current configuration, and the incremental reduction of shoulder width that will be caused by this improvement is not expected to increase this collision rate, the effective benefit/cost ratio would be calculated as zero.

Two Roadside Safety Analysis Program “run” were performed to review benefit cost from a different perspective, analyzing the following comparisons:

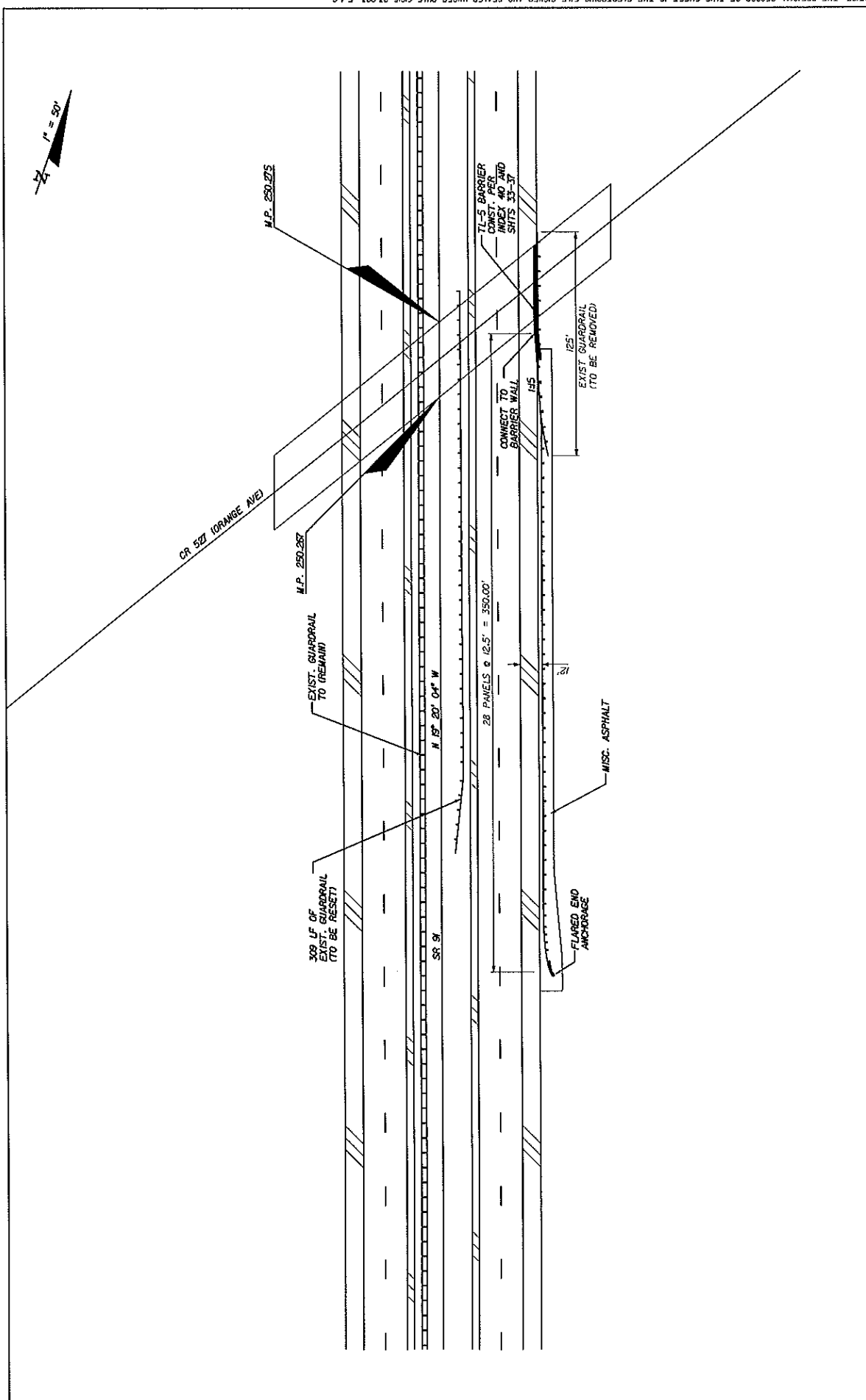
- Existing Conditions vs. full remedy (bridge reconstruction): **Benefit/Cost = 0.04**
- Existing Conditions vs. proposed TL-5 improvement: **Benefit/Cost = 0.57**

As can be seen in these analyses, the benefit of replacing the bridge to achieve full compliance for criteria yields a very low benefit/cost of 0.04. The proposed improvement yields a significantly larger benefit/cost, despite the fact that the shoulder widths are reduced by 1.2'. This is due to the reduction in probable severity of collisions over the existing condition by installation of a proper barrier. (Note that the existing guardrail is modeled as a blunt object within the clear zone, as its mounting against the bridge piers will not allow it to properly function due to lack of available deflection).

#### **Conclusion and Recommendation.**

Because there is no foreseeable, measurable benefit for bringing these locations up to full standard based upon crash data and a benefit-cost analysis, and these situations will likely be remedied as part of a future widening project (scheduled for 2020), it is recommended that a Design Exception be granted for shoulder widths at the two identified underpass bridges on the project. In addition, the proposed improvements include retrofitting of the area with TL-5 redirective barriers, and will enhance the safety of the corridor at these two locations beyond its current condition.

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REVISIONS		DESCRIPTION		DATE		BY	

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		ROAD NO. 91 COUNTY ORANGE		FINANCIAL PROJECT ID 419570-1-52-01 419570-3-52-01	
PROJECT NO. 91		COUNTY ORANGE		FINANCIAL PROJECT ID 419570-1-52-01 419570-3-52-01	

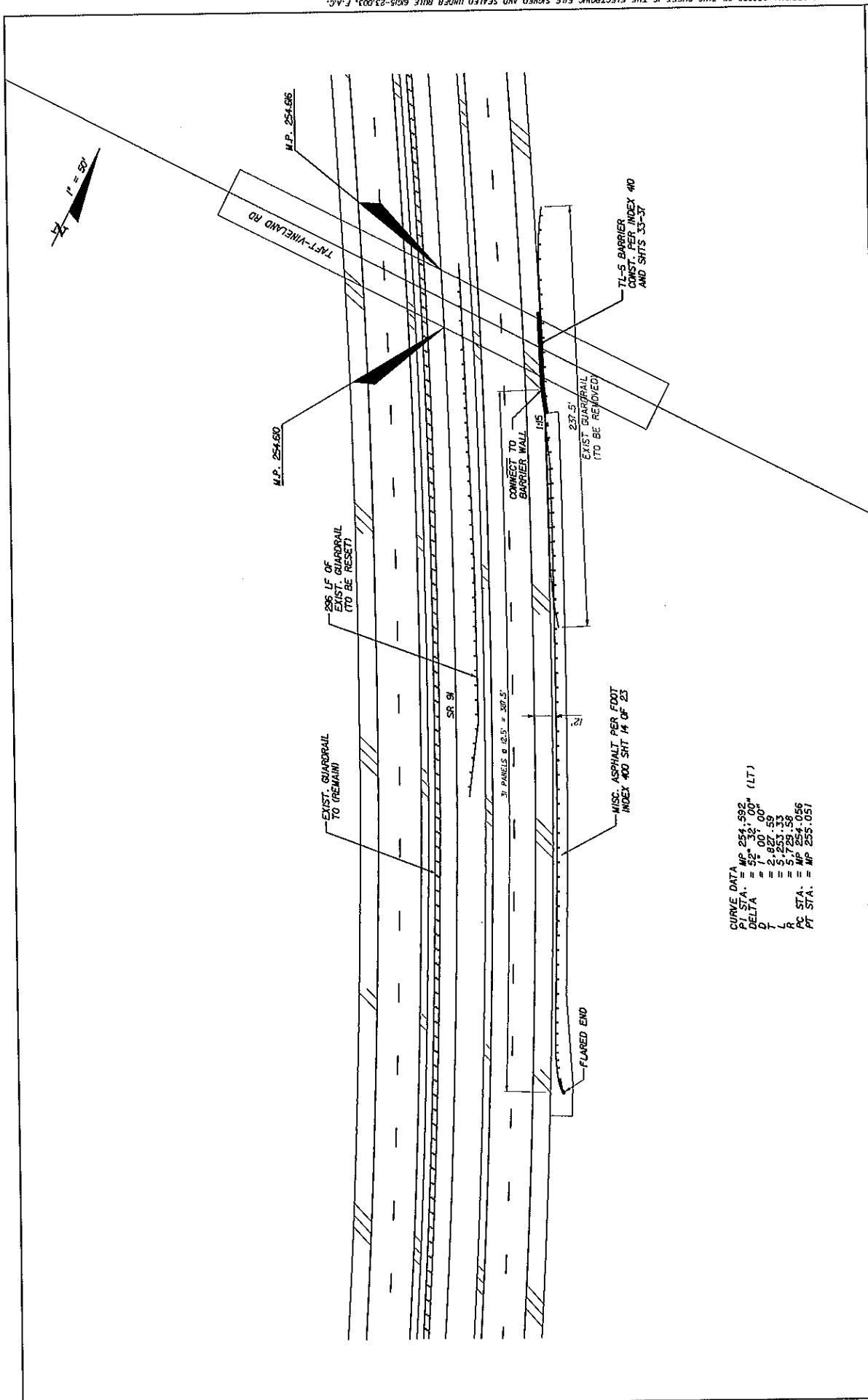
ENGINEER OF RECORD <b>EarthTech</b> <small>11000 E. US HWY 90          SUITE 200          ORLANDO, FL 32837</small>	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION CONTRACT NO. 419570-1-52-01 COUNTY ORANGE
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SHEET NO. 16

**GUARDRAIL DETAILS**

1/21/2009

12-0022 74 419570-0001-0001-0001-0001-0001-0001



CURVE DATA  
 PI STA. = MP 254.592  
 DELTA = 52° 34' 00" (LT)  
 D = 1" 00' 00"  
 T = 2+827.59  
 L = 5,728.58  
 PC STA. = MP 254.056  
 PT STA. = MP 255.051

REVISIONS		DESCRIPTION	
DATE	BY	DATE	BY

STATE OF FLORIDA		DEPARTMENT OF TRANSPORTATION	
COUNTY		FINANCIAL PROJECT ID	
91	ORANGE	49570-1-52-01	
ROAD NO.		49570-3-52-01	

SHEET NO.	
22	

ENGINEER OF RECORD  
**EarthTech**  
 CONSULTANTS  
 FLORIDA CORP. INC. 2015 N.W. 42ND STREET  
 SUITE 2000 BOCA RATON, FL 33433  
 TEL: 561-991-1000 FAX: 561-991-1001

DATE: 12/2/2017

PROJECT NO.: 49570-3-52-01

DATE: 12/2/2017

PROJECT NO.: 49570-3-52-01

DATE: 12/2/2017

PROJECT NO.: 49570-3-52-01

DATE: 12/2/2017

PROJECT NO.: 49570-3-52-01

DATE: 12/2/2017









CRASH #	ROADWAY ID	FCI	NEAREST NODE SR.	YEA	MONTH	DAY	CHASSIS CLASS	CRASH CLASS	CRASH INVOLVEMENT	HARVEST EVENT	WEATHER	ROAD SURFACE	TRAFFIC CONTROL	ROAD RATE	ROAD SIDE	ACCIDENT LANE	VEHICLE TYPE	VEHICLE USE	VEHICLE MOVEMENT	VEHICLE DIRECTION	POINT OF IMPACT	CONTRIBUTING CAUSE	DRIVER/VEHICLE EDGE	VEHICLE TYPE 2	VEHICLE MOVEMENT	VEHICLE DIRECTION	VEHICLE IMPACT	CONTRIBUTING CAUSE 2	DRIVER/VEHICLE AGE 2	NUMBER OF VEHICLES	NUMBER KILLED	NUMBER INJURED	
557462480	75470000		5522 8810	91	2400	98	14 15 U/UTOL	14 15 U/UTOL	0	16	1	1	1	4	7 L	X	1	1	88	1	1	3	0	1	1	1	1	1	21	2	0	0	
567969770	75470000		5522 8810	91	2400	99	12 14 15 U/UTOL	12 14 15 U/UTOL	0	1	1	1	1	1	7 L	X	1	1	1	1	1	8	6	48	1	1	1	1	19	2	0	2	
567969770	75470000		5526 8810	91	2600	00	7 29 8 U/UTOL	7 29 8 U/UTOL	0	1	1	1	1	1	1 R	S	0	0	88	1	1	8	12	46	3	2	1	1	31	2	0	0	
567969770	75470000		5526 8810	91	2600	00	7 29 8 U/UTOL	7 29 8 U/UTOL	0	1	1	1	1	1	1 R	S	0	0	88	1	1	8	12	46	3	2	1	1	31	2	0	0	
567969770	75470000		5537 8810	91	3200	03	3 6 U/UTOL	3 6 U/UTOL	0	1	1	1	1	1	1 L	S	2	6	3	2 S	1	10	55	4	3	2 S	8	0	47	2	0	1	
703824080	75470000		5537 8810	91	3200	03	3 6 U/UTOL	3 6 U/UTOL	0	1	1	1	1	1	1 L	S	2	6	3	2 S	1	10	55	4	3	2 S	8	0	47	2	0	1	
703824080	75470000		5537 8810	91	3200	03	3 6 U/UTOL	3 6 U/UTOL	0	1	1	1	1	1	1 L	S	2	6	3	2 S	1	10	55	4	3	2 S	8	0	47	2	0	1	
703824080	75470000		5537 8810	91	3200	03	3 6 U/UTOL	3 6 U/UTOL	0	1	1	1	1	1	1 L	S	2	6	3	2 S	1	10	55	4	3	2 S	8	0	47	2	0	1	
739176980	75470000		5537 8810	91	4850	04	4 29 23 U/UTOL	4 29 23 U/UTOL	0	20	1	1	1	1	1 M	M	1	1	1	1	1	2	20	39	1	1	1	0	1	0	0	0	
739176980	75470000		5537 8810	91	4850	04	4 29 23 U/UTOL	4 29 23 U/UTOL	0	20	1	1	1	1	1 M	M	1	1	1	1	1	2	20	39	1	1	1	0	1	0	0	0	
739176980	75470000		5537 8810	91	4850	04	4 29 23 U/UTOL	4 29 23 U/UTOL	0	20	1	1	1	1	1 M	M	1	1	1	1	1	2	20	39	1	1	1	0	1	0	0	0	
739176980	75470000		5537 8810	91	4850	04	4 29 23 U/UTOL	4 29 23 U/UTOL	0	20	1	1	1	1	1 M	M	1	1	1	1	1	2	20	39	1	1	1	0	1	0	0	0	
739176980	75470000		5537 8810	91	4850	04	4 29 23 U/UTOL	4 29 23 U/UTOL	0	20	1	1	1	1	1 M	M	1	1	1	1	1	2	20	39	1	1	1	0	1	0	0	0	
757940520	75470000		5537 8810	91	4850	04	10 17 21 U/UTOL	10 17 21 U/UTOL	0	6	4	1	1	1	1 R	S	1	1	1	1	1	6	5	0	6	3	1 S	4	0	23	3	0	0
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757940520	75470000		5537 8810	91	4850	04	10 17 21 U/UTOL	10 17 21 U/UTOL	0	6	4	1	1	1	1 R	S	1	1	1	1	1	6	5	0	6	3	1 S	4	0	23	3	0	0
703826280	75470000		5537 8810	91	5400	05	1 30 11 U/UTOL	1 30 11 U/UTOL	0	31	4	1	1	1	1 M	M	2	3	1	1	1	1	4	1	24	1	1	1	0	66	2	0	1
703826280	75470000		5537 8810	91	5400	05	1 30 11 U/UTOL	1 30 11 U/UTOL	0	31	4	1	1	1	1 M	M	2	3	1	1	1	1	4	1	24	1	1	1	0	66	2	0	1
703826280	75470000		5537 8810	91	5400	05	1 30 11 U/UTOL	1 30 11 U/UTOL	0	31	4	1	1	1	1 M	M	2	3	1	1	1	1	4	1	24	1	1	1	0	66	2	0	1
703826280	75470000		5537 8810	91	5400	05	1 30 11 U/UTOL	1 30 11 U/UTOL	0	31	4	1	1	1	1 M	M	2	3	1	1	1	1	4	1	24	1	1	1	0	66	2	0	1
703826280	75470000		5537 8810	91	5400	05	1 30 11 U/UTOL	1 30 11 U/UTOL	0	31	4	1	1	1	1 M	M	2	3	1	1	1	1	4	1	24	1	1	1	0	66	2	0	1
704006180	75470000		5537 8810	91	5400	05	6 9 6 U/UTOL	6 9 6 U/UTOL	0	1	1	1	1	1	1 R	S	2	1	1	1	1	1	18	35	3	1	2 S	8	0	23	4	0	2
704006180	75470000		5537 8810	91	5400	05	6 9 6 U/UTOL	6 9 6 U/UTOL	0	1	1	1	1	1	1 R	S	2	1	1	1	1	1	18	35	3	1	2 S	8	0	23	4	0	2
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704006180	75470000		5537 8810	91	5400	05	6 9 6 U/UTOL	6 9 6 U/UTOL	0	1	1	1	1	1	1 R	S	2	1	1	1	1	1	18	35	3	1	2 S	8	0	23	4	0	2
704006180	75470000		5537 8810	91	5400	05	6 9 6 U/UTOL	6 9 6 U/UTOL	0	1	1	1	1	1	1 R	S	2	1	1	1	1	1	18	35	3	1	2 S	8	0	23	4	0	2
707955830	75470000		5537 8810	91	5400	05	8 5 0 U/UTOL	8 5 0 U/UTOL	0	6	4	2	2	3	1 R	S	1	3	1	1	1	1	19	44	3	1	1 N	3	0	30	2	0	1
707955830	75470000		5537 8810	91	5400	05	8 5 0 U/UTOL	8 5 0 U/UTOL	0	6	4	2	2	3	1 R	S	1	3	1	1	1	1	19	44	3	1	1 N	3	0	30	2	0	1
707955830	75470000		5537 8810	91	5400	05	8 5 0 U/UTOL	8 5 0 U/UTOL	0	6	4	2	2	3	1 R	S	1	3	1	1	1	1	19	44	3	1	1 N	3	0	30	2	0	1
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707955830	75470000		5537 8810	91	5400	05	8 5 0 U/UTOL	8 5 0 U/UTOL	0	6	4	2	2	3	1 R	S	1	3	1	1	1	1	19	44	3	1	1 N	3	0	30	2	0	1
707955830	75470000		5537 8810	91	5400	05	8 5 0 U/UTOL	8 5 0 U/UTOL	0	6	4	2	2	3	1 R	S	1	3	1	1	1	1	19	44	3	1	1 N	3	0	30	2	0	1
707955830	75470000		5537 8810	91	5400	05	8 5 0 U/UTOL	8 5 0 U/UTOL	0	6	4	2	2	3	1 R	S	1	3	1	1	1	1	19	44	3	1	1 N	3	0	30	2	0	1
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707955830	75470000		5537 8810	91	5400	05	8 5 0 U/UTOL	8 5 0 U/UTOL	0	6	4	2	2	3	1 R	S	1	3	1	1	1	1	19	44	3	1	1 N	3	0	30	2	0	1
707955830	75470000		5537 8810	91	5400	05	8 5 0 U/UTOL	8 5 0 U/UTOL	0																								





VEHICLE TYPE		VEHICLE USE		TRAILER TYPE		RESIDENCE (Driver/Ped.)		PHYSICAL DEFECTS		ALCOHOL/DRUG USE		LOCATION					
01 Automobile 02 Van 03 Light Truck / P.U. - 2 or 4 rear tires 04 Medium Truck - 4 rear tires 05 Heavy Truck - 2 or more rear axles 06 Truck Tractor (Cab-Boat/ail) 07 Motor Home (RV) 08 Bus / driver , seats for 9-15) 09 Bus / driver + seats for over 15) 10 Bicycle 11 Motorcycle 12 Moped 13 All Terrain Vehicle 14 Train 15 Low Speed Vehicle 77 Other		01 Private Transportation 02 Commercial Passenger 03 Commercial Cargo 04 Public Transportation 05 Public School Bus 06 Private School Bus 07 Ambulance 08 Law Enforcement 09 Fire/Rescue 10 Military 11 Other Government 12 Dump 13 Concrete Mixer 14 Garbage or Refuse 15 Cargo Van 77 Other		01 Single Semi Trailer 02 Tandem Semi Trailer 03 Tank Trailer 04 Saddle Mount / Flatbed 05 Boat Trailer 06 Utility Trailer 07 Horse Trailer 08 Pole Trailer 09 Towed Vehicle 10 Auto Transport 77 Other		1 County of Crash 2 Elsewhere in State 3 Non-Resident Out of State 4 Foreign 5 Unknown DL TYPE 1 A 2 B 3 C 4 D / Chauffeur 5 E / Operator 6 E / Oper- Rest 7 None REQUIRED ENDORSEMENTS 1 Yes 2 No 3 No Endorsement Required		1 No Defects Known 2 Eysight Defect 3 Fatigue / Asleep 4 Hearing Defect 5 Illness 6 Seizure, Epilepsy, Blackout 7 Other/Physical Defect INJURY SEVERITY 1 None 2 Possible 3 Non-incapacitating 4 Incapacitating 5 Fatal (Within 30 Days) 6 Non-Traffic Fatality 7 Eye Protection		1 Not Drinking or Using Drugs 2 Alcohol - Under Influence 3 Drugs - Under Influence 4 Alcohol & Drugs - Under Influence 5 Had Been Drinking 6 Pending ALC/DRUG Test Results SAFETY EQUIPMENT IN USE 1 Not in use 2 Seat Belt/Shoulder Harness 3 Child Restraint 4 Air Bag - Deployed 5 Air Bag - Not Deployed 6 Safety Helmet 7 Eye Protection		1 Front Left 2 Front Center 3 Front Right 4 Rear Left 5 Rear Center 6 Rear Right 7 In Body Of Truck 8 Bus Passenger 9 Other EJECTED 1 No 2 Yes 3 Partial					
CONTRIBUTING CAUSES - DRIVER/PEDESTRIAN		VEHICLE DEFECT		VEHICLE MOVEMENT		VEHICLE SPECIAL FUNCTIONS		VEHICLE MOVEMENT		VEHICLE SPECIAL FUNCTIONS		VEHICLE MOVEMENT					
01 No Improper Driving / Action 02 Careless Driving (Explain In Narrative) 03 Failed To Yield Right-of-way 04 Improper Backing 05 Improper Lane Change 06 Improper Turn 07 Alcohol - Under Influence 08 Drugs - Under Influence 09 Alcohol & Drugs - Under Influence 10 Followed Too Closely 11 Disregarded Traffic Signal 12 Exceeded State Speed Limit 13 Drugged State Speed Limit 14 Failed To Maintain Equip. / Vehicle 15 Improper Passing 16 Drove Left of Center 17 Exceeded Stated Speed Limit 18 Obstructing Traffic		01 No Defects 02 Def. Brakes 03 Worn/Smooth Tires 04 Defective/Improper Lights 05 Punctures/Blowout 06 Steering Mech. 07 Windshield Wipes 08 Equipment/ Vehicle Defect POINT OF COLLISION 01 On Road 02 Not On Road 03 Shoulder 04 Median 05 Turn Lane WORK AREA 01 None 02 Neatly 03 Entered		01 Straight Ahead 02 Slowing/Stopped/Stalled 03 Making Left Turn 04 Backing 05 Making Right Turn 06 Changing Lanes 07 Entering/Leaving/Parking Space 08 Properly Parked 09 Improperly Parked 10 Making U-Turn		1 None 2 Ram 3 Police Pursuit 4 Recreational 5 Emergency Operation 6 Construction / Maintenance SOURCE OF CARRIER INFORMATION 1 Not Applicable 2 Shipping Papers 3 Vehicle Side 4 Driver 5 Other		01 Straight Ahead 02 Slowing/Stopped/Stalled 03 Making Left Turn 04 Backing 05 Making Right Turn 06 Changing Lanes 07 Entering/Leaving/Parking Space 08 Properly Parked 09 Improperly Parked 10 Making U-Turn		1 None 2 Ram 3 Police Pursuit 4 Recreational 5 Emergency Operation 6 Construction / Maintenance SOURCE OF CARRIER INFORMATION 1 Not Applicable 2 Shipping Papers 3 Vehicle Side 4 Driver 5 Other		01 Crossing Not at Intersection 02 Crossing at Mid-Block/Crosswalk 03 Crossing at Intersection 04 Walking Along Road Against Traffic 05 Walking Along Road Against Traffic 06 Working on Vehicle in Road 07 Working In Road 08 Standing/Playing In Road 09 Stopping Pedestrian/Island 77 All Other (Explain In Narrative)		1 Primarily Business 2 Primarily Residential 3 Open County		01 Interstate 02 Slowing/Stopped/Stalled 03 State 04 County 05 Local 06 T-Complex/Tall In Narrative) ROAD SYSTEM IDENTIFIER 01 Interstate 02 Slowing/Stopped/Stalled 03 State 04 County 05 Local 06 T-Complex/Tall In Narrative) ROAD SURFACE CONDITION 01 Dry 02 Wet 03 Slippery 04 Ice 77 All Other (Explain In Narrative) WEATHER 01 Clear 02 Cloudy 03 Rain 04 Fog 77 All Other (Explain In Narrative) ROAD SURFACE TYPE 01 Slag/Gravel/Stone 02 Blacktop 03 Brick/Block 04 Concrete 05 Dirt 77 All Other (Explain In Narrative)	
FIRST / SUBSEQUENT HARMFUL EVENTS		ROAD SYSTEM IDENTIFIER		LIGHTING CONDITION		ROAD SURFACE CONDITION		ROAD SURFACE TYPE		TRAFFIC CONTROL		VISION OBSTRUCTED					
01 Collision With MV / In T transport (Rear End) 02 Collision With MV / In T transport (Head On) 03 Collision With MV / In T transport (Angle ) 04 Collision With MV / In T transport (Left Turn) 05 Collision With MV / In T transport (Right Turn) 06 Collision With MV / In T transport (Sideswipe) 07 Collision With MV / In T transport (Backed Into) 08 Collision With Parked Car 09 Collision With MV on Roadway 10 Collision With Pedestrian 11 Collision With Bicycle 12 Collision With Bicycle (Bike Lane) 13 Collision With Moped 14 Collision With Van		29 MV Ran Into Ditch/Culvert 30 Ran Off Road Into Water 31 Overturned 32 Occupant Fell From Vehicle 33 Tractor Trailer Jackknifed 34 Fire 35 Explosion 36 Downhill Runaway 37 Cargo Loss or Shift 38 Separation of Units 39 Median Crossover 77 All Other (Explain In Narrative)		01 Day Light 02 Dusk 03 Dawn 04 Dark (Street Light) 05 Dark (No Street Light) 06 Unknown		01 Clear 02 Cloudy 03 Rain 04 Fog 77 All Other (Explain In Narrative)		01 Slag/Gravel/Stone 02 Blacktop 03 Brick/Block 04 Concrete 05 Dirt 77 All Other (Explain In Narrative)		01 No Control 02 Special Speed Zone 03 Speed Control Sign 04 School Zone 05 Traffic Signal 06 Stop Sign 07 Yield Sign 08 Flashing Light 09 Railroad Signal 10 Officer / Guard / Flag Person		01 Vision Not Observed 02 Inclement Weather 03 Parked / Stopped Vehicle 04 Trees / Crops / Bushes 05 Load On Vehicle 06 Building / Fixed Object 07 Signs / Billboard 08 Fog 09 Smoke 77 All Other (Explain In Narrative)		01 Not At Intersection / RR X-ing / Bridge 02 At Intersection 03 Influenced By Intersection 04 Driveway Access 05 Railroad 06 Bridge 11 Private Property 12 Toll Booth 13 Public Bus Stop Zone 08 Exit Ramp 09 Parking Lot - Public 10 Parking Lot - Private		01 Straight - Level 02 Straight - Upgrade / Downgrade 03 Curve - Level 04 Curve - Upgrade / Downgrade TYPE SHOULDER 01 Paved 02 Unpaved 03 Curb	

# Benefit/Cost Ratio Report

**File Name:** RSAP.rpd  
**Project Description:** Turnpike Orange County - Shoulder Widths

<u>Alternative</u>	<u>Description</u>
1	Existing Conditions - Guardrail against piers
2	Install TL-5 Barrier

## Alternative

<u>Alternative</u>	<u>1</u>	<u>2</u>
1	0.00	0.57
2	0.00	0.00

Date: January 31, 2007

Time: 17:15:28PM

# Alternative Cost Report

Page: 2

**File Name:** RSAP.rpd  
**Project Description:** Turnpike Orange County - Shoulder Widths

<u>Alternative</u>	<u>Description</u>	<u>Annual Crash Cost (\$)</u>	<u>Annual Installation Cost (\$)</u>	<u>Annual Maintenance Cost (\$)</u>	<u>Annual Repair Cost (\$)</u>
1	Existing Conditions - Guardrail against piers	4412.18	0.00	100.00	0.00
2	Install TL-5 Barrier	2418.76	2560.48	1000.00	39.42



# Feature Cost Report

**File Name:** RSAP.rpd  
**Project Description:** Turnpike Orange County - Shoulder Widths

**Alternative:** 1  
**Description:** Existing Conditions - Guardrail against piers

<u>Feature</u>	<u>Distance From Beginning Of First Segment</u>	<u>Expected Crash Freq (Acc/Year)</u>	<u>Average Severity</u>	<u>Annual Crash Cost (\$)</u>	<u>Category</u>	<u>Type</u>
1.1	0.0	0.589308	6.23	4412.18	Fixed Objects	Round, 1.0 m (3 ft) Dia.

# Feature Cost Report

**File Name:** RSAP.rpd  
**Project Description:** Turnpike Orange County - Shoulder Widths

**Alternative:** 2  
**Description:** Install TL-5 Barrier

<b>Distance From Beginning Of</b>	<b>Expected</b>	<b>Annual Crash</b>	<b>Type</b>
<b>Feature</b>	<b>First Segment</b>	<b>Cost (\$)</b>	<b>TL-5 Bridge Rail</b>
1.1	0.0	2418.76	Longitudinal Barriers
	<b>Freq (Acc/Year)</b>	<b>Average Severity</b>	
	0.516243	4.47	

Date: January 31, 2007

Time: 17:15:28PM

# Input Data Report

Page: 5

**File Name:** RSAP.rpd  
**Project Description:** Turnpike Orange County - Shoulder Widths

**Alternative** 1[Baseline(Existing)Condition]

<b>Description</b>	Existing Conditions - Guardrail against piers
<b>Life(years)</b>	25
<b>Total Installation Cost (\$)</b>	0.00
<b>Annual Maintenance Cost (\$)</b>	100.00
<b>Discount Rate</b>	4.00
<b>Area Type</b>	Rural
<b>Functional Class</b>	Freeway
<b>Highway Type</b>	Two-Way, Divided
<b>Number of Lanes</b>	4
<b>Lane Width(ft)</b>	12.0
<b>Right Shoulder Width(ft)</b>	9.7
<b>Left Shoulder Width(ft)</b>	8.0
<b>Speed Limit(mph)</b>	70.0
<b>Nominal Percent Truck(%)</b>	15.0
<b>ADT</b>	62800
<b>Traffic Growth Factor(%)</b>	5.0
<b>Encroachment Rate Adjustment Factor</b>	1
<b>Random Seed Number</b>	58240000 (Auto Generated)

<u>Segment</u>	<u>Length(ft)</u>	<u>Median Width(ft)</u>	<u>Percent Grade(%)</u>	<u>Curvature Direction</u>	<u>Curvature Radius(ft)</u>
1	100.0	40.0	0.0	None	

# Input Data Report

**File Name:** RSAP.rpd  
**Project Description:** Turnpike Orange County - Shoulder Widths

**Alternative** 1 [Baseline(Existing) Conditions]

<u>Feature</u>	<u>Category</u>	<u>Type</u>
1	Fixed Objects	Round, 1.0 m (3 ft) Dia.

# Input Data Report

**File Name:** RSAP.rpd  
**Project Description:** Turnpike Orange County - Shoulder Widths

**Alternative** 1 [Baseline(Existing) Conditions]

<u>Feature</u>	<u>Length(ft)</u>	<u>Width(ft)</u>	<u>Flare Rate</u>	<u>Location</u>	<u>Offset(ft)</u>	<u>Distance(ft)</u>	<u>Repetitions</u>	<u>Spacing(ft)</u>
1	100.0	3.0	0.000	Right	10.0	0.0		

Date: January 31, 2007

Time: 17:15:30PM

# Input Data Report

Page: 8

**File Name:** RSAP.rpd  
**Project Description:** Turnpike Orange County - Shoulder Widths

**Alternative** 2

**Description** Install TL-5 Barrier  
**Life(years)** 25  
**Total Installation Cost (\$)** 40000.00  
**Annual Maintenance Cost (\$)** 1000.00  
**Discount Rate** 4.00  
**Area Type** Rural  
**Functional Class** Freeway  
**Highway Type** Two-Way, Divided  
**Number of Lanes** 4  
**Lane Width(ft)** 12.0  
**Right Shoulder Width(ft)** 8.5  
**Left Shoulder Width(ft)** 8.0  
**Speed Limit(mph)** 70.0  
**Nominal Percent Truck(%)** 15.0  
**ADT** 62800  
**Traffic Growth Factor(%)** 5.0  
**Encroachment Rate Adjustment Factor** 1  
**Random Seed Number** 58240000 (Auto Generated)

<u>Segment</u>	<u>Length(ft)</u>	<u>Median Width(ft)</u>	<u>Percent Grade(%)</u>	<u>Curvature Direction</u>	<u>Curvature Radius(ft)</u>
1	100.0	40.0	0.0	None	

# Input Data Report

**File Name:** RSAP.rpd  
**Project Description:** Turnpike Orange County - Shoulder Widths

**Alternative** 2

<u>Feature</u>	<u>Category</u>	<u>Type</u>
1	Longitudinal Barriers	TL-5 Bridge Rail

# Input Data Report

**File Name:** RSAP.rpd  
**Project Description:** Turnpike Orange County - Shoulder Widths

**Alternative** 2

<u>Feature</u>	<u>Length(ft)</u>	<u>Width(ft)</u>	<u>Flare Rate</u>	<u>Location</u>	<u>Offset(ft)</u>	<u>Distance(ft)</u>	<u>Repetitions</u>	<u>Spacing(ft)</u>
1	100.0	2.0	0.000	Right	8.5	0.0		



# Benefit/Cost Ratio Report

**File Name:** RSAP2.rpd  
**Project Description:** Turnpike Orange County - Shoulder Widths

<u>Alternative</u>	<u>Description</u>
1	Existing Conditions - Guardrail against piers
2	Replace Bridge - Accomodate proper shoulder widths

## Alternative

<u>Alternative</u>	<u>1</u>	<u>2</u>
1	0.00	0.04
2	0.00	0.00

Date: February 09, 2007

Time: 14:14:36PM

# Alternative Cost Report

Page: 2

**File Name:** RSAP2.rpd  
**Project Description:** Turnpike Orange County - Shoulder Widths

<u>Alternative</u>	<u>Description</u>	<u>Annual Crash Cost (\$)</u>	<u>Annual Installation Cost (\$)</u>	<u>Annual Maintenance Cost (\$)</u>	<u>Annual Repair Cost (\$)</u>
1	Existing Conditions - Guardrail against piers	4449.21	0.00	100.00	0.00
2	Replace Bridge - Accomodate proper shoulder widths	2347.28	51209.57	1000.00	38.58

# Feature Cost Report

**File Name:** RSAP2.rpd  
**Project Description:** Turnpike Orange County - Shoulder Widths

**Alternative:** 1  
**Description:** Existing Conditions - Guardrail against piers

<u>Feature</u>	<u>Distance From Beginning Of First Segment</u>	<u>Expected Crash Freq (Acc/Year)</u>	<u>Average Severity</u>	<u>Annual Crash Cost (\$)</u>	<u>Category</u>	<u>Type</u>
1.1	0.0	0.589741	6.18	4449.21	Fixed Objects	Round, 1.0 m (3 ft) Dia.

# Feature Cost Report

File Name: RSAP2.rpd

Project Description: Turnpike Orange County - Shoulder Widths

Alternative: 2 Replace Bridge - Accomodate proper shoulder widths

Distance From Beginning Of First Segment	Expected Crash Freq (Acc/Year)	Average Severity	Annual Crash Cost (\$)	Category	Type
0.0	0.516576	4.41	2347.28	Longitudinal Barriers	TL-5 Bridge Rail

Date: February 09, 2007

Time: 14:14:36PM

# Input Data Report

Page: 5

**File Name:** RSAP2.rpd  
**Project Description:** Turnpike Orange County - Shoulder Widths

**Alternavtive** 1[Baseline(Existing)Condition]

<b>Description</b>	Existing Conditions - Guardrail against piers
<b>Life(years)</b>	25
<b>Total Installation Cost (\$)</b>	0.00
<b>Annual Maintenance Cost (\$)</b>	100.00
<b>Discount Rate</b>	4.00
<b>Area Type</b>	Rural
<b>Functional Class</b>	Freeway
<b>Highway Type</b>	Two-Way, Divided
<b>Number of Lanes</b>	4
<b>Lane Width(ft)</b>	12.0
<b>Right Shoulder Width(ft)</b>	9.7
<b>Left Shoulder Width(ft)</b>	8.0
<b>Speed Limit(mph)</b>	70.0
<b>Nominal Percent Truck(%)</b>	15.0
<b>ADT</b>	62800
<b>Traffic Growth Factor(%)</b>	5.0
<b>Encroachment Rate Adjustment Factor</b>	1
<b>Random Seed Number</b>	24999000 (Auto Generated)

<u>Segment</u>	<u>Length(ft)</u>	<u>Median Width(ft)</u>	<u>Percent Grade(%)</u>	<u>Curvature Direction</u>	<u>Curvature Radius(ft)</u>
1	100.0	40.0	0.0	None	

# Input Data Report

**File Name:** RSAP2.rpd  
**Project Description:** Turnpike Orange County - Shoulder Widths

**Alternative** 1 [Baseline(Existing) Conditions]

<u>Feature</u>	<u>Category</u>	<u>Type</u>
1	Fixed Objects	Round, 1.0 m (3 ft) Dia.

# Input Data Report

**File Name:** RSAP2.rpd  
**Project Description:** Turnpike Orange County - Shoulder Widths

**Alternative** 1 [Baseline(Existing) Conditions]

<u>Feature</u>	<u>Length(ft)</u>	<u>Width(ft)</u>	<u>Flare Rate</u>	<u>Location</u>	<u>Offset(ft)</u>	<u>Distance(ft)</u>	<u>Repetitions</u>	<u>Spacing(ft)</u>
1	100.0	3.0	0.000	Right	10.0	0.0		

Date: February 09, 2007

Time: 14:14:36PM

# Input Data Report

Page: 8

**File Name:** RSAP2.rpd  
**Project Description:** Turnpike Orange County - Shoulder Widths

**Alternative** 2

**Description** Replace Bridge - Accomodate proper shoulder widths  
**Life(years)** 25  
**Total Installation Cost (\$)** 800000.00  
**Annual Maintenance Cost (\$)** 1000.00  
**Discount Rate** 4.00  
**Area Type** Rural  
**Functional Class** Freeway  
**Highway Type** Two-Way, Divided  
**Number of Lanes** 4  
**Lane Width(ft)** 12.0  
**Right Shoulder Width(ft)** 10.0  
**Left Shoulder Width(ft)** 8.0  
**Speed Limit(mph)** 70.0  
**Nominal Percent Truck(%)** 15.0  
**ADT** 62800  
**Traffic Growth Factor(%)** 5.0  
**Encroachment Rate Adjustment Factor** 1  
**Random Seed Number** 24999000 (Auto Generated)

<u>Segment</u>	<u>Length(ft)</u>	<u>Median Width(ft)</u>	<u>Percent Grade(%)</u>	<u>Curvature Direction</u>	<u>Curvature Radius(ft)</u>
1	100.0	40.0	0.0	None	



# Input Data Report

**File Name:** RSAP2.rpd  
**Project Description:** Turnpike Orange County - Shoulder Widths

**Alternative** 2

<u>Feature</u>	<u>Category</u>	<u>Type</u>
1	Longitudinal Barriers	TL-5 Bridge Rail

# Input Data Report

**File Name:** RSAP2.rpd  
**Project Description:** Turnpike Orange County - Shoulder Widths

**Alternative**      2

<u>Feature</u>	<u>Length(ft)</u>	<u>Width(ft)</u>	<u>Flare Rate</u>	<u>Location</u>	<u>Offset(ft)</u>	<u>Distance(ft)</u>	<u>Repetitions</u>	<u>Spacing(ft)</u>
1	100.0	2.0	0.000	Right	8.5	0.0		