LOCAL CONCEPT DEVELOPMENT

Burns Avenue Roadway Improvements/Widening

South City of Vineland, Cumberland County, NJ

South Jersey Transportation Planning Organization

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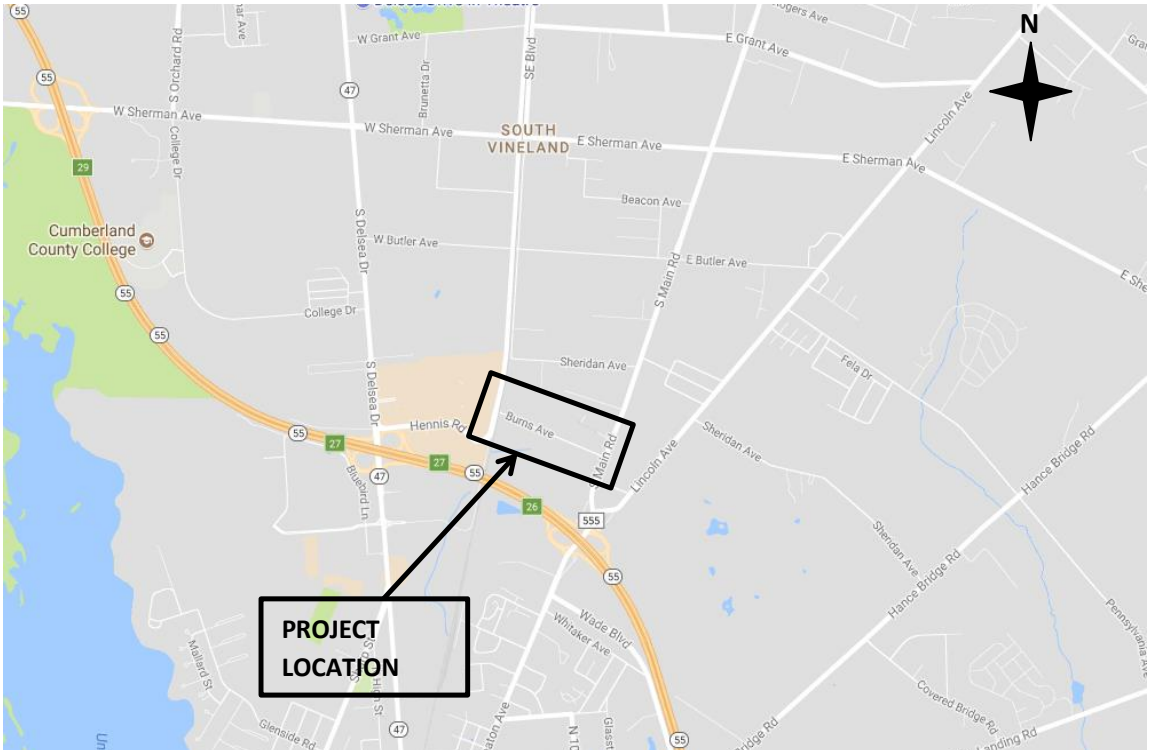
I. INTRODUCTION

The Local Concept Development Study for improvements along Burns Avenue was initiated by South Jersey Transportation Planning Organization (SJTPO). Burns Avenue is a 2,500' long municipal roadway in the City of Vineland that connects South Main Road (CR 555) to Southwest Boulevard. Burns Avenue is underutilized due to its lack of shoulders and poor turning radii at intersections. The City of Vineland is interested in widening this roadway and implementing other enhancements to improve safety, drainage, freight accessibility, and to provide another connection to the commercial center in southern Vineland. The project location map is shown in **Figure 1**.

SJTPO retained the services of IH Engineers, P.C. to provide support for the Local Concept Development, data collection, right-of-way analysis, cost estimates, environmental assessment, and related tasks necessary to advance the improvements to Burns Avenue.

FIGURE 1 – PROJECT LOCATION MAP



A. Background

NJDOT's Straight Line Diagram (SLD) classifies Burns Avenue as an "Urban Major Collector". The SLD indicates the speed limit is 25 mph on the eastern half of the roadway and 35 mph for the western half of the roadway. The intersection of Burns Avenue and

Southwest Boulevard is under the jurisdiction of the City of Vineland while the intersection of Burns Avenue and South Main Road is under county jurisdiction. (See Straight Line Diagram - *Appendix 'E'*).

The roadway provides one travel lane in each direction with no shoulders, including a single approach lane to the intersections. The westbound Burns Avenue approach to Southwest Boulevard is controlled by a stop sign. The intersection of Burns Avenue and Main Road (CR 555) is controlled by a three-phase, semi-actuated traffic signal, which also controls a commercial driveway opposite Burns Avenue. This signal is owned and maintained by Cumberland County.

Southern Railroad of New Jersey (SRNJ) tracks are also present, parallel to and approximately 40'east of Southwest Boulevard, with an at-grade rail crossing on Burns Avenue. A stop bar is striped across westbound Burns Avenue approximately 20'east the tracks. Roadside development along the length of Burns Avenue includes three commercial uses (Riggins Oil, Joffe Millwork & Supply, and Vertol Custom Machining) and eight residential structures. Several large undeveloped and/or vacant parcels are also located along the route.

B. Data Reviewed

During the data collection phase of this project, various sources were consulted to obtain the information on the existing conditions within the study area. These sources include:

1. Burns Avenue Sanitary Sewer Extension (Contract no. 14) As-Built plans from Landis Sewerage Authority Cumberland County.
2. Accident data Reports provided by Vineland Police Department
3. NJDOT Roadway Information and Traffic Monitoring System Program, Interactive Traffic Count Reports
4. New Jersey State Transparency Center, Tax Records

This information was evaluated to determine areas of non-conformance with current design standards and to form the base data for use in the development of alternatives. In addition to this information, numerous field visits were conducted to ascertain and document existing conditions. Photos are included in *Appendix 'D'*.

C. Design Standards

The following design standards were utilized in the analysis of the existing conditions, identification of deficiencies within the project area and the development of alternatives for this project.

- AASHTO - A Policy on Geometric Design of Highways and Streets, 2011
- NJDOT - Design Manual – Roadway
- NJDOT - Specifications for Road and Bridge Construction
- NJDOT - Construction Cost Estimating Guide & Average Bid Price Reports

D. Characteristics of the Roadways and Surrounding Area

Based on the As-Built Plans and RFP, the Burns Avenue right-of-way (ROW) is 33' wide, with a pavement width of 24'. The posted speed limit is 35 mph based on signs present on the westerly half of the corridor; however, the NJDOT Straight Line Diagram indicates the regulatory speed is 25 mph for the easterly portion. A 7-day ATR count conducted by IH for this project indicates that the Average Daily Traffic (ADT) volume on the corridor is ±5,400 vehicles per day (vpd) on weekdays, and ±5,080 vpd on weekend days. Additional detail on traffic volume data collection is presented in Part IV of this report, "Traffic Data Collection & Analysis".

II. PURPOSE AND NEED

The City of Vineland has expressed interest in widening this roadway and implementing other enhancements to improve safety, drainage, freight accessibility, attract motorists and to provide another connection to the commercial center in southern Vineland.

A. Need

Burns Avenue is largely underutilized due to its lack of shoulders, poor pavement condition and poor turning radii for truck movements at the intersections with South Main Road to the east and Southwest Boulevard to the west.

B. Goals and Objectives

1. Based on information provided and field visits by IH Engineers, the roadway requires widening to provide 12' lanes and 6' shoulders and the existing pavement needs to be milled and paved.
2. While shoulders will provide Bicycle Compatibility, a sidewalk is required to provide pedestrians safe passage along the corridor.
3. Cross slopes will be improved to provide positive storm water removal from the roadway eliminating ponding issues.

FIGURE 2 – INTERSECTION OF BURNS AVENUE & SW BLVD

III. EXISTING INVENTORY AND CONDITION

A. Data Collection

During the data collection phase, specific data sources for information on existing conditions within the project area were obtained (see Table 1) including the Sanitary Sewer Construction Plan As-Built provided by SJTPO. IH performed the traffic counts at key locations during this project. The data sources were used to develop project base mapping, evaluate existing conditions, identify existing deficiencies, and develop conceptual alternatives addressing project needs.

Table 1: Data Sources

DATA	SOURCE	YEAR
Sanitary Sewer Construction Plans	SJTPO	2013
Traffic Counts	IH Engineers	2017
Crash Data	Vineland PD/SJTPO	2014-2016
Aerial Photography	NJGIN Orthphotography	2012
Parcel Data	Tax Map City of Vineland	2002
Environmental Data	NJ-GeoWeb	

B. Existing Roadway Inventory and Condition

Burns Avenue is a 2,500' long municipal roadway in the City of Vineland that connects South Main Road (CR 555) to Southwest Boulevard with limited curbing at the intersections.

Burns Avenue is a two lane, Urban Major Collector within the project limits. The pavement width is 24' with no shoulders.

Review of the drawings provided by client indicates that the existing vertical grade on Burns Avenue is varies from 0% to 1.6%. This indicates that the stormwater drainage disposal is poor.

Table 2 lists the roadway classifications within the study area along with the posted speed limit, while **Table 3** describes roadway cross-section data. The NJDOT Straight Line Diagrams for all the roadways are included in *Appendix E.*

There is no guiderail within the project limits.

Table 2: Roadway Classifications

Roadway	Jurisdiction	Roadway Classification	Posted Speed
South Main Road (CR 555)	County	Urban Minor Arterial	45 MPH
Southwest Boulevard	Vineland	Urban Major Collector	25 MPH
Burns Avenue	Vineland	Urban Major Collector	25/35 MPH

Table 3: Roadway Cross-sections

Roadway	Travel Lanes	Lane Width (ft)	Shoulder Width (ft)	Pavement Width (ft)	Right of Way (ft)	Cross Slope (%)
South Main Road (CR 555)	2	12	10	48	66	
Southwest Boulevard	2	12	6	36	75	
Burns Avenue	2	12	0	24	33	

Controlling Substandard Design Elements on Burns Avenue within the project limits include Substandard Shoulder Width.

C. Existing Utilities and Right-of-Way

The As-Built Plans for this project shows the existing underground as well as above ground utilities. The underground utilities include sanitary sewer and water supply. The utility poles are located on the south side of Burns Avenue from Southwest Boulevard for about 1,150' where it crosses over to the north side through South Main Road. The pole line is located within a few feet of the edge of the pavement and carries electrical, telephone and cable and.

The following are the utility owners/companies within/around the project location.

Facility	Utility Company
Telephone	Jersey Bell-Atlantic
Gas	South Jersey Gas
Water	City of Vineland
Cable	Suburban Cable
Sanitary Sewer	The Landis Sewerage Authority
Electrical	Vinland Municipal Electric Distribution Division
Cable	CONECTIV

Utility correspondence can be found in *Appendix 'K'*.

D. Hydraulics and Drainage

Burns Avenue is a normal crowned roadway section with no curbs; accordingly, water drains into the roadside area in both directions. There are no inlets on the roadway. Roadside ponding can be an issue following major rain events, particularly near the driveways to the properties as well as at the intersections.

There is a 15" CMP/RCP culvert carrying stormwater from the north side of the roadway to the south side. Using the StreamStats (USGS), the area contributing to this culvert is 0.78 square miles having 100 year peak flood of 157 CFS.

E. As-Built Plans, Right of Way Maps and Jurisdiction Map

Sanitary Sewer Construction Plans dated July 2013 were provided (AutoCAD) for use in the Burns Avenue Alternative Development.

F. Environmental Inventory

This project included an initial exploration of environmental impacts under the national Environmental Policy Act (NEPA). The environmental inventory consisted of online research and documentation of ecological resources. Findings are documented below by category:

1. **Noise and Air Quality**
   There are residences and businesses within project area; however, due to the nature of the project, no significant impacts are anticipated.

2. **Section 4(f) Properties**
   Per the NJDEP Green Acres Recreation and Open Space Inventory (ROSI), there are no Green Acres within or in close proximity (i.e. within 500 feet) of the project study area.

3. **Wetlands**
   Although National Wetlands Inventory maps show wetlands in project area, our field visit did not encounter wetlands in project area.

4. **Sole Source Aquifer**
   Project area lies within NJ Coastal Plain Sole Source Aquifer; EPA confirmed project satisfies requirements of Section 1424(e) of the SDWA.

5. **Threatened/Endangered Species**
   IPac revealed Northern long-eared bat and Swamp pink may be in project area, however the project is not expected to impact the habitat of either species. No adverse impact to these species is anticipated due to the nature of this project.

6. **Vernal Pools**
   Natural Heritage Program and NJGeoWeb maps potential vernal pool habitat in project area, however, vernal pool habitat not encountered in project area during field visit.

7. **Stormwater**
   If greater than 0.25 acre new impervious surface added or if more than 1.0 acre of land disturbance results from project, then NJDEP Stormwater Management is applicable.

8. **Hazardous Waste**
   Known Contaminated Sites include: Riggins Oil, Inc. located toward eastern end of Burns Avenue - Block 7110, Lot 36, owned by Clayville Switch Petroleum, LLC. UST site located on Block 7110, Lot 39 - Joffe Lumber and Supply Co.

9. **Anticipated Environmental Permits or Approvals**
   NJDEP FWW General Permit No. 10 likely required for work proposed in the two (2) drainage ditches located in project area (One ditch located along east side of Conrail

Railroad along Southwest Boulevard and the other located east of Joffe Lumber Yard (Block 7110, Lot 39). The ditches anticipated to be considered State Open Waters.

10. Cultural Resources

The Reconnaissance-level historic architectural survey identified 12 resources more than 50 years in age within the APE for Historic Architecture (APE-Architecture). Of these, one resource was previously identified as being eligible for listing on the National Register of Historic Places (NRHP): the Millville and Glassboro Railroad Historic District (SHPO Opinion: 1/4/2002). The remaining 11 resources are previously undocumented historic architectural resources more than 50 years in age and consist primarily of early to mid-twentieth-century dwellings. None of the previously undocumented resources were determined to possess the requisite significance or integrity to justify further investigation at the intensive level. No further historic architectural survey is recommended. The project as proposed will not constitute an adverse effect on the NRHP-eligible Millville and Glassboro Railroad Historic District (See *Appendix 'I'*).

IV. TRAFFIC DATA COLLECTION & ANALYSIS

This section of the report summarizes the traffic analysis conducted by IH as part of this Concept Development assignment, the results of that analysis, and the conclusions supported by this analysis from a traffic safety, capacity and accessibility standpoint.

A. Traffic Operation

Burns Avenue is a two-lane roadway classified as an Urban Major Collector per the 2015 NJDOT Straight Line Diagrams. Burns Avenue follows a generally east-west alignment through the study area, with a paved width varying from 20 feet, just east of Southwest Boulevard, to 26 feet just west of Main Road. The roadway provides one through travel lane in each direction. For much of the roadway's length, painted edge lines denote 1- to 2-foot wide shoulders. The westbound Burns Avenue approach to Southwest Boulevard is controlled by a stop sign; the Main Road intersection is signalized.

The only speed limit signs posted on Burns Avenue read "35 mph". The NJDOT Straight Line Diagram for the roadway indicates that the regulatory speed limit is 25 mph on the eastern half of the roadway; however, IH staff observed no such signs. Existing center line striping on the roadway indicates that passing is permitted in both directions, except for ±200 feet eastbound approaching Main Road, and ±530 feet westbound approaching Southwest Boulevard. The horizontal alignment of Burns Avenue is generally straight throughout its length. The vertical alignment includes a low point in the area of a culvert crossing approximately 560 feet east of Southwest Boulevard; however, no significant grades are present.

A single railroad track crosses Burns Avenue just east of its intersection with Southwest Boulevard, to which the track runs parallel. The at-grade crossing of Burns Avenue is controlled by crossbuck signs with pole-mounted flashing signals, including some signals oriented to face traffic approaching from Southwest Boulevard. However, no crossing gates are provided. A "RXR" pavement marking legend and circular warning sign is posted on the westbound Burns Avenue approach. Warning signs advising of the side road railroad crossing are posted on both Southwest Boulevard approaches. The spacing

between the rail track and Southwest Boulevard is such that the westbound Burns Avenue stop bar is only separated from the rail by a distance of 15 feet.

Land uses along Burns Avenue include two large industrial sites. One is the Riggins Oil Company, on the northwest corner of the Main Road intersection. This site includes two driveways to Burns Avenue. One extends north from Burns Avenue ±150 feet west of Main Road, leading to a parking lot that typically serves primarily passenger vehicle traffic, although a small number of trucks were observed using this driveway. 275 feet further west is a second driveway serving a truck loading/storage yard. This driveway is controlled by a gate ±60 feet from the northerly Burns Avenue edge line, which was observed to be sufficient to allow trucks to stop and gain entry without interfering with Burns Avenue traffic lanes. This driveway serves Riggins Oil delivery trucks which include single-unit and articulated tractor-trailers.

The second large industrial use is the Joffe Lumber & Supply Company, located along the north side of Burns Avenue just east of the rail tracks. This site includes a large front parking lot for passenger vehicles, and a rear truck yard; all vehicular access to the site is by a pair of driveways ±300 feet to the east on Burns Avenue.
Aside from these two sites, other land uses along (or served by) Burns Avenue include a small commercial use opposite the Joffe site, and nine residential structures. A portion of the Burns Avenue frontage is vacant/undeveloped, including the easternmost ¼-mile length of the southerly Burns Avenue frontage.

Main Road (County Route 555) is a two-lane Cumberland County roadway classified as an Urban Minor Arterial, following a north-south alignment within the study area. The posted speed limit on Main Road is 45 mph. Main Road intersects Burns Avenue at its eastern terminus, at an intersection controlled by a traffic signal. A driveway to a small commercial strip mall extends east from Main Road opposite Burns Avenue, forming a fourth leg of this intersection. To the south, Main Road provides a full interchange with the NJ Route 55 expressway and then extends into Millville; to the north, Main Road skirts the eastern edge of the "downtown" Vineland area.

At the Burns Avenue intersection, Main Road widens to provide dedicated head-to-head left-turn lanes, with a shared through/right turn lane on each approach. The Burns Avenue and driveway approaches to this traffic signal each provide a single lane to serve all traffic movements. The signal provides a three-phase operation, with protected/permitted left turn green arrows on Main Road, and through traffic phases for Main Road and for Burns Avenue. Mast arm-mounted video camera detectors provide for traffic-actuated operation. Pedestrian signal heads with "hand"/"man" indications and countdown timer readouts are provided, with push buttons for pedestrian actuation. Concrete curb ramps for accessibility are provided; however, these are generally non-compliant with current ADA/MUTCD criteria including ramp slopes and geometry, landing areas/turning spaces, and spacing to push buttons. In addition, water ponding at the bases of curb ramps was observed during IH's field views.

Southwest Boulevard is a two-lane municipal roadway aligned in a north-south direction in the area of the Burns Avenue intersection. No speed limit signs were observed on Southwest Boulevard in the area of this intersection; the NJDOT Straight Line Diagram indicates the regulatory speed limit is 25 mph to the north of Burns Avenue. Further north, Southwest Boulevard extends directly into downtown Vineland. To the south, the

roadway curves to the west and becomes Hennis Road, which intersects Delsea Drive (NJ Route 47) just north of its full interchange with NJ Route 55.

As noted previously, within this area a rail track is located just to the east of Southwest Boulevard. Within the area of Burns Avenue, the roadway is bordered on the west by a large multi-building retail complex including the Cumberland Mall, numerous retail and restaurants. Southwest Boulevard SB traffic approaching Burns Avenue is provided with a channelized right-turn ramp into this complex just to the north of Burns Avenue. However, there is no direct access into or out of this retail site from Burns Avenue, which forms a T-intersection with Southwest Boulevard.

B. Traffic Data

In accordance with the Scope of Work for this assignment, IH staff collected both Automated Traffic Recorder (ATR) data on Burns Avenue, and manual turning movement count data at the study area intersections, as follows.

ATR Data

An ATR machine was placed by IH staff on Burns Avenue on Tuesday, November 14, 2017. In accordance with the scope of work, the machine was installed between the two Burns Avenue driveways, with the result that Riggins Oil trucks traveling between the truck access and Main Road would be included in the ATR count. This machine was left in place through Tuesday, November 21, 2017, providing 24 hours of data for the seven days beginning Wednesday, November 15. Data was therefore collected for five (5) complete weekdays, and two (2) complete weekend days. The average daily traffic volumes observed in each direction of travel on Burns Avenue are shown in Table 4:

Table 4. Summary of Automated Traffic Recorder Data, November 15-21, 2017

Direction of Travel	Average weekday ADT	Average weekend day ADT
Westbound (toward Southwest Blvd)	2,756 vpd	2,622 vpd
Eastbound (toward Main Road)	2,647 vpd	2,461 vpd
Total, two-way	5,403 vpd	5,083 vpd

The ATR data also included a classification of vehicle types, including passenger vehicles, light trucks, heavy trucks and buses. Table 5 summarizes the total classification of each of these vehicle types over the course of the 7-day count data collection period.

Table 5. Vehicle Classification by Direction, per ATR Data

Direction of Travel	Percent Composition by Vehicle Type			
	Passenger cars	Buses	Single unit trucks	Semitrailers
Westbound	93.1%	0.8%	5.8%	0.3%
Eastbound	94.0%	0.6%	4.8%	0.5%
Total, two-way	93.6%	0.7%	5.3%	0.4%

Copies of the hourly ATR data sheets are included in the Appendix to this report.

Manual Turning Movement Counts
IH staff conducted manual turning movement counts as follows:

Burns Avenue and Main Road (C.R. 555):
- 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. – Wednesday, November 15, 2017

Burns Avenue and Southwest Boulevard:
- 7:00 a.m. to 9:00 a.m.; 11:00 a.m. to 1:00 p.m.; and 2:00 p.m. to 6:00 p.m. – Thursday, November 16, 2017. Manual counts were conducted for eight (8) hours at this intersection for purposes of conducting a traffic signal warrant analysis.

Figure H-1 (*Appendix 'G'*) illustrates the existing weekday morning, midday and evening peak hour traffic volumes identified through these counts.

Existing Peak Hour Levels of Service
IH has used the "HCS2010" analysis module within the Synchro/SimTraffic (version 9) software application to evaluate the existing weekday morning and evening peak hour levels of service (LOS) at the intersections at each end of Burns Avenue. This analysis has assumed existing volume characteristics (volume, peak hour factor, heavy vehicle %) as observed during IH's data collection program, and intersection geometry and signal timings per the plans and timing directive forwarded to us by SJTPO. Based on this analysis, the existing peak hour LOS at these two intersections are as follows:

Table 6. Existing Weekday Peak Hour Levels of Service
Burns Avenue and Southwest Boulevard

Approach	Movement	Level of Service (delay, seconds)	
		Weekday Morning Peak Hour	Weekday Evening Peak Hour
Burns Ave WB	Left/ Right	B (11)	E (39)
SW Blvd SB	Left	A (8)	A (9)

Table 7. Existing Weekday Peak Hour Levels of Service
Burns Avenue and Main Road (C.R. 555)

Approach	Movement	Level of Service (delay, seconds)	
		Weekday Morning Peak Hour	Weekday Evening Peak Hour
Burns Ave EB	Left/Thru/Right	C (32)	D (44)
Driveway WB	Left/Thru/Right	C (29)	C (27)
Main Road NB	Left	A (7)	B (12)
	Through/Right	A (7)	A (8)
Main Road SB	Left	A (8)	A (10)
	Through/Right	B (11)	B (18)
Overall intersection		*B (11)*	*B (19)*

As shown, under existing conditions all traffic movements at the study area intersections operate at good levels of service during the weekday morning and weekday evening peak hours, with all movements operating at LOS 'C'/'c' or better, with two exceptions:

- During the weekday evening peak hour, the eastbound Burns Avenue approach to Main Road operates at level 'D'. This can be improved to level 'C' through adjustment of traffic signal timings.
- During the weekday evening peak hour, the westbound Burns Avenue approach to Southwest Boulevard operates at level 'e'.

C. Traffic Volume Forecasts

Projections of future traffic volume typically include two components: one is traffic increases due to general regional population and/or employment growth; and the other is traffic increases due to specific site developments and roadway network improvements. This study will evaluate future traffic operational conditions using ten-year projections of peak hour traffic volume, with a target year of 2027.

Based on available population figures and trends, including a table from New Jersey Department of Labor and Work Force Development, Cumberland County is forecast to experience a population growth of 2.3% from 2017 to 2027, for an average growth rate per year of 0.22%. A figure of Population Growth by County, 2012-2032 prepared by the New Jersey Division of Economic and Demographic Research shows total population growth within Cumberland County of 4.2% over this 20-year period, equating to an annual rate of approximately 0.12% per year. The New Jersey Department of Transportation also publishes annual growth rates for use in access permit applications. This suggests a 1% per year growth rate for this type of roadway (urban collector) in Cumberland County; however these rates are typically only applied for short-term growth, 1-3 years. Based on this information we believe an annual growth rate of 0.5% per year for 10 years is appropriate and may be slightly conservative.

IH understands that there are no major site developments anticipated within the area. Two possible future roadway improvements in the area include a potential new roadway extending east from Main Road opposite Burns Avenue and connecting to (or representing a realignment of) South Lincoln Avenue. The other is a potential westerly extension of Burns Avenue into the retail center, providing full access in and out as opposed to the existing southbound-only right turn entry provided. Based on coordination with SJTPO and the City of Vineland, there are no specific plans for the advancement of either roadway improvement. We note that the Burns Avenue extension into the retail center would only proceed if a traffic signal is installed at the Southwest Boulevard intersection, and as will be discussed later in this report, the intersection is not a candidate for signalization.

Therefore the future ten-year (Year 2027) peak hour traffic volumes to be considered in this study will include annual growth at 0.5% per year for 10 years, for a total increase of 5.1%. **Figure H-2** (Appendix 'H') illustrates these projected future peak hour traffic volumes. The following tables illustrate the projected future Year 2027 peak hour levels of service assuming no physical or operational improvements are made; i.e. future "no-build" conditions.

Table 8. Projected Future Year 2027 "No-Build" Weekday Peak Hour Levels of Service - Burns Avenue and Southwest Boulevard

Approach	Movement	Level of Service (delay, seconds)	
		Weekday Morning Peak Hour	Weekday Evening Peak Hour
Burns Ave WB	Left/Right	B (12)	F (52)
SW Blvd SB	Left	A (8)	A (9)

Table 9. Projected Future Year 2027 "No-Build" Weekday Peak Hour Levels of Service - Burns Avenue and Main Road (C.R. 555)

Approach	Movement	Level of Service (delay, seconds)	
		Weekday Morning Peak Hour	Weekday Evening Peak Hour
Burns Ave EB	Left/Thru/Right	C (32)	D (46)
Driveway WB	Left/Thru/Right	C (29)	C (27)
Main Road NB	Left	A (7)	B (14)
	Through/Right	A (7)	A (9)
Main Road SB	Left	A (8)	B (11)
	Through/Right	B (11)	B (20)
Overall intersection		*B (11)*	*C (21)*

As shown, the only significant LOS impact anticipated under Year 2027 no-build conditions is that the westbound Burns Avenue approach to Southwest Boulevard will operate at level 'f', compared with level 'e' under existing conditions. Evaluation of improvement alternatives in this report will review traffic signal warrants at this intersection, and whether the intersection will be a candidate for installation of a traffic signal, which could be expected to reduce delays on the Burns Avenue approach.

As with existing conditions, adjustment of the traffic signal timings at the Burns Avenue/Main Road intersection can improve the LOS 'D' condition to level 'C' without significant impacts to any other approaches.

D. Crash Data Analysis and Crash Diagram

SJTPO provided IH with copies of crash reports for the entire Burns Avenue corridor, covering the period from January, 2014 through December, 2016 (three years). 33 unique crash reports were forwarded for review. Based on evaluation of these reports, ten (10) were determined to have occurred outside the study area – most either to the north on Southwest Boulevard, or to the south on Main Road.

Therefore, the crash analysis for this project included 23 crashes, which were distributed along the corridor as follows:

- Southwest Boulevard intersection area and rail crossing: 4 crashes
- Burns Avenue, mid-block (away from endpoint intersections): 3 crashes
- Main Road intersection area including approaches: 16 crashes

At the Southwest Boulevard intersection, one of the crashes involved a hit/run vehicle leaving the roadway and striking several fixed objects. Another crash involved a truck stopped on the railroad tracks when the signals sounded; the truck driver reversed to move off the tracks and collided with the vehicle behind it. This was the only crash in which the rail crossing was a factor; it did not involve a vehicle being struck by a train.

The remaining two crashes at this intersection were right-angle crashes involving a westbound Burns Avenue vehicle colliding with a northbound Southwest Boulevard vehicle. Right-angle crashes are typically considered as part of a traffic signal warrant analysis, since a traffic signal can generally address this crash pattern. The MUTCD permits reduced minimum traffic volume criteria if five or more right-angle (or other correctable) crashes occurred within a 12-month period. Since the three-year crash history only included two such crashes, the crash experience will not be a factor in the signal warrant analysis.

The three "mid-block" crashes noted above all involved a vehicle leaving the roadway and striking a fixed object. In two of these, ice on the roadway was a contributing factor. In the third, a driver swerved to avoid an oncoming vehicle encroaching into the opposite travel lane.

At the Main Road intersection, the crash history included sixteen (16) crashes, which can be broken down as follows:

- Five crashes (31%) were same-direction, rear-end crashes on Main Road. This was the most prevalent crash type in this analysis; same-direction rear-end crashes are not uncommon near signalized intersections; however, they are more common at congested intersections (as noted previously, this intersection appears to operate at good levels of service).
- Four crashes (25%) were same-direction sideswipe crashes, three of which occurred on the southbound Main Road approach.
- Three crashes (19%) were right-angle crashes involving an eastbound Burns Avenue vehicle colliding with a southbound Main Road vehicle.
- Two crashes were head-on crashes involving a collision between northbound and southbound Main Road vehicles; one of these crashes involved injuries to three persons.
- The remaining two crashes included one left-turn crash, and one vehicle striking a fixed object on the north Main Road leg.

Given that these crashes all occurred over a three-year period, we do not believe that they are representative of any significant crash patterns. However, it appears that the "mid-block" crashes, which involved vehicle leaving the roadway and striking fixed objects, could potentially have been addressed if Burns Avenue provided a wider cartway (despite the weather involvement in two of these crashes).

Collision diagrams and copies of police crash reports are included in Appendix *'C'*.

E. Pedestrian & Bicycle Accommodations

The existing traffic signal at the intersection of Burns Avenue and Main Road (C.R. 555) provides pedestrian accessibility in the form of concrete curb cut ramps, with pedestrian

push buttons and pedestrian signal indications. The ramp system connects to a sidewalk extending south from the intersection area along the east side of Main Road.

Curb ramps on the west (Burns Avenue) side of Main Road do not connect to any sidewalk or other pedestrian circulation. No sidewalks are present along the entire length of Burns Avenue; in addition there are no crosswalks or curb cut ramps provided at the westerly project intersection, at Burns Avenue and Southwest Boulevard. Given the minimal shoulders on Burns Avenue, any pedestrians walking along the corridor must either do so outside the roadway, in the grass and/or gravel, or within a travel lane. During IH's field views as part of this project, no east-west pedestrian activity along Burns Avenue was observed.

The existing minimal shoulders along Burns Avenue are not bicycle-compatible based on AASHTO criteria.

V. EVALUATION OF CONCEPTUAL ALTERNATIVES

A. Design Criteria

As stated previously, Burns Avenue is an Urban Major Collector 2,500' long in the City of Vineland connecting South Main Road (CR 555) to Southwest Boulevard. The pavement width is 24' with no shoulders and the existing vertical grade varies from 0% to 1.6%. IH analyzed three alternatives of which all had to meet the following criteria:

1. The roadway will be designed with 2- 12' lanes and 2- 6' shoulders.
2. A 5' wide sidewalk will be added to one side of the roadway.
3. Curb ramps will be provided at the intersections of Southwest Boulevard and Main Road.
4. The vertical grade will be improved where practical to provide a minimum 0.5% longitudinal grade for positive drainage.
5. Cross slopes will be improved to a minimum grade of 1.5% on lanes and 4.0% on shoulders for positive drainage.

B. Conceptual Alternatives

As stated in the design criteria, all of the alternatives are very similar. Differences are in the right of way acquisitions, access and the utility relocations.

Alternate No. 1 – This alternative follows the exiting edge of pavement to the north from Main Road (station 125+00) to Station 113+00 at which point curves are introduced to shift the road so that it follows the southerly edge of pavement to Southwest Boulevard. The sidewalk has been added to the southerly side of the roadway to minimize impacts to the utility poles.

Advantages

1. Nine utility poles and two fire hydrants remained in place.
2. Ten driveways will need only minor adjustments to access.

Disadvantages

1. Nine utility poles and two fire hydrants will need to be relocated.
2. Six driveways will require modification to access.

3. Sixteen parcels will be required Totaling 1.487 acres.

The Construction Cost for this alternative is estimated to be **$1,433,632.00**.

Alternate No. 2 – This alternative follows the exiting edge of pavement to the north over the entire length of the roadway. The sidewalk has been added to the northerly side of the roadway to minimize impacts to the utility poles.

Advantages

1. Four utility poles and one fire hydrants remained in place.
2. Nine driveways will need only minor adjustments to access.

Disadvantages

1. Fifteen utility poles and one fire hydrant will need to be relocated.
2. Seven driveways will require modification to access.
3. Sixteen parcels will be required Totaling 1.496 acres.

The Construction Cost for this alternative is estimated to be **$1,494,531.00**.

Alternate No. 3 – This alternative follows the exiting baseline widening equally to both sides of the roadway. The sidewalk has been added to the southerly side of the roadway to minimize impacts to the utility poles.

Advantages

1. One fire hydrant remains in place.

Disadvantages

1. Eighteen utility poles and three fire hydrants will need to be relocated.
2. All driveways will require modification to access.
3. Sixteen parcels will be required Totaling 1.501 acres.

The Construction Cost for this alternative is estimated to be **$1,519,787.00**.

Alternate No. 4 – This alternative follows Alternative No. 3 with the exception of the addition of separate left and right turn lanes at the intersection of Southwest Boulevard. The intent of this alternative was to develop a cost to add the separate left and right turn lanes.

Advantages

1. The current level of service (LOS) on Burns Avenue at the intersection is ‘E’ and the future LOS in 2027 is ‘F’. The addition of the separate left and right lanes will increase the future LOS in 2027 to ‘D’ reducing the delays by half.

Disadvantages

1. Sixteen parcels will be required Totaling 1.746 acres.

The additional Construction Cost for each of the three alternatives to include the separate left and right turn lanes is estimated to be approximately **$70,000.00**.

C. Drainage

A project is considered a Major Development per the NJDEP Stormwater Management (SWM) Rules if the proposed project, including all elements such as shoulder widening

and sidewalk, adds more than ¼ acre of impervious area or disturbs more than one acre of land. Each of the alternatives will increase the impervious area equally by approximately 1 acre of additional impervious surface; therefore, the proposed project is classified as a Major Development and compliance with the stormwater management design and performance standards is required, and the SWM standards for groundwater recharge and runoff quantity (volume and rate) will apply.

A preliminary drainage feasibility assessment was performed to evaluate feasible stormwater management facilities for alternatives that would need to comply with the SWM Rules. A shallow infiltration swale is proposed along both sides of the roadway. Drainage pipes are proposed under each of the driveways to continue the flow to the existing low point.

D. Alternative Analysis – Traffic Signal Warrant Analysis, Burns Avenue and SW Blvd.

Using the guidance presented in Chapter 4C of the MUTCD, IH has performed a traffic signal warrant analysis for the intersection of Burns Avenue and Southwest Boulevard. This analysis has assumed the following geometric and operational characteristics:

- One (1) lane on each major roadway approach (Southwest Boulevard);
- One (1) lane on the minor roadway (Burns Avenue) approach;
- Major roadway speeds below 40 mph, based on the posted speed limit of 25 mph;
- Turning movement volumes as conducted by IH staff in November, 2017, and augmented by the 5.1% growth factor to the year 2027 as detailed in this report;
- Fewer than five (5) correctable crashes within a 12-month period; therefore no reduction in minimum volume criteria for crash experience;
- At-grade railroad crossing within 140 feet of the stop line on the Burns Avenue approach (the rail crossing is only ±15 feet from the stop line at Southwest Boulevard).

Table H-3 (Appendix 'G') summarizes the hourly approach traffic volumes and the traffic signal warrant analysis. Also, each individual warrant is discussed separately, as follows:

Warrant 1A – Eight-Hour Vehicular Volume (Condition A - Minimum Vehicular Volume). Based on conditions at this intersection, this warrant is satisfied if, for eight (8) hours of an average day, the two-way major street volume exceeds 500 vehicles per hour, and the minor street approach volume exceeds 150 vehicles per hour.

As shown in the lower portion of **Table H-3**, these criteria are satisfied for four hours (during the fourth hour, the major street volume of 498 vehicles virtually meets the criteria). Since the warrant criteria needs to be met for eight hours, we conclude that this warrant is not satisfied.

Warrant 1B – Eight-Hour Vehicular Volume (Condition B - Interruption of Continuous Traffic). Based on conditions at this intersection, this warrant is satisfied if, for eight (8) hours of an average day, the two-way major street volume exceeds 750 vehicles per hour, and the minor street approach volume exceeds 75 vehicles per hour. As shown in **Table H-3**, these criteria not satisfied for any of the study hours. Therefore Warrant 1B, Interruption of Continuous Traffic, is not satisfied.

Warrant 2 – Four-Hour Vehicular Volume. This warrant is satisfied if the plotted points

representing volumes for at least four (4) hours fall above the designated line on the appropriate MUTCD nomograph. Only two of the plotted points representing the future traffic volumes fall above the curve; therefore this warrant is not satisfied.

Warrant 3 – Peak Hour Volume. This warrant is satisfied if the plotted points representing volumes for at least one (1) hour fall above the designated line on the appropriate nomograph. None of the plotted points representing the future traffic volumes fall above the curve; therefore this warrant is not satisfied.

Warrant 4 – Pedestrian Volume. During the entire eight-hour manual turning movement count period, zero pedestrians were observed crossing at the intersection. This warrant is not satisfied.

Warrant 5 – School Crossing. There are no schools in close enough proximity for this intersection to be considered a school crossing. As noted above, no pedestrians, school children or otherwise, were observed crossing at the intersection. This warrant is not satisfied.

Warrant 6 – Coordinated Signal System. This warrant considers the installation of a traffic signal at an intersection that might not otherwise need one, for the purposes of encouraging progressive flow and proper platooning of vehicles. We do not believe that installation of a traffic signal at this location would achieve any such benefits; therefore this warrant is not satisfied.

Warrant 7 – Crash Experience. As discussed previously, the crash history at this intersection, including the number of crashes "susceptible to correction by a traffic control signal" (i.e. right-angle crashes), is not sufficient to meet the requirements of this warrant, which is not satisfied.

Warrant 8 – Roadway Network. This warrant is applied to intersections of "two or more major routes". We do not believe that either of these two roadways meets the criteria for a "major route" in terms of this warrant. This warrant is not satisfied.

Warrant 9 – Intersection Near a Grade Crossing. This warrant is for intersections at which the proximity of a railroad grade crossing to an approach controlled by a stop or yield sign is a concern. The criteria for this warrant involves plotted points that fall above the respective curve on the nomograph for this warrant. Curves on the nomograph relate to the spacing "D" between the stop bar and the the rail crossing – in actuality a point six feet from the rails. In this case "D" is ±10 feet; the lowest curve, representing D=30 feet, was used for this evaluation.

Each of the eight hours studied satisfy the minimum volume requirements. However, the guidance for the application of this warrant notes that "this signal warrant should be applied only after adequate consideration has been given to other alternatives or after a trial of an alternative has failed to alleviate the safety concerns associated with the grade crossing." Two alternatives suggested as potential mitigations include provision of additional pavement to permit a vehicle space for an evasive maneuver (which does not appear to have been implemented), or to reverse the STOP control – in this case, to place STOP signs on the Southwest Boulevard approaches and allow the westbound Burns Avenue approach to move freely. We believe that reversing a longstanding stop control may introduce other safety problems.

Since it does not appear that alternative improvements have been considered and/or implemented, then based on the guidance provided in the MUTCD for this warrant, at this time we cannot conclude that the warrant is satisfied, or that the intersection is a candidate for signalization.

Since none of the traffic signal warrants outlined in the MUTCD are satisfied by the existing geometric conditions, or the projected future 10-year traffic volumes, we have not included the installation of a traffic signal at this intersection in the potential intersection improvement alternatives.

E. Alternative Analysis – Auxiliary Lanes at Intersections

As part of this evaluation, we have analyzed the potential benefits of two additional geometric improvements:

Widening of the westbound Burns Avenue approach to Southwest Boulevard, to provide separate lanes for left- and right-turning traffic. This alternative was evaluated due to the projected future LOS 'F' condition during the future Year 2027 peak hour, and because the traffic signal warrant analysis concluded that the intersection is not a candidate for signalization. This improvement option, which is depicted as part of Alternative 3, would include a ±150-foot long right turn lane and appropriate transition taper on the westbound Burns Avenue approach.

As discussed previously, during the future Year 2027 weekday morning peak hour, the westbound Burns Avenue approach to Southwest Boulevard is projected to operate at level of service 'B' during the morning peak hour, but level 'F' during the weekday evening peak hour. With this widening alternative, during the morning peak hour, delays will not improve significantly (LOS 'B'). However, during the weekday evening peak hour the LOS on this approach would be improved to 'D', with average delays per vehicle reduced by approximately half.

IH's evaluation has concluded that the intersection of Burns Avenue and Southwest Boulevard is not a candidate for signalization. Minimum traffic volume requirements are (or will be) satisfied, but to the best of our knowledge, alternative treatments to improve safety related to the rail crossing have not been completed, and deployment of one or more such alternatives is considered a requirement for application of this warrant, especially because none of the other traffic signal warrants are satisfied. Widening of the westbound approach could be considered an alternative treatment, since it would provide additional pavement space for a driver to make an evasive maneuver, which is cited as a potential treatment in the description of the warrant analysis.

On the other hand, the provision of a second approach lane increases the minimum traffic volume threshold for satisfaction of the warrant. However, review of the required volumes indicates that even with two westbound approach lanes we believe the minimum traffic volume criteria can be satisfied.

Widening of the eastbound Burns Avenue approach to provide a dedicated right-turn lane. This improvement was envisioned because the eastbound Burns Avenue right-turn volume onto Main Road represented over 85% of the total eastbound Burns Avenue approach volume over the course of the data collection period. The delay and queuing experienced by these motorists could be reduced by allowing these vehicles to use an "overlap" signal

phase, with a right turn green arrow displayed during the northbound Main Road left turn green arrow phase (only when the southbound left turn arrow phase is not actuated). This right turn "overlap" phase can only be implemented if the right turns are moving in an exclusive lane.

Capacity analysis of this alternative shows that the overall gains in terms of delay reduction are low: the eastbound Burns Avenue approach is forecast to operate at level 'C' during both peak hours under this alternative. Assuming existing physical conditions, the intersection would operate at the same level 'C' under future traffic conditions with adjustment of traffic signal timings. Based on this result, IH has not included this potential improvement among the alternatives presented in this report.