Regional Parkway

SEGMENT A
PARK RD. 22 - RODD FIELD RD.
SEGMENT B
RODD FIELD RD. - SH 286
SEGMENT C
SEGMENT D
SEGMENT E
SEGMENT F
SEGMENT G

Planning and Environmental Linkages (PEL) Study

Prepared by:

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City of Corpus Christi

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City of Corpus Christi

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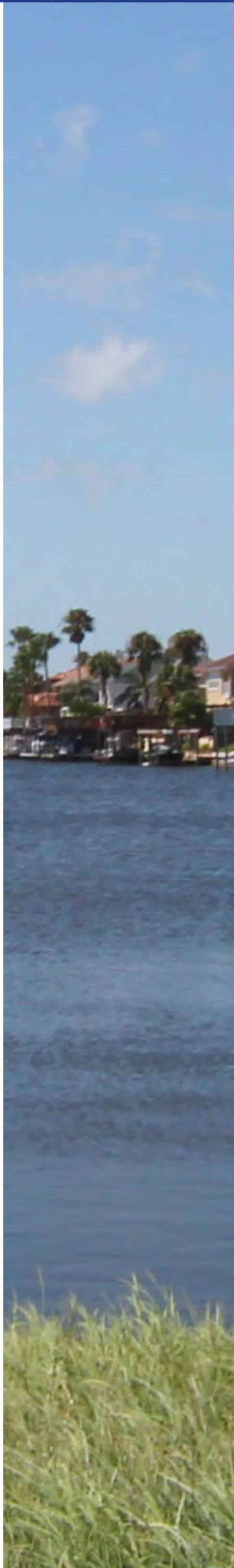

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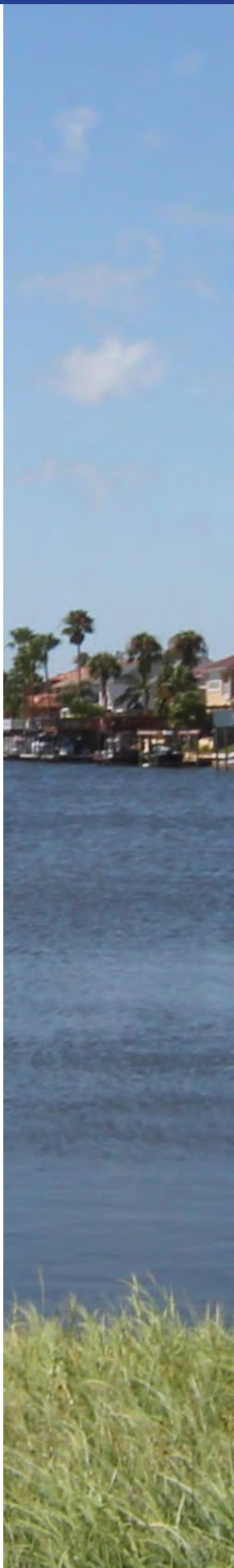


1.0 Summary

The Corpus Christi Metropolitan Planning Organization (CCMPO), in cooperation with the City of Corpus Christi (City), initiated the Regional Parkway Planning and Environmental Linkages (PEL) Study to further refine transportation needs and potential route alignment alternatives for two of the seven segments of independent utility identified in the Regional Parkway Mobility Corridor (RPMC) Feasibility Study (2013). The RPMC yielded seven segments, Segments A to G; this PEL centers on Segments A and B, as well as the future extension of Rodd Field Road. Segment A extends from the intersection of Park Road 22 (PR 22), on Padre Island to an area just south of the proposed extension of Rodd Field Road. Segment B extends from the western terminus of Segment A to the intersection of State Highway 286 (SH 286) (Crosstown Expressway).

The Regional Parkway PEL study area comprises numerous natural features as well as constructed elements. The examination of the environmental resources establishes a baseline data of existing conditions for further analysis in subsequent NEPA studies.

PEL studies are a collaborative and integrated approach to identifying mobility solutions, allowing the CCMPO and the City to review and consider community, environmental, and economic issues early in the transportation planning process. In turn, the CCMPO and City will use the information, analysis, and products developed during a PEL to inform future environmental reviews.

The Regional Parkway PEL Study alternatives were developed and guided by establishing purpose and need as described later in this Report. This Study does not go so far as to determine the purpose and need for a NEPA action, but rather serves to inform a more robust NEPA process in future development phases. There has been discussion going back to the mid-eighties among the CCMPO, City, Nueces County and other interested parties concerning the need for an alternate major transportation route within Nueces County, particularly on the south side of Corpus Christi.

The Texas State Data Center (TSDC) has projected that the population of the Corpus Christi Metropolitan Area, which includes Nueces and San Patricio Counties, will increase by 21 percent by 2050. This alternate route would be designed to address the expanding housing, industrial and commercial developments in Nueces County and the resulting traffic congestion and safety issues. This projected growth in population and its accompanying development activity is anticipated to result in a substantial increase in future traffic volumes by the year 2040 along existing roadways in Nueces County. This projected growth is likely to be concentrated on the south side of Corpus Christi and North Padre Island.

A comprehensive public involvement process was undertaken as a part of the Study. There were several opportunities for public engagement and coordination with public agencies. Over 400 people received direct information about the project and information was made available to the wider public through the website, televised presentations, and media coverage.

The Regional Parkway PEL study area comprises numerous natural features as well as constructed elements. The examination of the environmental resources establishes a baseline data of existing conditions for further analysis in subsequent NEPA studies.

Multiple alignment alternatives were established for the PEL on the basis of key parameters such as prioritization of existing public rights-of-way, previously disturbed areas, proximity to intersecting roadways, existing drainage features, as well as on the basis of feedback from the planning team and targeted stakeholder interviews. In total, eight (8) alternatives were considered in Segment A, four (4) alternatives were considered in Segment B, and three (3) alternatives were considered for the future extension of Rodd Field Road. These fifteen alternatives, along with the No-Build alternative, were subject to the screening process.

The screening methodology and criteria were mutually agreed upon by the planning team and shared with stakeholders. It should be noted the initial screening is a high-level, pass/fail type analysis intended to eliminate alignment alternatives that do not meet purpose and need. Each of the alignment alternatives, other than the No-Build, meets the purpose and need of the Regional Parkway. Therefore, none of the alignment alternatives identified were eliminated from further study.

The secondary evaluation process involves analyzing and differentiating between the alternatives in Segment A, Segment B and the extension of Rodd Field Road. Three areas of consideration were employed to conduct the secondary evaluation: Engineering considerations, environmental considerations, and stakeholder input. Each was evaluated using multiple criteria, each criterion was defined, and ranges were established for the purpose of scoring. The cumulative engineering, environmental, and stakeholder considerations and evaluation results for Segments A, B and Rodd Field Road are tabulated later in this Report.

Next steps in the project planning process may include incorporation of the results of this PEL into the City of Corpus Christi's Urban Transportation Plan. Future planning efforts should include: further evaluation of strategies to avoid, minimize, and mitigate environmental impacts; consideration of additional connecting facilities; and assessment of potential funding strategies. Additionally, amendments to the City's Unified Development Code may be necessary to accommodate implementation of Regional Parkway.

» These memoranda describe the processes and significant findings which formed the basis for the highest ranking alignment alternatives for subsequent environmental analyses under the National Environmental Policy Act (NEPA) process.

Several technical memoranda are provided as appendices to this Report:

Appendix A includes a Summary of Previous Studies and Project History relative to the Regional Parkway corridor.

Appendix B includes the Purpose and Need Technical Memorandum.

Appendix C includes the Stakeholder and Public Outreach Report which describes the public involvement efforts which have occurred throughout the study area.

Appendix D includes the Affected Environment and Environmental Consequences Technical Memorandum, detailing existing environmental constraints.

Appendix E contains the Alternatives Development and Evaluation Technical Memorandum, along with various supporting data.

Appendix F Traffic Analysis Technical Memorandum includes additional data and analyses.

Appendix G covers the Crossing of the Laguna Madre Bridge Type Study.

Appendix H includes digital files of the Regional Parkway PEL Study Alignment Alternatives Exhibits, Design Summary Report, and Preliminary Cost Estimates.

Appendix I includes the PEL Questionnaire, which was used as a guide during the study.

2.0 Study Overview

2.1 What is a PEL Study?

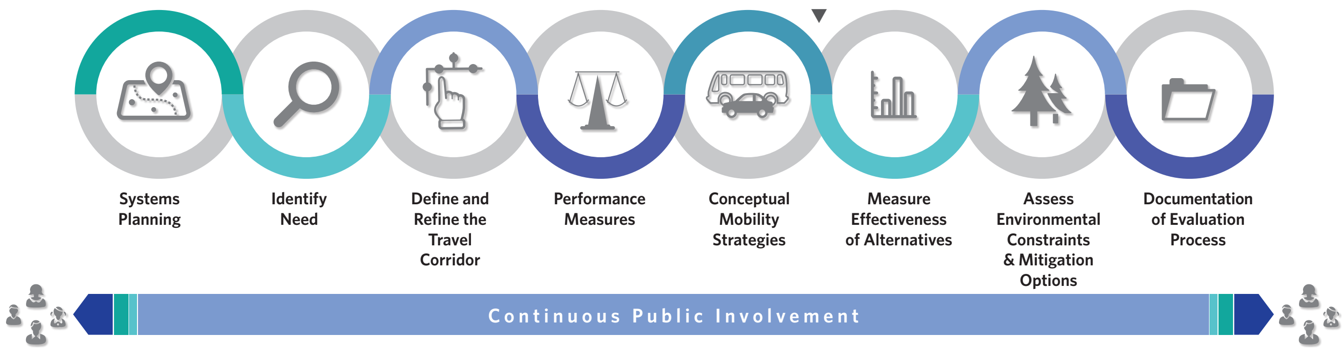


Figure 1: The PEL Process

PEL studies are a collaborative and integrated approach to identifying mobility solutions, allowing the CCMPO and the City to review and consider community, environmental, and economic issues early in the transportation planning process.

In turn, the CCMPO and City will use the information, analysis, and products developed during a PEL to inform future environmental reviews. A PEL study also removes the need to further consider alternatives that are determined to be ineffective as a result of a planning-level alternatives analysis. **Figure 1** illustrates the key steps and coordination points of the Regional Parkway PEL decision-making process.

A PEL is intended to provide a more detailed planning effort than is typical of studies at the regional or system planning levels, yet it is not as thorough as the traditional project-specific environmental analyses typically conducted during the NEPA process. "Corridor and subarea studies can be used to produce a wide range of analyses or decisions for Federal Highway Administration (FHWA) review, consideration and possible adoption in the NEPA process for an individual transportation project, including:

- The foundation for purpose and need statements;
- Definition of general travel corridor and/or general mode(s);
- Preliminary screening of alternatives and elimination of unreasonable alternatives;
- Planning-level evaluation of indirect and cumulative effects;
- Regional or eco-system-level mitigation options and priorities; and

Linkage with housing, development, economic and environmental goals and analysis." This Regional Parkway PEL Study did not address indirect and cumulative effects or eco-system level mitigation opportunities. These issues are normally addressed in project-level NEPA documents.

A new facility could link key destinations in or near Corpus Christi as well as relieve current congestion on SH 358 (South Padre Island Drive), improve safety, and facilitate regional mobility.

To be easily integrated into the NEPA process, corridor and subarea studies following PEL Study methodology must conform to federal standards and include substantial public involvement and agency coordination. The requirements for a PEL Study are specified in the Statewide Transportation Planning; Metropolitan Transportation Planning; Final Rule (23 CFR 450), which describes how transportation planning study outcomes may be used as part of the overall NEPA project development process. Appendix A to 23 CFR Part 450 - Linking the Transportation Planning and NEPA Processes (23 USC 139) - explains how data, analyses, and products from transportation planning efforts can be incorporated into and relied upon in NEPA documents under existing laws. Corridor or subarea planning study documents may be incorporated into successive NEPA documents "if the systems-level, corridor, or subarea planning study is conducted with:

- Involvement of interested state, local, tribal, and Federal agencies;
- Public review;
- Reasonable opportunity to comment during the development of the corridor or subarea planning study;
- Documentation of relevant decisions in a form that is identifiable and available for review during the NEPA scoping process and can be appended to or referenced in the NEPA document; and
- The review by FHWA and the Federal Transit Administration (FTA), as appropriate."

FHWA has developed a PEL questionnaire to facilitate the use of the results from subarea or corridor plans to inform the NEPA process. The questionnaire is intended to function as a guide and planning process summary used to streamline the transition from a planning level study to NEPA analysis. The questionnaire is consistent with the planning regulations found in 23 CFR 450 and other FHWA policies on the PEL process. The Regional Parkway PEL Study was conducted in compliance with these regulations. The completed FHWA PEL Questionnaire for the Regional Parkway PEL Study is a stand-alone document that is included with this report.

2.2 Purpose of the Regional Parkway PEL Study

The Texas State Data Center (TSDC) has projected that the population of the Corpus Christi Metropolitan Area, which includes Nueces and San Patricio Counties, will increase by 21 percent by 2050. This projected growth in population and its accompanying development activity is anticipated to result in a substantial increase in future traffic volumes by the year 2040 along existing roadways in Nueces County including segments of U.S. Highway (US) 77, SH 44, SH 358 (South Padre Island Drive), SH 286, and PR 22. This projected growth is likely to be concentrated on the south side of Corpus Christi and North Padre Island, resulting in anticipated increased traffic congestion and associated safety issues.

The Regional Parkway PEL Study builds upon the results of previous planning studies, e.g., the 1999 South Loop Transportation Study, and the 2013 Regional Parkway Mobility Corridor Feasibility Study, and other planning documents such as the CCMPO Metropolitan Transportation Plan (MTP) and the City of Corpus Christi's Mustang-Padre Island Area Development Plan (April, 2004) and Plan CC Comprehensive Plan 2035 (Plan CC). These plans have identified a need for transportation improvements within the Study Area, but have not proceeded to the NEPA process for further development. The PEL Study establishes a foundation for agencies and stakeholders to develop improvements within the Regional Parkway Study Area, thereby minimizing duplication of effort.

Additionally, the PEL Study can reduce the time required to develop and implement projects by conveying planning-level recommendations into subsequent, detailed environmental studies. Ultimately, the goal of this PEL Study is to plan for long-term transportation improvements within the Regional Parkway Study Area. In order to produce findings that will contribute significantly to subsequent NEPA studies, the Regional Parkway PEL Study completed the following actions:

- Engaged stakeholders (public, agencies, etc.) repeatedly throughout the planning process;
- Identified the transportation needs and issues within the Study Area;
- Identified potential alternatives, to meet the identified needs, and assessed them for their likely benefits and impacts;
- Recommended a feasible alignment alternative(s) that can be carried forward into future, detailed engineering and environmental studies; and
- Documented activities, stakeholder coordination, and findings related to the Regional Parkway PEL Study.

2.3 Regional Parkway PEL Study Area

The study area for the Regional Parkway PEL Study is composed of Segment A and Segment B of the RPMC. These segments are located within the area for which CCMPO is required to perform transportation planning activities. The study area is south of the Corpus Christi city limits, specifically the Southside Planning District and the Flour Bluff Planning District, but within the City's extraterritorial jurisdiction (ETJ). The study area also crosses the northern limits of the Laureles Division of the King Ranch.

The Regional Parkway PEL study area generally comprises of a one-mile buffer bounded on the east by PR 22 and on the west by SH 286. The PEL Study Area defines Segments A and B and is inclusive of the proposed extension of Rodd Field Road, which is bounded on the north by its intersection with Yorktown Boulevard. The Study Area limits are graphically depicted in **Figure 2**.

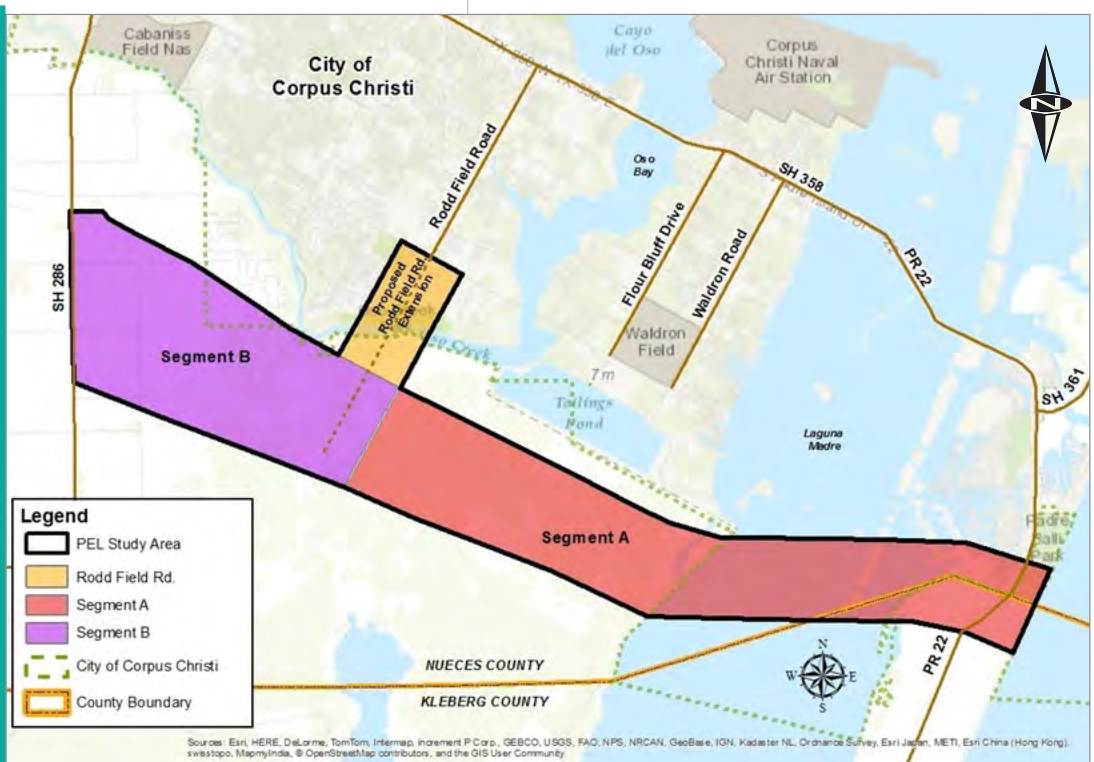


Figure 2: Regional Parkway PEL Study Area

- Segment A begins on North Padre Island and extends west approximately 10 miles inland. This segment ranges in width from approximately 1.3 miles in the east to about 1.7 miles wide in the west and includes about 9,000 acres. The majority of this segment occurs within Nueces County; only a small portion of the southeastern edge of this segment lies within Kleberg County.
- Segment B, which follows Segment A within the project corridor, continues to the northwest and terminates at SH 286. This segment ranges from approximately 4.5 to 5.8 miles in length, and includes a varied width of about 1.7 miles in the east to 2.6 miles in the west. Segment B occurs entirely within Nueces County and contains approximately 6,500 acres.
- Rodd Field Road, a primary arterial, would be extended south from its intersection with Yorktown Boulevard, crossing Oso Creek and connecting to the Regional Parkway corridor. A corridor incorporating approximately 0.5 mile on either side of this proposed roadway extension would also be evaluated for potential environmental impacts. Rodd Field Road is currently included in the Corpus Christi Urban Transportation Plan which depicts it as ultimately intersecting with FM 70.

The study area is mostly rural in character and predominantly includes agricultural and undeveloped areas with the exception of the developed areas on North Padre Island and along Rodd Field Road above Oso Creek. Segment A also crosses the Laguna Madre and its marine environment. Portions of both Segments A and B lie within the 100-year floodplain, and have been prone to flood. Flood events are more commonly observed in Segment B as it approaches the intersection of SH 286.

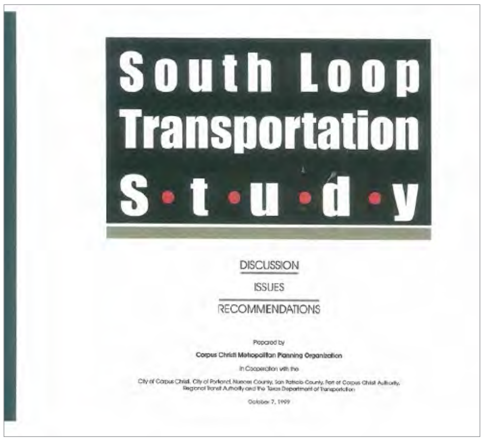
Land uses adjacent to the proposed Rodd Field Road extension include light industrial, low to medium density residential, and the crossing of Oso Creek which has adjacent preservation corridors that the City has planned as public green spaces.

Capital improvements within the study area include a small number of unpaved roads and engineered drainage channels. TxDOT is currently working to expand and extend capacity of SH 286 to just south of the intersection of FM 2444 (Staples Street) as well as improvements to FM 2444. Potential connecting facilities in Segment B include county roads (CR) 41 and 43 and the proposed extension of Rodd Field Road, south of Yorktown Boulevard. Other potential connecting facilities of the Regional Parkway have been discussed in the context of this PEL, such as, Waldron Road and Flour Bluff Drive. However, the feasibility of these other potential connecting facilities was not considered in the scope of this report.

2.4 Previous Plans and Studies

The Regional Parkway Study Area has been included in several previous studies in which various mobility improvements have been identified. These studies are summarized in this section. In addition, Appendix A: Summary of Previous Studies and Project History, contains a detailed account of the previous studies conducted within the study area.

South Loop Transportation Study

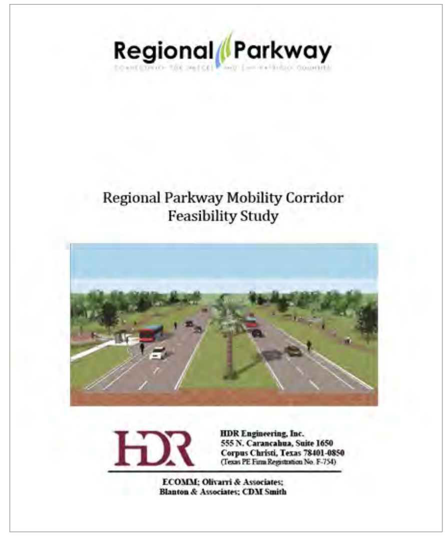


The South Loop Transportation Study was undertaken by the CCMPO and completed in October 1999. This report documented the actual and projected growth in population and vehicular trips, and the development pressures occurring within the south and northwest areas of Corpus Christi. The issues central to the study were:

- Increasing congestion on SH 358 and on arterials crossing SH 358;
- The role of SH 358 as the only major highway connecting various parts of the City of Corpus Christi for people who live on the south side and work either downtown, at Corpus Christi Naval Air Station, at area refineries, or other major employment centers on the city's north side;
- Insufficient right-of-way for improving SH 358 or crossing arterials; and
- Emergency evacuation routes

A new South Loop roadway was recommended in addition to several short-term and long-term transportation system improvements. Collectively, these recommendations were intended to provide relief to IH 37, US 77, and SH 358. The South Loop corridor was identified as originating from US 77 north of Odem, proceeding southward crossing the Joe Fulton International Corridor along Carbon Plant Road, and extending toward SH 286. The South Loop corridor extends to Padre Island via a second crossing of the Laguna Madre.

Regional Parkway Mobility Corridor Feasibility Study



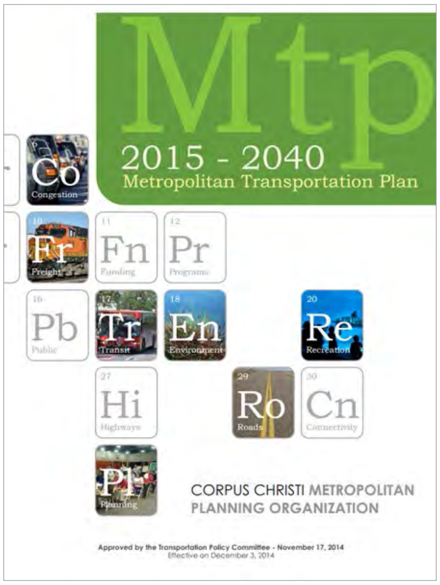
The Regional Parkway Mobility Corridor (RPMC) Feasibility Study, published in January 2013, was collectively sponsored by the CCMPO, the City, and Nueces and San Patricio Counties. The purpose of the Study was to determine whether a new roadway was merited to:

The purpose of the RPMC Feasibility Study was three-fold and stated as:

- Reduce congestion and facilitate regional mobility, connectivity and system linkages.
- Accommodate potential economic and population growth and address safety issues.
- Provide an alternate hurricane evacuation route.

The study utilized an alternatives evaluation approach to narrow a universe of corridor alternatives to a preferred corridor alternative. The preferred alternative is described as being 52 miles long, passing west of Robstown. Connections were proposed at thirteen locations including (from east to west): PR 22, Waldron Road, Flour Bluff Drive, Rodd Field Road, SH 286, FM 2444, FM 665/FM 1694, FM 892, FM 2826, US 77, SH 44, FM 624, and IH 37.

The preferred alternative was then divided into seven segments of independent utility. Those segments were designated as Segment A through Segment G, beginning at PR 22 on North Padre Island and ending at IH 37. Segment A and Segment B, as identified in the RPMC Feasibility Study are included in the Regional Parkway PEL Study.



CCMPO Metropolitan Transportation Plan (MTP) The greater Corpus Christi area has a 50-year history of transportation planning, exemplified by the creation of the CCMPO in 1972. The CCMPO leads a comprehensive, cooperative, and continuing transportation planning process. The CCMPO also produces and maintains the MTP, which is the 25-year long-range plan for preserving and expanding the transportation system in the region.

The MTP defines the region's transportation goals and an action plan for achieving those goals. The five goals are:

1. Reduce congestion by maximizing the capacity and efficiency of existing major highways and streets.
2. Improve the safety of the transportation network through improved efficiency and effectiveness of major road and highway facilities.
3. Provide new facilities, improved facilities and transportation services that expand the economic opportunities in the area.
4. Provide new facilities, improved facilities and transportation services that support the maintenance of attainment status and air quality; and,
5. Provide new facilities, improved facilities and transportation services that increase the value of transportation assets.

Many of the actions specified in the MTP directly influence the Regional Parkway PEL Study; others have less direct impact but establish a broader context in which the PEL study will be completed.

City of Corpus Christi Plan CC Comprehensive Plan The City of Corpus Christi Planning Commission reviewed Plan CC along with the City Council's comments and recommended approval of the plan with changes on August 10, 2016. The City Council reviewed the Planning Commission's recommended changes and held a public hearing on September 20, 2016, during one of its regular meetings to formally adopt the plan.

The Plan CC provides direction for the development of the City over the next twenty years. Plan CC describes a city poised to take advantage of a unique time in history to diversify the regional economy and build a predictable and sustainable platform for development. Plan CC is a plan "to guide the city to take advantage of the opportunities, invest in the future, and make choices that result in higher quality of life and a more diversified economy." The plan is built upon a vision and set of principles upon which growth and development will be shaped. Plan CC has multiple topical elements that describe the community vision and principles in greater detail. Several plan elements which have bearing on the Regional Parkway PEL Study are presented below:

Element 2: Resilience and Resource-Efficiency While the focus of this plan element is energy, it has bearing on the Regional Parkway PEL Study. Plan CC describes resilience as "the ability to anticipate hazards and reduce overall vulnerability by adapting to changing conditions and promoting multiple lines of defense against hazardous events." The plan further promotes resource efficiency through sustainable design, a concept with significant application to the roads and bridges of the Regional Parkway.

Element 3: Housing and Neighborhoods

This element focuses on quality housing and community identity. Implicit in the element, however, are the concepts of mobility, connectivity, and access. The plan's vision states, "People can get around the city by multiple modes of transportation – connected networks of good streets and sidewalks, safe bicycle routes, and excellent public transportation." Mobility, connectivity, and multimodal integration are fundamental objectives of the Regional Parkway PEL Study.

Element 5: Getting From Here to There: Transportation and Mobility

The transportation element blends resilience, mobility, connectivity, land use and roadways as part of the future vision of the City. Plan CC states this element's focus as "improving Corpus Christi's transportation infrastructure and systems, including expanding mode choices to encourage biking, walking, and public transportation while maintaining the roadway system for long-term effective use. Integrating land use and transportation planning are key goals for the future."

Mustang-Padre Island Area Development Plan

The Mustang-Padre Island Area Development Plan adopted by City Council Ordinance #025725, April 20, 2004 states "The ultimate goal of this plan is to assist in transforming the Mustang-Padre Island area into a world-renowned tourist, resort and residential community. The City will encourage the highest development standards within the area's boundaries to create a unique "sense of place." Economic development will be tempered with environmental sensitivity to the significant coastal natural resources on the Islands. Growth will be tempered with common sense. Residential concerns will be tempered with tourism and business concerns. The area plays a vital role in the citywide and regional economies.

The City recognizes this and commits to doing its part to ensure the long-term success of Mustang-Padre Island." The principle objectives of this plan are as follows:

1. To recognize the unique characteristics of this area and establish policies for development standards that may not apply citywide.
2. To recognize the regional economic significance of this area and develop policies that advocate responsible economic development strategies.
3. To propose techniques or methods by which the environmentally sensitive areas must be preserved and/or developed with minimal adverse impacts.
4. To propose appropriate land uses and a corresponding transportation network to serve future land uses and public access to the Gulf beaches.
5. To facilitate infrastructure planning through a reasonable estimate of future land use.

Padre Island Mobility and Access Management Study

The Padre Island Mobility and Access Management Study was initiated by the City of Corpus Christi late summer of 2016. The scope of the study is to develop short and long range mitigation strategies to transportation issues as well as operations and maintenance practices along SH 361 and PR 22 on Padre Island. This study is currently ongoing and is has not yet been completed.

3.0 Purpose & Need

Network Congestion | **Network Safety** | **Regional Growth** | **Hurricane Evacuation**

The Regional Parkway alignment alternatives were developed and guided by establishing purpose and need as included below. This Study does not go so far as to determine the purpose and need for a NEPA action, but rather serves to inform a more robust NEPA process in future development phases. There has been discussion going back to the mid-eighties among the CCMPO, City, Nueces County and other interested parties concerning the need for an alternate major transportation route within Nueces County, particularly on the south side of Corpus Christi. This project would address the expanding housing, industrial and commercial developments in Nueces County and the resulting traffic congestion and safety issues. The Regional Parkway Mobility Corridor (RPMC) was proposed to meet these and other transportation needs of the Corpus Christi area.

As shown in Figure 3, the Parkway is envisioned as an at-grade, multi-lane facility with limited access which could accommodate vehicles

What problems will the project address?

AVERAGE DAILY TRAFFIC ON S.P.I.D.

S.P.I.D. near SH 286
137,254*
vehicles per day

S.P.I.D. near Staples Street
123,678*
vehicles per day

S.P.I.D. near Rodd Field Road
73,043*
vehicles per day

AVERAGE DAILY TRAFFIC ON SARATOGA BOULEVARD

Between SH 286 and Rodd Field Rd.

30,679*
vehicles per day

38% expected increase in traffic by 2035

FREQUENT CONGESTION IN THE S.P.I.D. CORRIDOR

Currently, between Ayers and Staples, S.P.I.D. operates at an unacceptable level of service, and further erodes by year 2035. Adding capacity within the existing S.P.I.D. corridor results in disruptive impacts to traffic and commercial businesses. To effectively manage congestion on S.P.I.D., other route/modal options must be considered.

LACK OF REDUNDANCY IN THE TRANSPORTATION NETWORK.

Alternate routes (redundancy) allow traffic to keep moving even in cases of major accidents or natural disasters.

*ADT Volumes Source TxDOT 2014

Figure 3: Conceptual rendering of Regional Parkway as shown in the Regional Parkway Mobility Corridor Feasibility Study (2013).

and other transportation modes including mass transit, bicycles, and/or pedestrians. As practical, it might incorporate existing roadways as well as include construction of new roadways and bridges as needed. Appendix B - Purpose and Need Technical Memorandum provides detailed data regarding population and economic growth trends, and historic and future traffic projections which support the need for improvements within the Regional Parkway PEL Study Area.

The PEL Study can reduce the time required to develop and implement projects by bringing the planning-level recommendations into subsequent, detailed environmental studies. Ultimately, the goal of this PEL Study is to create a fully functional transportation planning product that effectively addresses the transportation needs identified within the Study Area. The PEL is a transitional step intended to evaluate constraints, define and evaluate alignment alternatives and facilitate Right-of-Way preservation.

The PEL Study will yield a transportation planning product that would be incorporated into the City of Corpus Christi's Urban Transportation Plan. The planning team opted to use the purpose and need previously defined in the RPMC Study as a guide for this PEL for consistency and to increase the likelihood that the alternatives under consideration would be a constructive step toward formal project development. A summary of this information is shown in **Table 1**. The purpose and need will guide the evaluation and comparison of alignment alternatives for Segments A, B and the extension of Rodd Field Road. It is also important to note that this alternatives analysis is based upon language and processes commonly used for NEPA studies.

Table 1: Purpose and Need Summary

Purpose of Regional Parkway	Need for Regional Parkway
Reduce congestion and facilitate regional mobility, connectivity and system linkages	Frequent congestion in the SH 358 corridor and other major east-west routes
Facilitate potential growth and address operational safety issues	Lack of redundancy in the transportation network
Address safety issues and provide alternate hurricane evacuation routes	Provide alternate routes for traffic to/from the south side of Corpus Christi and the Islands

4.0

Public Involvement and Agency Coordination

A comprehensive public involvement process was undertaken as a part of the Regional Parkway PEL Study. There were several opportunities for public engagement and coordination with public agencies.

The process was initiated with the creation of a Stakeholder Engagement Plan, which subsequent public involvement activities used as a guideline. This plan identified potential audiences, including public officials, property owners and developers, and other interested groups; state and federal agencies to be coordinated with; methods for public engagement; key messages for the project; a project schedule; and reporting/review and QA/QC procedures.

The engagement effort occurred in two major phases. In the first phase, general information on the study was circulated and one-on-one or group meetings were scheduled with individuals or groups identified as key stakeholders. At the meetings and/or interviews, the project team solicited input to help identify issues, planned development, ideas on acceptable routes, information on constraints, and other comments.

Once the universe of alternatives had been defined, additional stakeholder meetings and presentations were held as needed to solicit additional input as part of the evaluation of individual alternatives. Throughout the process, content from meetings and comments was captured to provide a comprehensive record for the project.

A database of key stakeholders within Segments A and B, interested agencies, and pubic officials identified in the Stakeholder Engagement Plan was created and updated throughout the project.

Information about the Regional Parkway PEL Study was provided to the public, as discussed generally above, through multiple platforms:

- A project webpage was created on the MPO website (www.corpuschristi-mpo.org).
- Nineteen (19) stakeholder interviews were held with interested parties, including landowners, developers, public officials, public committees and organization, key resource agencies and others to discuss the PEL Study and receive feedback. All landowners with major tracts of land within or near the study area were interviewed. Other interviews included the Executive Coordinator of the Padre Island Property Owners Association, which is the neighborhood organization representing most of the residential lots near the study area of Segment A. The team met with some key stakeholders more than once over the course of the alternaitves analysis process.
- Segment B included a number of smaller tracts of land. Local property owners of these smaller tracts of land and near within the study area were invited to an open house landowner meeting held on Aprill 11, 2016. Representatives of any known neighborhood associations in developed neighborhoods a mile or more to the northwest of Segment B were also invited. In total, 50 notices of the meeting were mailed. The meeting was attended by nine (9) individuals representing five (5) properties.
- Twenty-eight (28) presentations were made to governmental entities, agencies, and local organizations interested in the project. Several of these presentations were televised on public access. Two additional presentations to the Corpus Christi City Council and Kleberg County Commissioners Court are planned following the completion of the final Report.

At each gathering, up-to-date fact sheets and comment forms were distributed. Attendees were encouraged to submit comments regarding the project via comment form, letter or email. Nine (9) public comments were received with suggestions, concerns and declarations of support. Most comments either: (1) Pertained to habitat or property impacts from a specific alternative or (2) expressed general support of a second crossing of Oso Creek and/or the Laguna Madre.

Additional, opportunistic outreach was also conducted on an informal basis with individuals and groups. Media coverage of the Regional Parkway PEL Study was presented in the Corpus Christi Caller Times, the Island Moon, and on television on Channel 6 –KRIS-TV.

Appendix C: Stakeholder and Public Outreach Report, provides detailed information about the public involvement and agency coordination done for the Regional Parkway PEL Study.

» Overall, the public involvement and agency coordination effort was extensive; over 400 people received direct information about the project and information was made available to the wider public through the website, televised presentations, and media coverage.

5.0 Affected Environment

The Regional Parkway PEL study area comprises numerous natural features as well as constructed elements. The identified affected environment served as the backdrop against which proposed alignment alternatives, developed through stakeholder and public involvement, were addressed throughout the PEL Study.

In addition to informing the alternatives development process, the examination of the environmental resources establishes a baseline data of existing conditions for further analysis in subsequent NEPA studies. Future assessments will include a robust community and stakeholder involvement and will build upon the background information provided in this Report.

Appendix D: the Affected Environment and Environmental Consequences Technical Memorandum, provides information about the area of potential effect in relation to applicable environmental laws and policies.

These include:

- Land Use and Planning;
- Socioeconomic Factors, Including Population, Minority Population, and Employment;
- Neighborhoods and Community Resources;
- Visual and Aesthetic Qualities;
- Existing Transportation Infrastructure;
- Surface Water;
- Groundwater;
- Air Quality/Area Emissions;
- Traffic Noise;
- Hazardous Materials;
- Threatened and Endangered Species;
- Natural Areas and Preserves;
- Parklands and Recreation Areas;
- Historic and Cultural Resources;
- Utilities;
- Mine and Quarry Locations; and
- Prime Farmland

6.0 Alignment Alternatives Development and Screening

This section describes the alignment alternatives development process for the Regional Parkway PEL Study.

6.1 Alignment Alternatives Development Process

The Regional Parkway PEL Study utilized information from previous planning studies, current technical analyses, and input from the Technical Working Group (TWG) workshop conducted April 6, 2016. The TWG included representatives of CCMPO, CITY, Nueces County, general public and other key stakeholders who, together, developed the "universe of alignment alternatives" as shown in **Figure 4**.

The universe of alignment alternatives was established for the PEL on the basis of key parameters such as prioritization

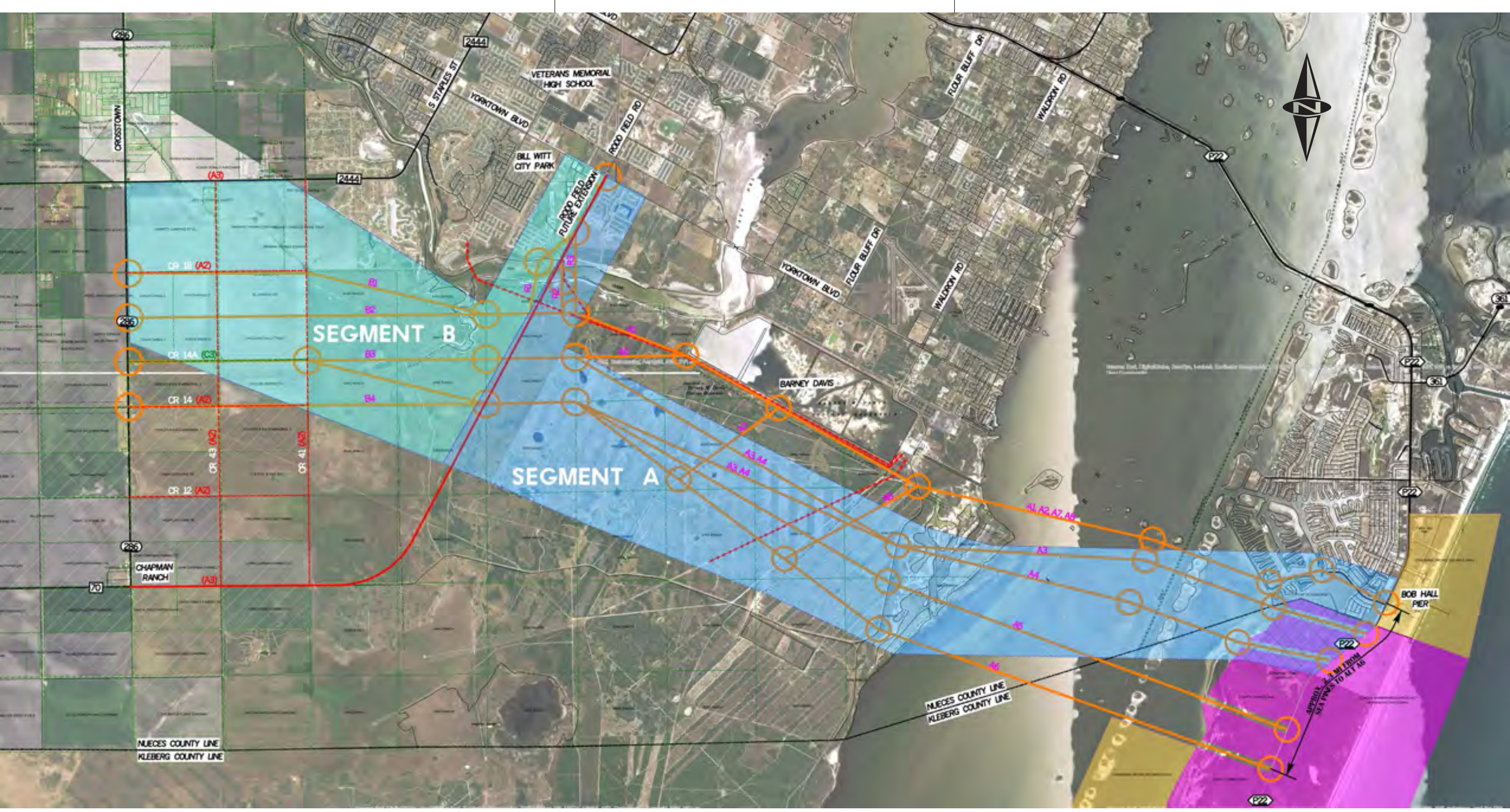


Figure 4: Universe of alignment alternatives for Regional Parkway (Segments A and B).

of existing public rights-of-way, previously disturbed areas, proximity to intersecting roadways, existing drainage features, as well as on the basis of feedback from the TWG and targeted stakeholder interviews.

6.2 Description of Alignment Alternatives

The following is a brief description of the alignment alternatives under consideration in the Regional Parkway PEL Study, Segments A, B, and extension of Rodd Field Road. A detailed description of each alignment alternative is included in Appendix E: Alternatives Development and Evaluation Technical Memorandum. In total, eight alternatives were considered in Segment A, four alternatives were considered in Segment B, and three alternatives were considered for the future extension of Rodd Field Road. These fifteen alternatives were subject to the screening process along with the No-Build alternative.

No-Build Alternative: No improvements beyond those already be identified and funded in local planning documents are made in this alternative. The No-Build alternative provides a baseline to gauge how effective other alignment alternatives will be at accomplishing purpose and need. This alternative is a required element of consideration in future NEPA analyses.

Segment A Alignment Alternatives: Segment A included eight different alignment alternatives. These alternatives each originate along and intersect with the future extension of Rodd Field Road as represented by the City of Corpus Christi Urban Transportation Plan (UTP) (2013), continuing easterly, crossing the Laguna Madre and terminating at an intersection with PR 22 on North Padre Island.

Segment B Alternatives: In Segment B, four different alternatives were considered. These alternatives each originate along and intersect with SH 286 (Crosstown Expressway) and continue east or southeast, terminating in an intersection with the future extension of Rodd Field Road, as represented by the City's UTP.

Alternatives for the future extension of Rodd Field Road: Three alternatives were considered for the future extension of Rodd Field Road as represented by the UTP. These alternatives originate at the intersection of Yorktown Boulevard and the extension of Rodd Field Road and continue either south or southwest, ultimately crossing Oso Creek.

›› In total, eight alternatives were considered in Segment A, four alternatives were considered in Segment B, and three alternatives were considered for the future extension of Rodd Field Road.

7.0 Alignment Alternatives Evaluation

This section describes the screening and evaluation methodology utilized to assess each of the alignment alternatives considered for the Regional Parkway PEL Study. Additional information regarding the alternatives development, screening, and evaluation decision matrices can be found in Appendix E: Alternatives Development and Evaluation Technical Memorandum.

7.1 Initial Screening

Each alignment alternative was tested in terms of whether or not they met the purpose and need of the Regional Parkway. This section describes the initial screening method used to evaluate alignment alternatives. The purpose of the initial screening process was to identify those alternatives which have potential to meet the purpose and need of the Regional Parkway.

The screening methodology and criteria were mutually agreed upon by the TWG and shared with stakeholders. It should be noted the initial screening is a high-level, pass/fail type analysis intended to eliminate alignment alternatives that do not meet purpose and need.

The initial pass/fail analysis focused on broad evaluation factors directly related to the purpose and need of the Regional Parkway. The initial evaluation criteria are shown in **Table 2**.

Table 2: Initial Evaluation Criteria

Criteria	Key Considerations
Safety	Does the alignment alternative have the potential to reduce crashes on existing facilities, such as SH 358, SH 357, and principal arterials (Ayers, Weber, Everhart, Staples, and Airline)? Based on traffic volumes, an alternative that could reduce volumes on existing facilities would conceivably reduce crashes as well. Does the alternative provide for redundancy in the network and serve as an alternate hurricane evacuation route?
Mobility	Does the alternative have the potential to reduce congestion on existing facilities (freeways, arterials)? An alternative that could reduce congestion should be evaluated favorably.
Environmental Impacts	Does the alternative have a potentially significant unmitigated environmental impact? An alternative that has environmental impacts that cannot be mitigated should be evaluated unfavorably.

These factors seek to provide a rough characterization and differentiation between:

1. those alternative concepts with a high probability of reducing congestion and facilitating mobility, connectivity, and system linkages; accommodating potential growth (economic and population); and addressing safety and providing an alternate hurricane evacuation route and
2. those alternatives which will not meet the purpose and need and thus should be eliminated from further study at this point.

7.2 Initial Screening Results

The results of the initial alternative screening processes are presented in **Table 3**. The full discussion of the initial screening is presented in Appendix E.

Table 3: Initial Screening Results

Evaluation Criteria				Meets Need	Comments
Alternatives	Safety	Mobility	Environmental Impacts		
No-Build	Fail	Fail	Fail	No	Required Baseline
A-1	Pass	Pass	Pass	Yes	
A-2	Pass	Pass	Pass	Yes	
A-3	Pass	Pass	Pass	Yes	
A-4	Pass	Pass	Pass	Yes	
A-5	Pass	Pass	Pass	Yes	
A-6	Pass	Pass	Pass	Yes	
A-7	Pass	Pass	Pass	Yes	
A-8	Pass	Pass	Pass	Yes	
B-1	Pass	Pass	Pass	Yes	
B-2	Pass	Pass	Pass	Yes	
B-3	Pass	Pass	Pass	Yes	
B-4	Pass	Pass	Pass	Yes	
R-1	Pass	Pass	Pass	Yes	
R-2	Pass	Pass	Pass	Yes	
R-3	Pass	Pass	Pass	Yes	

7.3 Alignment Alternatives Eliminated from Further Study

Each of the alignment alternatives, other than the No-Build, meets the purpose and need of the Regional Parkway. Although the No-Build alternative does not meet the purpose and need, it is a NEPA requirement to advance this alternative as an environmental baseline against which other alternatives are measured. Therefore, none of the alignment alternatives identified in the "Universe of Alternatives" were eliminated from further study. This outcome is not surprising since the Regional Parkway is planned primarily as a new-location route and the alignment alternatives were specifically generated to address the project purpose and need.

7.4 Alignment Alternatives Carried Forward for Further Study

Alignment alternatives passing the initial screening were evaluated as having potential to meet the need and purpose of the Regional Parkway. A total of fifteen (15) alignment alternatives as well as the No Build alternative were recommended to be carried forward for further development and consideration in the secondary evaluation.

No-Build Alternative: The No-Build alternative was recommended to advance to the secondary evaluation. Though this alternative did not score favorably in the initial evaluation, it is a PEL and NEPA requirement to advance it as an environmental baseline against which other alternatives are measured.

Segment Alternatives: Each alternative in Segments A, B and Rodd Field Road was refined to meet the established engineering design criteria. These criteria are summarized in the Design Summary Report prepared for the PEL, which is included in Appendix E. These refinements are necessary to create a centerline alignment from which a 500-foot buffer could be produced by offsetting 250 feet on left and right.

Each alignment alternative is represented by an engineered planimetrics (dgn) file created using Microstation software. Subsequently, each 500-foot buffer offset from the geometric alignment was mapped in GIS as a shapefile. The refined geometric alignment alternatives are depicted in **Figure 5**.

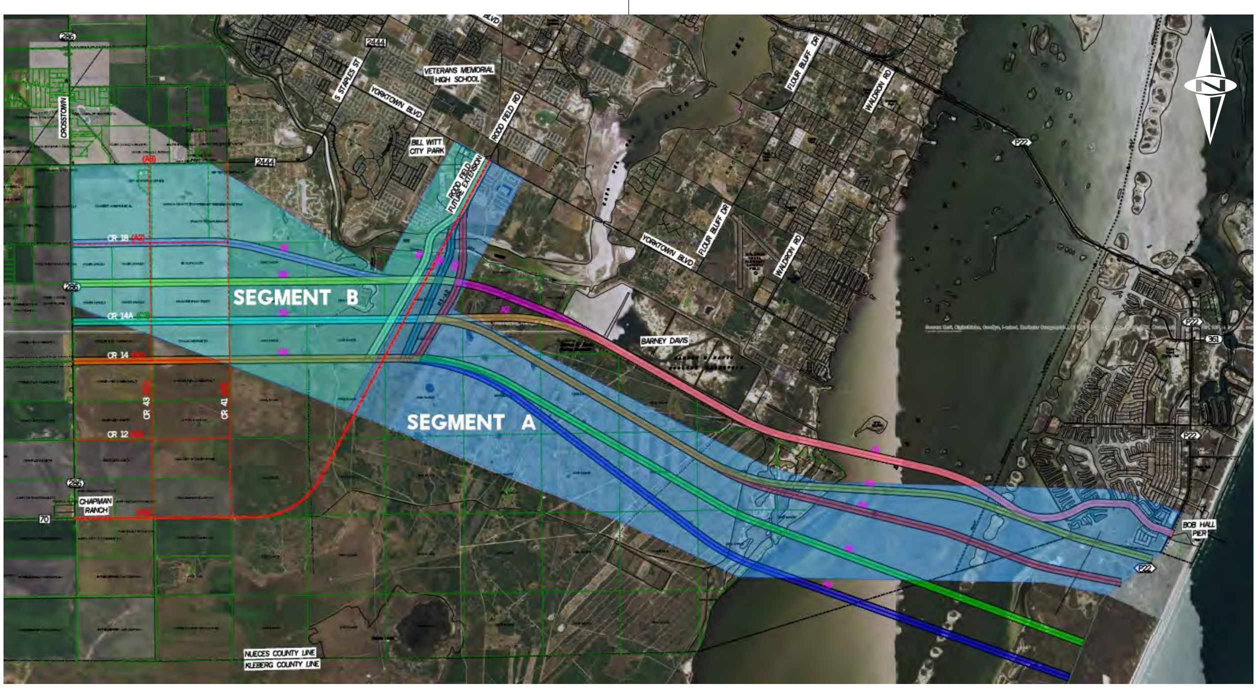


Figure 5: Refined alignment alternatives for Regional Parkway (Segments A and B).

7.5 Secondary Evaluation

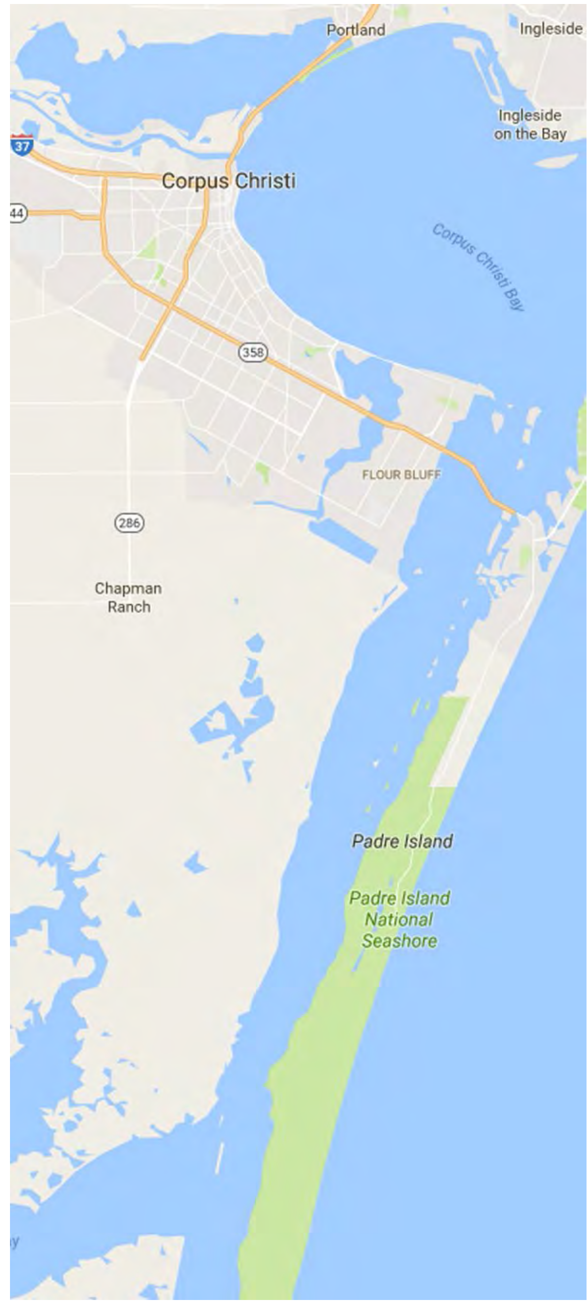
The secondary evaluation process normally involves the assessment of a reduced set of alternatives resulting from the initial screening. The following sections describe the methods used for analyzing and differentiating between the alternatives in Segment A, Segment B and the extension of Rodd Field Road. Three areas of consideration were employed to conduct the secondary evaluation: Engineering considerations, environmental considerations, and stakeholder input. Each area of consideration was evaluated using multiple criteria, each criterion was defined, and ranges were established for the purpose of scoring. The criteria, definitions, and scoring ranges, along with the complete decision matrix with back-up data, are presented in Appendix E.

Evaluation Methodology: In the secondary screening phase, each of the fifteen (15) alignment alternatives was evaluated based on several considerations.

The team opted for a "traffic light" scorecard using green, yellow, and red color scores to facilitate visualization and to minimize the subjectivity of a weighted or fine-grained scoring protocol. It is widely understood that green is indicative of good, yellow indicates fair, and red indicates poor or bad performance. One challenge of a low/medium/high scoring system is to effectively present the scoring criteria so that a low score indicates good performance across performance measures. The effort to consistently align performance measures across each evaluation criterion can produce awkward or counterintuitive results.

This method of relative criteria scoring can be either qualitative (based on professional judgment) or quantitative (based on direct quantity comparisons), depending on the criteria. Environmental scores were based on quantitative GIS data collected for numerous resource categories.

As with any scoring criteria, any alignment alternatives that rank highest may be carried forward to the next step in the project development process. The planning team recognizes that avoidance, minimization, and mitigation of environmental impacts could take place in a subsequent NEPA phase, thereby affecting the environmental analysis performed in this PEL Study. In addition, the No-Build alternative is carried through each evaluation step regardless of rank to keep a consistent baseline for comparison and since it must be retained for comparison in any NEPA document.



» As with any scoring criteria, any alignment alternatives that rank highest may be carried forward to the next step in the project development process.

7.6 Secondary Evaluation Results

Alignment alternatives that passed initial screening were developed further and refined in response to TWG reviews and stakeholder outreach. The secondary evaluation of each alignment alternative was then compared against the No-Build and other alignment alternatives.

The results of the secondary evaluation are presented in this section. The engineering, environmental, and stakeholder considerations and evaluation results for Segments A, B and Rodd Field Road are tabulated (**Tables 4-12**) on the following pages. **Table 13** presents the Cumulative Performance for each alignment alternative.

Engineering Considerations »

Table 4: Segment A

Evaluation Criteria	Segment A Alignment Alternatives								
	No-Build	A1	A2	A3	A4	A5	A6	A7	A8
Bridge Length	Green	Red	Red	Red	Green	Green	Green	Red	Red
Required ROW	Green	Red	Yellow	Yellow	Green	Green	Green	Red	Red

Table 5: Segment B

Evaluation Criteria	Segment B Alignment Alternatives				
	No-Build	B1	B2	B3	B4
Bridge Length	Green	Red	Red	Red	Green
Required ROW	Green	Yellow	Red	Green	Yellow

Table 6: Rodd Field Road Extension

Evaluation Criteria	Segment B Alignment Alternatives			
	No-Build	R1	R2	R3
Bridge Length	Green	Red	Red	Green
Required ROW	Green	Red	Yellow	Yellow

Table 7: Segment A

Evaluation Criteria	Segment A Alignment Alternatives								
	No-Build	A1	A2	A3	A4	A5	A6	A7	A8
Critical Habitat	Green	Red	Red	Red	Red	Red	Red	Red	Red
T&E Potential Occurrences	Green	Red	Red	Red	Red	Red	Red	Red	Red
FEMA Floodplains	Green	Red	Red	Red	Red	Red	Red	Red	Red
Hydrography	Green	Green	Green	Yellow	Yellow	Yellow	Yellow	Green	Green
Water Wells	Green	Green	Green	Green	Green	Green	Green	Green	Green
Wetlands	Green	Red	Red	Red	Red	Red	Red	Red	Red
National Registry District	Green	Red	Red	Red	Red	Red	Red	Red	Red
TARL (Linear Features)	Green	Green	Green	Green	Green	Green	Green	Green	Green
TARL (Site Points)	Green	Green	Green	Green	Green	Green	Green	Green	Green
Wet Utilities	Green	Red	Red	Yellow	Green	Green	Green	Red	Red
Platted Subdivisions	Green	Yellow	Yellow	Green	Green	Green	Green	Yellow	Yellow
Community Facilities	Green	Green	Green	Green	Green	Green	Green	Green	Green
Planned Developments	Green	Red	Red	Red	Red	Red	Red	Red	Red
Parks	Green	Red	Red	Green	Green	Green	Green	Red	Red
Prime Farmlands	Green	Green	Green	Green	Green	Green	Green	Green	Green
Haz Mat - Points	Green	Green	Green	Green	Green	Green	Green	Green	Green
Haz Mat - FUDS	Green	Red	Red	Red	Red	Green	Green	Red	Red
Oil and Gas Pipelines	Green	Red	Red	Red	Red	Yellow	Yellow	Red	Red
Oil and Gas Wells	Green	Yellow	Yellow	Green	Green	Green	Green	Yellow	Green
Current Land Use	Green	Red	Red	Green	Green	Green	Green	Yellow	Yellow
Unpaved Pathways	Green	Green	Green	Green	Green	Green	Yellow	Green	Green
CBRS Implications	Green	Green	Green	Red	Red	Yellow	Yellow	Green	Green

Table 8: Segment B

Evaluation Criteria	Segment B Alignment Alternatives				
	No-Build	B1	B2	B3	B4
Critical Habitat	Green	Green	Green	Green	Green
T&E Potential Occurrences	Green	Green	Green	Green	Green
FEMA Floodplains	Green	Yellow	Yellow	Yellow	Yellow
Hydrography	Green	Yellow	Green	Green	Yellow
Water Wells	Green	Green	Green	Green	Green
Wetlands	Green	Yellow	Yellow	Yellow	Yellow
National Registry District	Green	Red	Red	Red	Red
TARL (Linear Features)	Green	Green	Green	Green	Green
TARL (Site Points)	Green	Red	Green	Green	Green
Wet Utilities	Green	Green	Green	Green	Green
Platted Subdivisions	Green	Green	Green	Green	Green
Community Facilities	Green	Green	Green	Green	Green
Planned Developments	Green	Red	Red	Red	Red
Parks	Green	Green	Green	Green	Green
Prime Farmlands	Green	Red	Red	Red	Red
Haz Mat - Points	Green	Green	Green	Green	Green
Haz Mat - FUDS	Green	Green	Green	Green	Green
Oil and Gas Pipelines	Green	Yellow	Green	Green	Yellow
Oil and Gas Wells	Green	Green	Green	Green	Green
Current Land Use	Green	Green	Green	Green	Green
Unpaved Pathways	Green	Green	Green	Yellow	Green
CBRS Implications	Green	Green	Green	Green	Green

Table 9: Rodd Field Road

Evaluation Criteria	Rodd Field Road Alternatives			
	No-Build	R1	R2	R3
Critical Habitat	Green	Green	Green	Green
T&E Potential Occurrences	Green	Green	Green	Green
FEMA Floodplains	Green	Red	Yellow	Green
Hydrography	Green	Yellow	Yellow	Yellow
Water Wells	Green	Green	Green	Green
Wetlands	Green	Yellow	Yellow	Yellow
National Registry District	Green	Red	Red	Red
TARL (Linear Features)	Green	Green	Green	Green
TARL (Site Points)	Green	Red	Red	Green
Wet Utilities	Green	Red	Red	Red
Platted Subdivisions	Green	Yellow	Yellow	Yellow
Community Facilities	Green	Green	Green	Green
Planned Developments	Green	Red	Red	Green
Parks	Green	Red	Red	Red
Prime Farmlands	Green	Red	Red	Yellow
Haz Mat - Points	Green	Red	Red	Red
Haz Mat - FUDS	Green	Red	Red	Red
Oil and Gas Pipelines	Green	Yellow	Yellow	Yellow
Oil and Gas Wells	Green	Green	Green	Green
Current Land Use	Green	Yellow	Yellow	Yellow
Unpaved Pathways	Green	Yellow	Yellow	Yellow
CBRS Implications	Green	Green	Green	Green

Stakeholder Considerations »

Table 10: Segment A

Evaluation Criteria	Segment A Alignment Alternatives								
	No-Build	A1	A2	A3	A4	A5	A6	A7	A8
Property Owner 1	Green	Yellow	Yellow	Red	Red	Yellow	Yellow	Yellow	Yellow
Property Owner 2	Green	Red	Red	Green	Green	Green	Green	Green	Green
Property Owner 3	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Property Owner 4	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Agency 1 - FW	Green	Yellow	Yellow	Red	Red	Red	Red	Yellow	Yellow
Agency 2 - BE	Green	Yellow	Yellow	Red	Red	Red	Red	Green	Green
Entity - NGO	Green	Yellow	Yellow	Yellow	Yellow	Red	Red	Yellow	Yellow
Agency 3 - NS	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Green

Table 11: Segment B

Evaluation Criteria	Segment B Alignment Alternatives				
	No-Build	B1	B2	B3	B4
Property Owner 1	Green	Yellow	Yellow	Yellow	Yellow
Property Owner 2	Green	Red	Red	Green	Green
Property Owner 3	Green	Yellow	Yellow	Red	Green
Property Owner 4	Green	Yellow	Yellow	Yellow	Yellow
Agency 1 - FW	Green	Yellow	Yellow	Yellow	Yellow
Agency 2 - BE	Green	Yellow	Yellow	Yellow	Yellow
Entity - NGO	Green	Yellow	Yellow	Yellow	Yellow
Agency 3 - NS	Green	Yellow	Yellow	Yellow	Yellow

Table 12: Rodd Field Road

Rodd Field Road Alternatives			
No-Build	R1	R2	R3
Green	Yellow	Yellow	Yellow
Green	Yellow	Yellow	Yellow
Green	Yellow	Yellow	Yellow
Green	Yellow	Yellow	Yellow
Green	Yellow	Yellow	Yellow
Green	Yellow	Yellow	Yellow
Green	Yellow	Yellow	Yellow
Green	Yellow	Yellow	Yellow

The evaluation of alignment alternatives with respect to the considerations noted above revealed that A-5, B-4, and R-3 are the highest ranked alternatives in terms of the performance measures and reported in the decision matrix found in Appendix E. **Table 13** lists each of the alternatives and the respective number of green, yellow, and red marks. For simplicity the larger the number of green marks signifies a lower number of negative impacts, conversely the larger the number of red marks signifies a higher negative impact.

Table 13: Cumulative Performance of Alignment Alternatives

Segment A

Alignment Alternative	Cumulative Performance Scores		
	🟩	🟨	🟥
A1	9	10	13
A2	9	10	13
A3	12	7	13
A4	15	5	12
A5 ✓	16 ✓	7 ✓	9 ✓
A6	15	8	9
A7	12	8	12
A8	13	7	12

Segment B

Alignment Alternative	Cumulative Performance Scores		
	🟩	🟨	🟥
B1	14	12	6
B2	17	9	6
B3	18	9	5
B4 ✓	18 ✓	11 ✓	3 ✓

Rodd Field Road Extension

Alignment Alternative	Cumulative Performance Scores		
	🟩	🟨	🟥
R1	7	14	11
R2	7	16	9
R3 ✓	11 ✓	16 ✓	5 ✓

8.0 Traffic Analysis

Historical and existing traffic counts were collected for the study area to illustrate traffic patterns, truck percentages, directional distribution and intersection turning percentages.

In addition to the historical traffic counts obtained from TxDOT and the CCMPO, existing traffic counts were collected in November 2015 for a wider variety of geographic locations within the study area.

A review of the historical traffic counts (2010-2014) along the SH 358/PR 22 corridor indicates a four percent annual growth rate. This factor was then applied to the most recent traffic data sources from previous years to obtain 2015 traffic volumes. A summary of data is provided in the Traffic Analysis Technical memorandum in Appendix F.

8.1 Time of Day Traffic Distribution

The planning team utilized 24-hour tube counters to record the total vehicular volume every 15 minutes for one day. **Figure 6** depicts the average 15-minute volume plotted against the time of day for the fourteen (14) traffic count locations within the study area. Multiple days of data are typically collected to identify the time of day distributions. Since these are one-day counts, they are only considered a snapshot in time of the traffic characteristics within the study area.

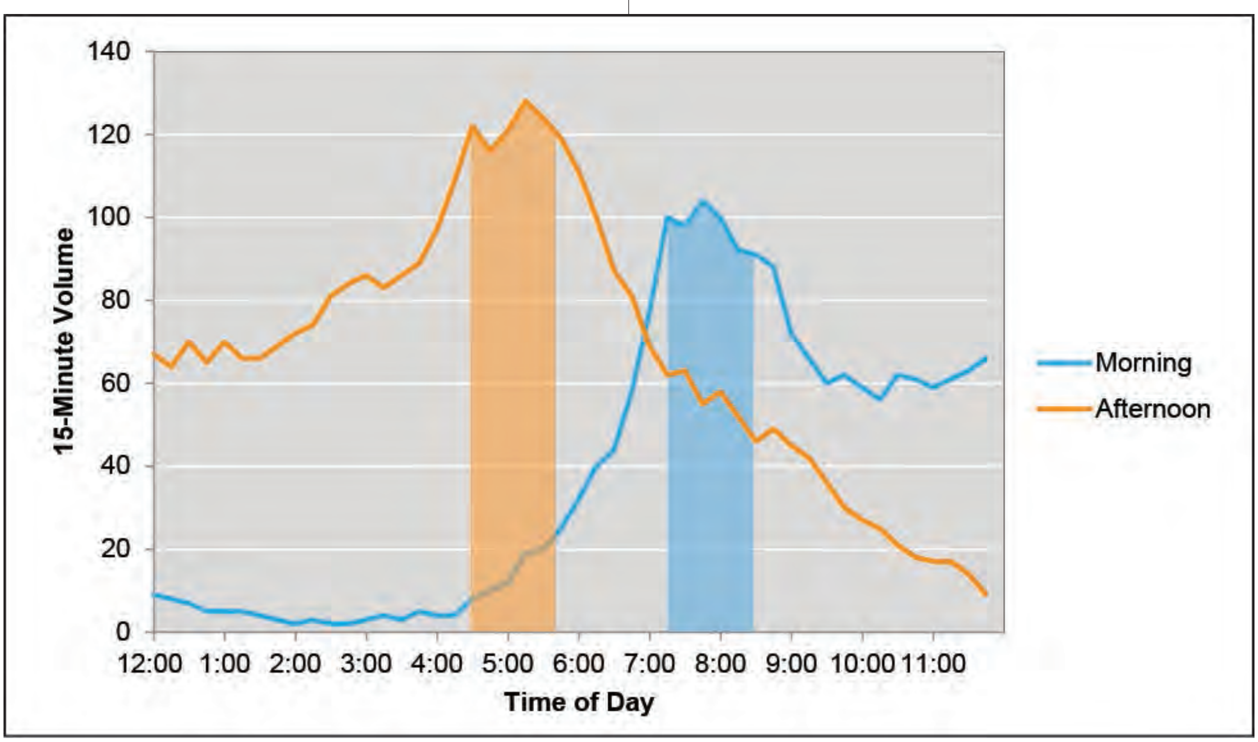


Figure 6: Average time of day traffic distributions from 14 traffic count locations within the study area.

Twenty-four hour count data were also used to determine the proportion of average annual daily traffic occurring in an hour (K-Factors) as well as directional distribution factor (D-Factors) in the eastbound and westbound directions during the peak hours.

The traffic analysis indicates that network traffic operations will improve with the construction of a Regional Parkway alignment alternative from within Segments A, B, and/or the Rodd Field Road Extension.

Below is a summary of findings:

- The 2040 CCMPO TransCAD travel demand model roadways were updated as part of this study. It should be noted that only the traffic assignment component of the model was run. It is recommended that the land use, employment, and population elements of the model be verified and updated accordingly as part of any future study.
- The results of the traffic assignment effort indicate that the proposed alignment alternatives will produce some induced demand in the urban areas.
- The modeling results suggest up to 7.6 percent of local traffic from South Padre Island Drive (SH 358) and PR 22 will divert to the proposed Regional Parkway alignment.
- The greatest diversion is projected for vehicles traveling to Padre/Mustang Islands: the model predicts a 15.3 percent shift in traffic from away SH 358/PR 22, suggesting Regional Parkway will serve as an alternate access to and from Padre and Mustang Islands.
- Based on this analysis, it is expected that each of the major intersections along SH 358 will operate at a level of service (LOS) E/F in 2035 No-Build conditions. The model suggests that traffic operations will improve under 2035 Build conditions to LOS D through implementation of Regional Parkway and intersection operational improvements.
- Based on this analysis, the Regional Parkway alignment is projected to operate at LOS A with the intersections operating at LOS B under 2035 Build conditions.

The traffic analysis indicates that network traffic operations will improve with the construction of a Regional Parkway alignment alternative from within Segments A, B, and/or the Rodd Field Road Extension.

9.0 Crossing of the *Laguna Madre*

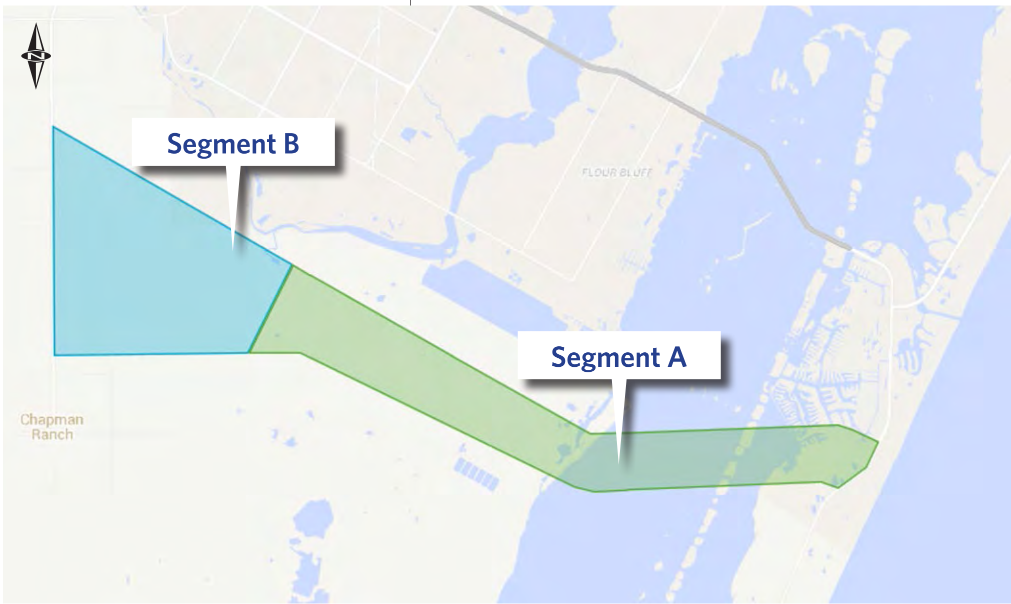
Appendix G: Crossing of the Laguna Madre Bridge Type Study describes the type and size (T&S) options studied for a second crossing of the Laguna Madre and provide a recommendation for the proposed bridge structures. This Bridge Type Study focuses on the proposed crossing of the Laguna Madre on the eastern end of Segment A.

Bridge structures will be designed in accordance with the most recent applicable AASHTO Load Resistance Factor Design (LRFD) Bridge Design Specifications, TxDOT Bridge Project Development Manual, TxDOT Bridge Design Manual-LRFD, and TxDOT Bridge Railing Manual.

Construction methodology will vary depending on the proximity of the construction activities to the navigable Gulf Intracoastal Waterway (GIWW) and sensitive aquatic habitats. Bridge design and technology will also reflect the state-of-the-art in the industry at the time of implementation. To minimize disturbance to aquatic habitats, it is anticipated that construction will utilize a span by span, or "launched", construction methodology from previously constructed portions of the proposed roadway/bridge.

A minimum 125 feet clear opening with a minimum of 73 feet vertical clearance over mean sea level must be maintained over the GIWW in accordance with the United States Coast Guard Bridge Clearance Guide. An opening of at least 200 feet is preferred to match other regional GIWW bridge structures such as the SH 332 (Surfside, TX) bridge and the John F. Kennedy Memorial Causeway (PR 22). The superstructure will need to be resistant to corrosion common to the coastal environment. Therefore, the main span and adjacent approach spans are anticipated to utilize a balanced cantilever segmental construction.

The recommended bridge type option includes pre-stressed U-beams for the approach spans and precast segmental concrete for the main span be continued to preliminary and final design based on the estimated construction cost, improved aesthetics, and the potential for impacts to aquatic habitat and shipping traffic. This option provides the necessary GIWW horizontal and vertical clearance requirements and corrosion resistance sought in a coastal environment while providing a construction method that has the least impact to ship and barge traffic within the GIWW.



The recommended bridge type option is the lowest magnitude cost option studied. This type of superstructure and substructure combination has been successfully implemented in other coastal environments and is common in Texas coastal regions and over the GIWW. It also provides an aesthetic and cost effective solution for the proposed Regional Parkway and would allow the aesthetic U-beams to be incorporated into the other overpass structures located inland or on Padre Island, such as a future direct connector between PR 22 and SH 361, for a consistent theme.

Figure 7: Precast Segmental Concrete Spans

›› The recommended bridge type option is the lowest magnitude cost option studied. This type of superstructure and substructure combination has been successfully implemented in other coastal environments and is common in Texas coastal regions and over the GIWW.

10.0 Conclusion & Recommendations

The Regional Parkway PEL Study developed fifteen alignment alternatives that met the fundamental purpose and need of the PEL Study.

These alternatives were subjected to a two-step evaluation process to identify alignment alternatives with the highest potential to meet the purpose and need of the Study, as defined in the RPMC Feasibility Study. The initial screening of the evaluation process was a high level pass/fail type analysis designed to eliminate alternatives that did not meet the purpose and need. No alternatives (other than the No-Build) were found to not meet the purpose and need of the Study.

In the secondary evaluation, each of the alignment alternatives was evaluated in greater detail on the basis of engineering considerations such as dimensional analyses, structural elements, and drainage elements; direct environmental impacts; and stakeholder input/support. The secondary evaluation process provided a more distinct comparison of alignment alternatives and ultimately identified the highest ranking alignment alternative for Segment A, Segment B, and the extension of Rodd Field Road.

Of the eight alignment alternatives evaluated in Segment A, Alternative A-5 was the highest ranking alternative. Of the four alignment alternatives evaluated in Segment B, Alternative B-4 was the highest ranking alternative. The future extension of Rodd Field Road included the evaluation of three alternatives; Alternative R-3 was the highest ranking.

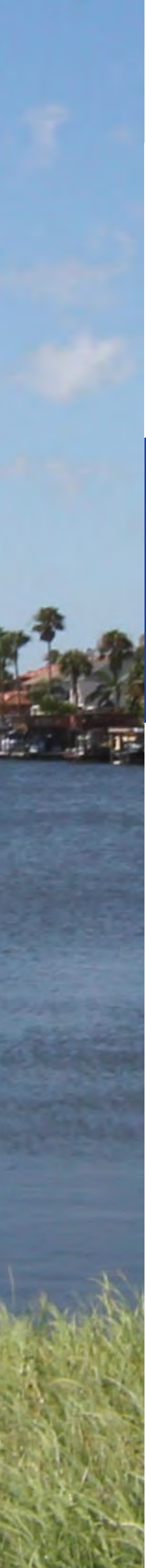
The evaluation results lend themselves to a phased approach to future development. Project implementation can be phased over time to provide incremental benefit in terms of improved mobility and enhanced travel safety as the study area continues to experience growth. The PEL Study recommends each of the alignment alternatives A-5, B-4, and R-3 as shown in **Figure 8** be carried forward and added into the City of Corpus Christi's Urban Transportation Plan.

Planning level order of magnitude cost estimates for each alignment alternative are provided and summarized in Appendix H. These costs are very conservative due to the conceptual nature of the alternatives and are suggested for planning purposes only. The capital cost elements considered such items as right-of-way preparation, paving, drainage and bridge structures. These items typically represent up to 80% of the costs associated with the development and construction of similar facilities. Additionally, a contingency factor of 20% was applied to each estimate for costs associated with engineering, ROW acquisition, utility coordination/adjustment/relocation, and environmental mitigation strategies. The median estimated cost of alignment alternatives is $42.4M per mile. Costs are largely driven by the bridge structure quantities and the crossing of the Laguna Madre.

Next steps in the project planning process may include incorporation of the results of this PEL into the City of Corpus Christi's Urban Transportation Plan. Future planning efforts should include: further evaluation of strategies to avoid, minimize, and mitigate environmental impacts; consideration of additional connecting facilities; and assessment of potential funding strategies. Additionally, amendments to the City's Unified Development Code may be necessary to accommodate implementation of Regional Parkway.

The CCMPO must continue to work collaboratively with the City and TxDOT to explore opportunities for including Regional Parkway in future updates of the MTP. The initial data collection and analyses presented in this PEL Study are intended to serve as a foundation for more comprehensive future field surveys and financial analyses necessary to consider Regional Parkway for placement on the State's transportation system.

Figure 8: Recommended Regional Parkway - Segment A5, B4 and R3



Appendix A

Summary of Previous Studies and Project History

SUMMARY OF PREVIOUS STUDIES AND PROJECT HISTORY

Regional Parkway - Planning and Environmental Linkages (PEL) Study

Corpus Christi Metropolitan Planning Organization
City of Corpus Christi

June 2016
CSJ: 0916-00-066

Introduction

The Regional Parkway Planning and Environmental Linkages (PEL) Study will explore alternatives and ultimately define a preferred alignment for two segments of the Regional Parkway Mobility Corridor (RPMC) between Park Road (PR) 22 on Padre Island and State Highway (SH) 286. The PEL will build upon the foundation of previous studies and address issues of growth, congestion, mobility and connectivity, and safety in the City of Corpus Christi (City) and Nueces County. The PEL Study will develop and evaluate roadway alternatives for environmental impacts, engineering and operational characteristics, and stakeholder support to determine a preferred route. The PEL Study will produce a transportation planning product for inclusion in the City of Corpus Christi's Master Thoroughfare Plan.

Planning for Regional Parkway

The Corpus Christi Metropolitan Planning Organization (CCMPO), City, Nueces County and San Patricio County sponsored and completed the Regional Parkway Mobility Corridor Feasibility Study in January 2013 to determine whether a new roadway is needed to alleviate congestion, provide an alternate route in portions of Nueces and San Patricio Counties, and to plan for forecasted population and traffic growth in the region. The study focused on the feasibility of the RPMC and determined that further study is warranted within a corridor extending from I-37 to PR 22.

As envisioned, this parkway would be an at-grade facility with limited access. Accommodations for vehicles, mass transit, bicycles, and/or pedestrians will be considered. As practical, Regional Parkway might also incorporate use of existing roadways as well as include construction of new location roadways and bridges. Development of the Regional Parkway is very likely to be phased in over time. Through an iterative alternatives evaluation process, including considerable public involvement, the feasibility study established a preferred corridor for the RPMC. Additionally, the feasibility study identified seven segments (Segments A-G) of independent utility – segments of roadway that would function independently without further construction of an adjoining roadway system, see **Figure 1**. These segments each encompass a broad area, but the RPMC study did not identify a specific path for any facility within the segments. However, it did set the stage for future planning work and also identified two segments as potential priorities for additional efforts given the projected growth in those

Figure 1: Segments of Independent Utility

areas, namely Segment A and Segment B.

Purpose of the Regional Parkway PEL Study

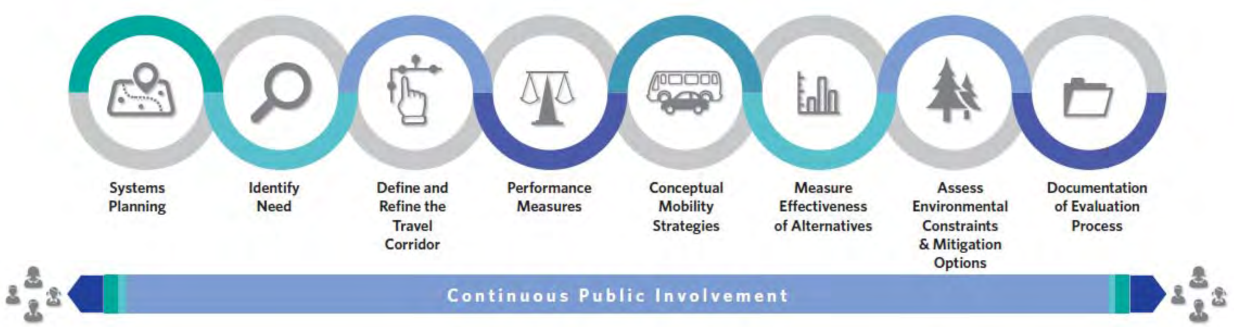
The purpose of the PEL is to conduct analyses and planning activities with resource agencies and the public in order to produce a transportation planning product that can be incorporated into the City's *Master Thoroughfare Plan*, effectively serving the community's transportation needs. The PEL seeks to define a preferred alignment for Segments A and B of the Regional Parkway within the previously identified RPMC study area. The results may be used to inform a subsequent project-specific National Environmental Policy Act (NEPA) process. This PEL provides an opportunity to further define the alignment and right-of-way footprint for Segment A and Segment B.

Linking planning and NEPA is an integral part of the PEL process that will serve to minimize duplication of future project development efforts, promote environmental stewardship, encourage meaningful and productive public engagement and reduce delays in project implementation.

What is a PEL?

A PEL study is a step in the national and state defined environmental review process at the corridor level. The results of the PEL may be used to inform a subsequent project-specific national Environmental Policy Act (NEPA) process.

Linking planning and NEPA is an integral part of the PEL process intended to be followed on the Regional Parkway PEL in order to minimize duplication of effort, promote environmental stewardship, encourage meaningful and productive public engagement, and reduce delays in project implementation.



The PEL process framework includes:

- Systems Planning;
- Identifying the Transportation Need;
- Identifying and Engaging Stakeholders throughout the community;
- Defining Roles and Responsibilities;
- Defining and Refining the Travel Corridor (including logical termini);
- Developing Purpose, Need, Goals and Objectives;

- Developing Performance Measures;
- Developing Alternatives and Defining Modes of Travel;
- Evaluating and Screening Alternatives;
- Identifying Planning-Level Environmental Impacts and Potential Mitigation Options;
- Documenting the Evaluation Process; and,
- Developing reports to document and finalize the PEL Study.

The PEL study is prepared to meet the thresholds identified in Appendix A to 23 CFR 450, specifically 23 CFR § 450.212(b) and 450.318(b), so that it can be used to inform the NEPA process. In order to meet these requirements the PEL study shall be NEPA-like and include the following thresholds:

- Coordination with local, state, tribal, and federal agencies;
- Public input and review of the PEL study, including opportunity for public/agency involvement in decision making;
- Documentation of decisions in technical memorandum format including specific information such as dates, interested parties, decisions made, distribution list, etc.; and
- Adherence to and completion of the Planning/Environmental Linkages Questionnaire that shall be included in the PEL study.

Study Area

The study area is composed of Segment A and Segment B of the RPMC. The Regional Parkway PEL study area is within the limits for which CCMPO is required to perform transportation planning activities. The study area is south of the Corpus Christi city limits, specifically the Southside Planning District and the Flour Bluff Planning District, but within its extraterritorial jurisdiction (ETJ). The study area crosses the northern limits of the Laureles Division of the King Ranch.

The study area, depicted in **Figure 2**, is bounded on the east by PR 22 on Padre Island and on the west by SH 286. The boundary between Segment A and B represents the planned extension of Rodd Field Rd. as shown in the City of Corpus Christi Urban Transportation Plan - 2013 update. The PEL study area is predominately located within Nueces County, except for a small portion south and east which traverses into Kleberg County and extends to Padre Island. The combined study area of Segment A and Segment B is over 14,000 acres.

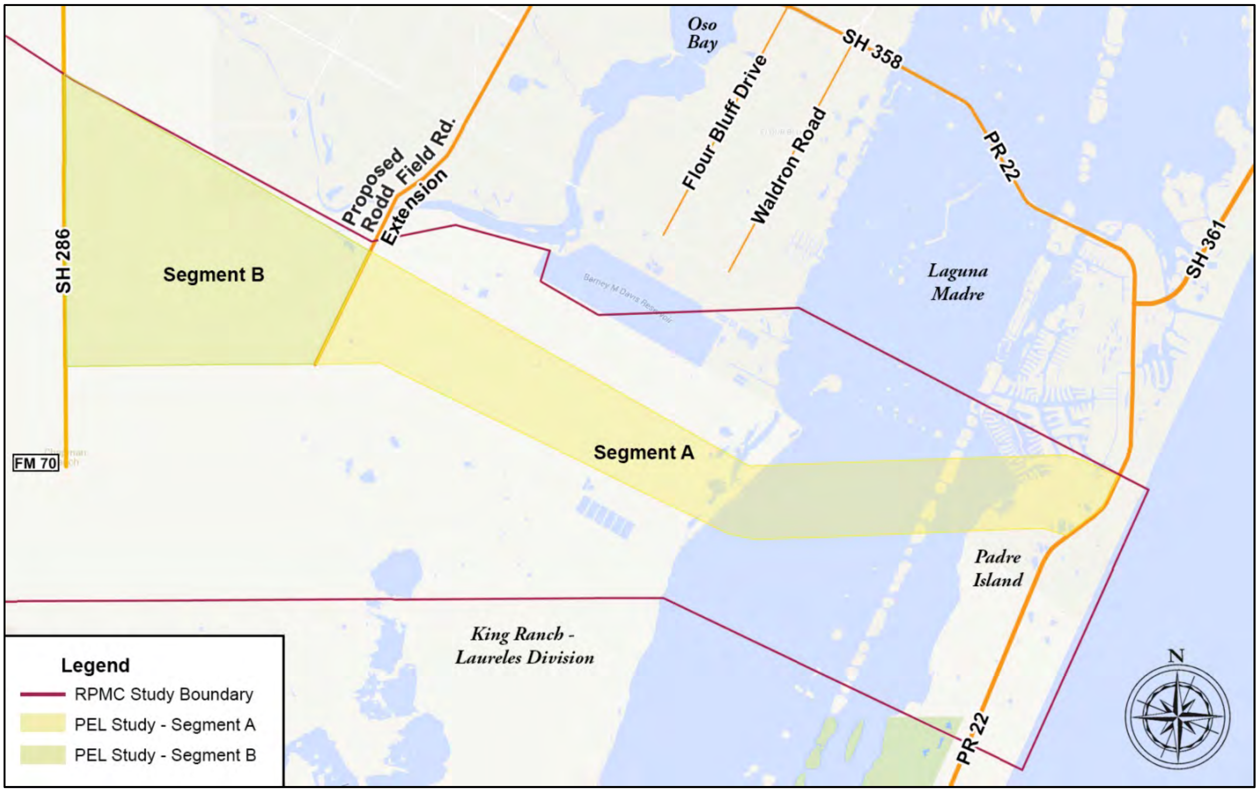


Figure 2: PEL Study Area

The study area is mostly rural in character; its use is predominantly agricultural and open space. Segment A crosses the Laguna Madre and its marine environment. Portions of Segments A and B lie within the 100-year floodplain. Land uses adjacent to the proposed Rodd Field Road extension include light industrial, low to medium density residential, and a crossing of Oso Creek which has adjacent preservation corridors. Capital improvements within the study area include a small number of unpaved roads and engineered drainage channels.

Previous Studies

The role of reviewing previous studies is an important task in the planning process. It is most often the case that a conceived project has some history that serves as a context for the current work. Previous studies record the goals and objectives as well as the parameters and constraints that produced the studies' findings and recommendations. It is important to note what changes have been effected that might alter previous findings and recommendations.

A review of previous studies also helps to avoid a duplication of effort. It is not necessary to evaluate alternatives previously studied and dismissed. Similarly, there may be revised legislation or new technologies that prompt new alternatives not previously considered. The current study may need to consider such potential scenarios.

Concurrent studies also serve to establish the planning context. There are no concurrent transportation studies that materially affect the Regional Parkway PEL Study. However, the City of Corpus Christi does have plans to add the south side area into a regional sub-area study in

2016. TxDOT also continues to make progress on extending SH 286 to the south, past FM 2444. There are planning documents, however, that do influence this current study. For these listed reasons, previous studies and concurrent planning documents are reviewed in the PEL study.

South Loop Transportation Study

The South Loop Transportation Study was undertaken by the CCMPO and completed in October 1999. The report recognized actual and projected growth in population and vehicular trips, and the development pressures to the south and northwest of Corpus Christi. These key issues were central to the study:

- Increasing congestion on SH 358 and on arterials crossing SH 358;
- The role of SH 358 as the only major highway connecting various parts of the City of Corpus Christi for people who live on the south side and work either downtown, at Corpus Christi Naval Air Station, at area refineries, or other major places of employment on the city's north side;
- Insufficient right of way for improving SH 358 or crossing arterials; and
- Emergency evacuation.

The report recommended a new South Loop roadway in addition to several short-term and long-term recommendations for transportation system improvements. Collectively, these recommendations were intended to provide relief to I-37, US 77, and SH 358. The South Loop corridor was identified as originating from US 77 north of Odem, proceeding southward crossing the Joe Fulton International Corridor along Carbon Plant Road, and extending toward SH 286. The corridor is extended to Padre Island with a second crossing of the Laguna Madre.

Among the long-term recommendations were actions related to the development of I-69 in the study area and a recommendation for a second crossing of the Nueces River due to access, capacity and operational limitations of the existing I-37 river crossing.

Regional Parkway Mobility Corridor Feasibility Study

The Regional Parkway Mobility Corridor Feasibility Study was collectively sponsored by the CCMPO, the City, Nueces County, and San Patricio County and was published in January 2013. The intent of the study was "to determine whether a new roadway is needed to alleviate congestion, provide an alternate route in portions of Nueces and San Patricio counties, and to plan for forecasted growth in the region. The study focused on the feasibility of what has become known as the Regional Parkway Mobility Corridor (RPMC)."

The purpose of the RPMC Feasibility Study was three-fold and was stated as:

- Reduce congestion and facilitate regional mobility, connectivity and system linkages;
- Facilitate potential economic and population growth and address safety issues; and,
- Provide an alternate hurricane evacuation route.

The study utilized an alternatives evaluation approach to narrow a universe of corridor alternatives to a preferred corridor alternative. The preferred alternative is described as being 52 miles long, passing west of Robstown, TX. Connections would be provided at thirteen locations included (from east to west): PR 22, Waldron Road, Flour Bluff Drive, Rodd Field Road, SH 286, FM 2444, FM 665/FM 1694, FM 892, FM 2826, US 77, SH 44, FM 624, and I-37.

The preferred alternative was then divided into seven segments of independent utility. Those segments are designated as Segment A through Segment G, beginning at PR 22 on North Padre Island and ending at I-37. Segment A, from PR 22 to Rodd Field Road, and Segment B, from Rodd Field Road to SH 286, as identified in the RPMC Feasibility Study are the subject of the Regional Parkway PEL Study. The feasibility study identified a broad corridor for the RPMC, and anticipated that a project development process would follow to identify a specific alignment.

Constructing the proposed parkway would link key destinations in or near Corpus Christi and provide other potential benefits including:

- Relieve congestion on SH 358 (South Padre Island Drive), improve safety, and facilitate regional mobility;
- Improve hurricane evacuation by providing a reliable, alternate evacuation route for North Padre Island and the South Side of Corpus Christi; and,
- Accommodate the region's projected population growth. According to the Texas State Data Center (TSDC), the population of the Corpus Christi Metropolitan Area, which includes Nueces and San Patricio Counties, is projected to increase by 21 percent by 2050.

Other Planning Documents

The previously cited studies provide a look back and establish the historical thread of the development of the Regional Parkway. Equally important is a look ahead at other documents which serve to guide the planning context and influence the Regional Parkway PEL Study. These planning documents reflect the community vision and act as a pathway to realize that vision. It is the intent of the Regional Parkway PEL Study to align with the community vision and the goals and objectives of the CCMPO *Metropolitan Transportation Plan* (MTP) and the City of Corpus Christi's *Plan CC Comprehensive Plan 2035*.

CCMPO Metropolitan Transportation Plan (MTP)

The greater Corpus Christi area has a more than 50 year history of transportation planning, most evidenced by the creation of the CCMPO in 1972. The CCMPO leads a comprehensive, cooperative, and continuing transportation planning process. The CCMPO produces the MTP that is the 25-year long-range plan for preserving and expanding the transportation system in the region.

The MTP sets out the regions' transportation goals and an action plan for achieving those goals. The five goals are:

1. Reduce congestion by maximizing the capacity and efficiency of existing major highways and streets.

2. Improve the safety of the transportation network through improved efficiency and effectiveness of major road and highway facilities.
3. Provide new facilities, improved facilities and transportation services that expand the economic opportunities in the area.
4. Provide new facilities, improved facilities and transportation services that support the maintenance of attainment status and air quality; and,
5. Provide new facilities, improved facilities and transportation services that increase the value of transportation assets.

Many of the MTPs planned actions directly influence the Regional Parkway PEL Study; others have less direct impact but will nonetheless help establish a broader context in which the PEL study will be completed. These actions were established in order to meet the five goals of the MTP:

- Action 1: Develop and maintain the street classifications geodatabase as roadway improvement decisions are made.
- Action 2a: Establish and support a system of priorities for the existing roadway reconstruction and preventative maintenance.
- Action 2b: Establish and support a system of priorities for the replacement of deficient bridges.
- Action 3: Preserve major street alignments by preventing development within corridors designated as right-of-way for future roads.
- Action 4: Ensure that land use (type, intensity, and traffic generation characteristics of developments) exhibits a reasonable relationship to the street system.
- Action 5: Minimize potential traffic conflicts by controlling the frequency and location of driveway access to principal arterial, arterial, and collector streets.
- Action 6: Provide off-street parking and loading facilities in sufficient quantity to accommodate vehicle volumes generated by the type and intensity of development.
- Action 7: Discourage on-street parking along major streets.
- Action 8: Maximize the efficiency of the existing street system by implementing effective transportation control measures.
- Action 9: Employ intelligent transportation systems and other transportation system management techniques for improving the capacity of the existing street system.
- Action 10: Emphasize the preservation of existing assets.
- Action 11: Promote community or urban designs that facilitate alternative travel modes.

City of Corpus Christi Plan CC Comprehensive Plan 2035

The July 2015 Plan CC draft provides direction for the development of the City over the next twenty years. Plan CC describes a city poised to take advantage of a unique time in history to diversify the regional economy and build a predictable and sustainable platform for development. Plan CC describes itself as a plan “to guide the city to take advantage of the opportunities, invest in the future, and make choices that result in higher quality of life and a more diversified economy.” The plan is built upon a vision and set of principles upon which growth and development will be shaped. These vision elements are descriptive of a future city where:

- A broadly diversified economy provides opportunity for all
- Modernized city services and systems support growth and vitality in all parts of the city.
- High-quality, safe, connected, and diverse neighborhoods provide a variety of living choices; and,
- Stewardship of our natural heritage and green-space networks strengthens our unique character and supports resilience.

The principles for achieving the vision are:

- Be strategic.
- Be cost-effective.
- Act transparently.
- Be accountable.
- Pursue goals through partnerships.
- Be business-friendly.
- Pursue high-quality development.
- Promote good health.
- Prepare students for good jobs.
- Support diversity.

Plan CC has nine topical elements that describe the community vision and principles in greater detail. Several plan elements which have bearing on the Regional Parkway PEL Study are presented below:

<u>Element 3 – Resilience and Resource-Efficiency</u>

While the focus of this plan element is energy, it has bearing on the Regional Parkway PEL Study. Plan CC describes resilience as “the ability to anticipate hazards and reduce overall vulnerability by adapting to changing conditions and promoting multiple lines of defense against hazardous events.” The plan further promotes resource efficiency through sustainable design, a concept with significant application to the roads and bridges of the Regional Parkway.

<u>Element 4 – Housing and Neighborhoods</u>

This element focuses on quality housing and community identity. Implicit in the element, however, are the concepts of mobility, connectivity, and access. The plan’s vision states, “People can get around the city by multiple modes of transportation – connected networks of good streets and sidewalks, safe bicycle routes, and excellent public transportation.” Mobility, connectivity, and multimodal facilities are included in the Regional Parkway PEL Study.

<u>Element 6 – Transportation and Mobility</u>

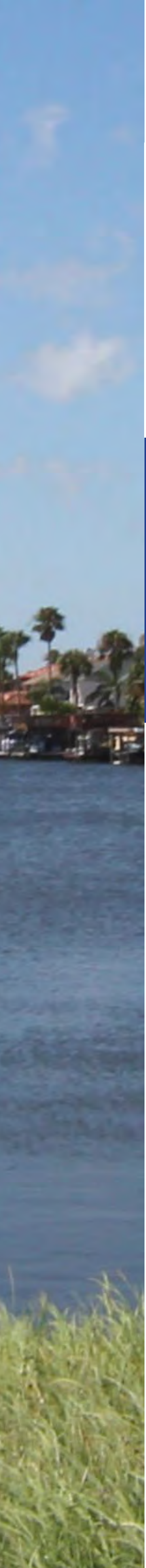
The transportation element blends resilience, mobility, connectivity, land use and roadways as part of the future vision of the city. Plan CC states this element’s focus as “improving Corpus Christi’s transportation infrastructure and systems, including expanding mode choices to encourage biking, walking, and public transportation while maintaining the roadway system for long-term effective use. Integrating land use and transportation planning are key goals for the future.”

Findings and Recommendations

The concept of a new roadway to the south of the City has been a topic of discussion for a considerable length of time and has been advanced in the two previous studies cited. The Regional Parkway PEL Study will build upon the framework of these previous studies to produce a transportation planning document designed to inform future mobility decisions. The Regional Parkway PEL Study will specifically accomplish these objectives:

- Determine a specific alignment in the RPMC Segments A and B;
- Perform an iterative alignment alternatives analysis with well documented decision points to determine a preferred alignment and provide the basis for a future NEPA study; and,
- Determine the location and bridge type for a second causeway across the Laguna Madre to improve mobility and serve as a secondary hurricane evacuation route.

These objectives will be accomplished in a manner consistent with the community goals and vision set forth in the CCMPO MTP and the City of Corpus Christi's Plan CC.



Appendix B

Purpose and Need Technical Memorandum

PURPOSE AND NEED

TECHNICAL MEMORANDUM

Regional Parkway - Planning and Environmental Linkages (PEL) Study

Corpus Christi Metropolitan Planning Organization
City of Corpus Christi

March, 2016
CSJ: 0916-00-066

Introduction

There has been discussion going back to the mid eighties among the Corpus Christi Metropolitan Planning Organization (CCMPO), City of Corpus Christi (COCC), Nueces and San Patricio Counties and other interested parties concerning the need for an alternate major transportation route within Nueces County, particularly on the south side of Corpus Christi. This alternate route would be designed to address the expanding housing, industrial and commercial developments in Nueces County and the resulting traffic congestion and safety issues. The Regional Parkway Mobility Corridor (RPMC) was proposed to meet these and other transportation needs of the Corpus Christi area. As envisioned, this parkway would be an at-grade facility with limited access. It could accommodate vehicles and other transportation modes including mass transit, bicycles, and/or pedestrians. As practical, it might incorporate existing roadways as well as include construction of new roadways and bridges as needed.

According to the Texas State Data Center (TSDC), the population of the Corpus Christi Metropolitan Area, which includes Nueces and San Patricio Counties, is projected to increase by 21 percent by 2050 (**Table 1**)(TSDC, 2016). This projected growth in population and its accompanying development activity is anticipated to result in a substantial increase in future traffic volumes by the year 2040 along existing roadways in Nueces County including segments of U.S. Highway (US) 77, State Highway (SH) 44, SH 358 (South Padre Island Drive), SH 286 (Crosstown Expressway), and Park Road (PR) 22 (**Table 2**) (CCMPO, 2016 and TxDOT, 2014). However, projected growth is likely to be concentrated on the south side of Corpus Christi and North Padre Island, resulting in anticipated increased traffic congestion and associated safety issues.

Table 1. 2010-2050 Corpus Christi Metropolitan Area Estimated Population Growth

Area	2010	2050	Percent Change
Corpus Christi Metro Area	405,027	487,867	20.5
Nueces County	340,223	398,122	17.0
San Patricio County	64,804	89,745	38.5

Source: TSDC, 2016

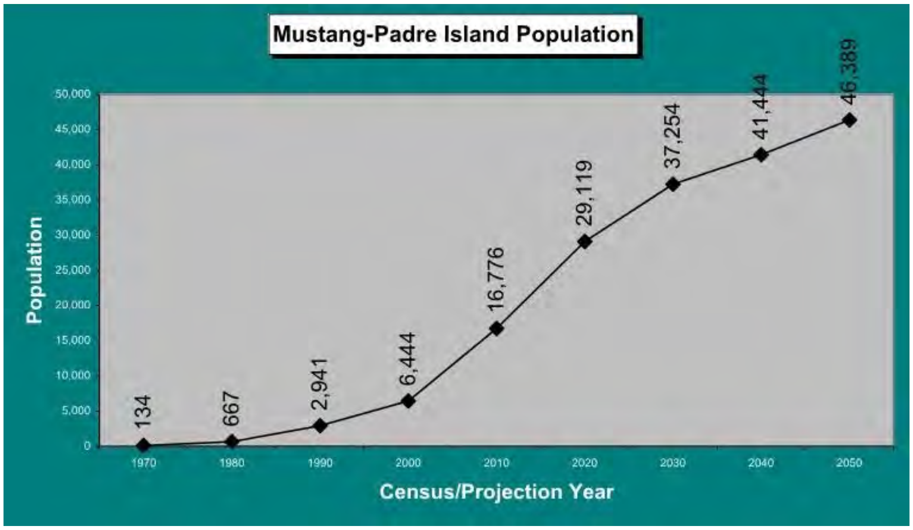
Table 2. 2014-2035 Average Traffic Data for Major Roads within the Project Area

Roadway	From	To	2014	2035	% Change 2014 to 2035
US 77	County Line	SH 44	22,200	38,979	76%
	IH 37	US 181	23,861	40,731	71%
SH 44	County Line	US 77	8,851	14,675	66%
	US 77	SH 358	21,478	47,134	119%
SH 286	IH 37	SH 358	84,212	102,813	22%
	SH 358	Saratoga	25,466	63,040	148%
	Saratoga	FM 2444	12,088	26,287	117%
	FM 2444	FM 70	5,409	6,268	16%
SH 358	IH 37	SH 286	63,903	103,066	61%
	SH 286	Staples	98,899	102,163	3%
	Staples	Naval Air Station	64,376	89,519	39%
	Naval Air Station	SH 361	25,570	56,265	120%
Park Rd 22	Jackfish Ave	SH 361	21,409	43,735	104%
	SH 361	Whitecap Blvd	13,798	35,440	157%

Sources: CCMPO TransCad model 2035 Data, and TxDOT 2014.

In addition, based on population estimates for the area (**Table 3**) (COCC, 2004), the growth and development of residential communities and vacation destinations located on Mustang-Padre Island is anticipated to escalate. At this time the John F. Kennedy Memorial Causeway is the only direct route that connects North Padre Island with Corpus Christi. However, the Texas Department of Transportation (TxDOT) operates a ferry system in Port Aransas, located approximately eighteen miles north of the intersection of SH 361 and PR 22. The route runs between two and six ferries a day and connects travelers on SH 361 a link across the Corpus Christi Channel between Aransas Pass, on the mainland, and Port Aransas, on Mustang Island.

Table 3. 1970-2050 Mustang-Padre Island Population Growth



Source: COCC, 2004.

The vulnerability of these areas to floods and severe weather events such as hurricanes underscores the need for redundancy in evacuation routes which would be provided by an additional crossing of the Laguna Madre.

The following is a discussion of the purpose and need for proposed improvements within the Regional Parkway study area. The proposed improvements referred to in this document focus on segments A and B of the original RPMC study completed in January 2013 which identified the feasibility of moving forward in the planning process to identify and evaluate alternatives. Current and future conditions within the Study Area are discussed, as well as previous studies in the region, and mobility throughout the region. The Study Area is defined in the paragraphs below and illustrated in **Figure 1**.

Study Background

The RPMC Feasibility Study, completed in January 2013 (HDR, 2013), identified seven segments within the corridor which were then evaluated to determine their prioritization of usage. It was subsequently concluded that a Regional Parkway route was feasible and merited if constructed in segments of independent utility (SIU). The seven SIUs are included within the region's Metropolitan Transportation Plan (MTP) which extends through the year 2040.

Segments A and B were selected for the next phase of the planning study, a Planning and Environmental Linkages Study (PEL) to evaluate the individual segments in addition to an area which includes the extension of Rodd Field Road from Yorktown Boulevard to Segment B. The selection of Segments A and B resulted from the examination of projected traffic volumes, reduction of travel time, and determination of the benefit/cost ratio for each SIU.

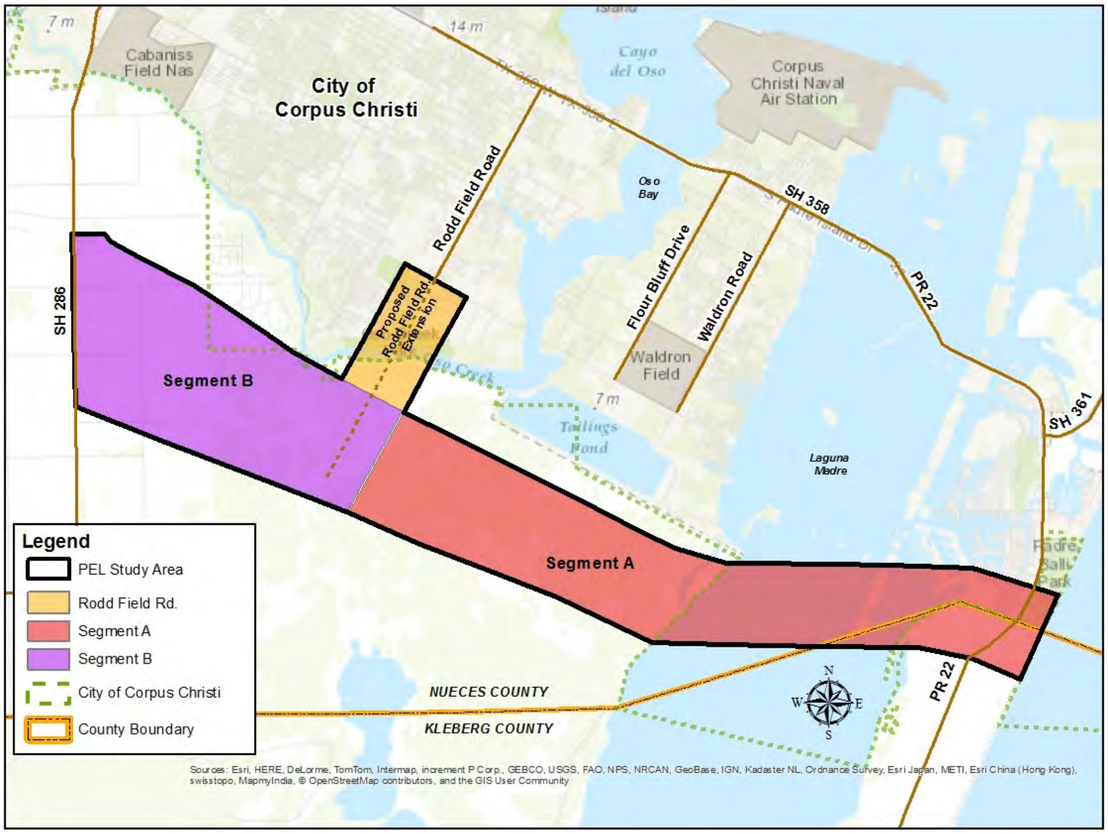


Figure 1: Regional Parkway PEL Study Area

Study Area

The study area for the Regional Parkway PEL study is composed of Segment A and Segment B of the RPMC. These segments are located within the limits for which CCMPO is required to perform transportation planning activities. The study area is south of the Corpus Christi city limits, specifically the Southside Planning District and the Flour Bluff Planning District, but within its extraterritorial jurisdiction (ETJ). The study area also crosses the northern limits of the Laureles Division of the King Ranch.

The study area, depicted in **Figure 1**, is bounded on the east by PR 22 on Padre Island and on the west by SH 286. The study area is contained in Nueces County with the exception of a small portion of Segment A which crosses into Kleberg County on Padre Island.

The study area is mostly rural in character; its use is predominantly agricultural and open space. Segment A crosses the Laguna Madre and its marine environment. Portions of Segments A and B lie within the 100-year floodplain. Land uses adjacent to the proposed Rodd Field Road extension include light industrial, low to medium density residential, and a crossing of Oso Creek which has adjacent preservation corridors. Capital improvements within the study area include a small number of unpaved roads and engineered drainage channels. TxDOT is currently working to expand and extend capacity of SH 286 (Crosstown Expressway) to just south of the intersection of FM 2444 (Staples St.) as well as improvements to FM 2444.

Potential connecting facilities in Segment B include county roads 41 (CR 41) and 43 (CR 43) and the proposed extension of Rodd Field Rd.

Previous Studies

Previous studies of the need for enhanced mobility have been conducted and generally focused on the south side of Corpus Christi. Early studies (1986) conducted by Chapman Ranch involved a new location south side route. Subsequently, the South Loop Transportation Study dated October of 1999 (CCMPO, 1999) recommended an outer loop be constructed within San Patricio and Nueces Counties to alleviate anticipated congestion based on expected growth and inadequate existing infrastructure. Some of the key issues noted in this report were:

- Increasing congestion on the State Highway (SH) 358 and on arterials crossing Interstate Highway (IH) 37
- SH 358 as the only major highway connecting various parts of Corpus Christi for people who live on the south side or on the island and work either downtown, at Corpus Christi Naval Air Station (NAS), at area refineries, or major places of employment in the area
- Insufficient right-of-way (ROW) for improving various arterials and SH 358
- Emergency evacuation issues

The 1999 study also summarized expected population growth patterns and projected traffic volumes within the study region. These findings estimated growth occurring south of Oso Creek and in areas adjacent to Farm-to-Market (FM) 624. The final recommendation identified a corridor from United States (US) 77 north of Odem, crossing the Joe Fulton International Trade Corridor towards the south via Carbon Plant Road, and extending to SH 286. However, a crossing extending from US 77 north of Odem would traverse the Nueces River delta. Also, an additional crossing of the Laguna Madre was recommended, which would extend the loop to North Padre Island. The findings of the 1999 study correlate with and are still relevant to the RPMC. Additionally, recent studies have been conducted to initiate implementation of IH 69 through portions of Nueces and Kleberg Counties.

The Need for Mobility Improvements to the Regional Parkway PEL Study Area

The TSDC anticipates a 21 percent increase in the population of the Corpus Christi Metropolitan Area by 2050 (**Table 1**) which would result in increased traffic congestion and safety issues. However, this overall population growth estimate is predominately due to residential and commercial development on the south side of Corpus Christi. In addition, within Nueces County future traffic volumes along existing roadways including segments of US 77, SH 44, SH 286, and SH 358/PR 22 are anticipated to increase substantially by 2040 (**Table 2**).

On North Padre Island, the COCC estimates projected population growth increases of nearly 250% in flood-prone and vulnerable residential communities and vacation sites on the island underscores the need for a more efficient evacuation route which would be provided by an additional crossing of the Laguna Madre (John F. Kennedy Causeway) (**Table 3**). Currently, the only other way to travel to and from North Padre/Mustang Islands is via the Port Aransas ferry system. According to TxDOT, the ferry system often experiences long wait times during peak periods of seasonal travel. System connectivity is also served by the City's planned extension of Rodd Field Rd. This proposed improvement, as shown on the Urban Transportation Plan Map (March 2013), proposes a six-lane primary arterial (A3) that would eventually extend south to FM 70.

Purpose of the Regional Parkway PEL Study

The purpose and need outlined in this document builds upon that which was developed in the RPMC and will be focused on Segments A and B. The PEL will be used as a platform for structuring later comparisons of transportation alternatives and determining recommended alignments from within the refined segment study areas. The PEL will serve as the basis for future purpose and need justifications. According to the Federal Highway Administration, the purpose and need establishes why an agency is proposing to spend taxpayers' money while at the same time causing potential environmental impacts.

The project purpose and need drives the process for alternatives consideration, analysis, and ultimate selection. The Council on Environmental Quality (CEQ) regulations requires that the NEPA process address the "no-action" alternative and "rigorously explore and objectively evaluate all reasonable alternatives." Furthermore, a well-justified purpose and need is vital to meeting the requirements of Section 4(f) (49 U.S.C. 303) and the Executive Orders on Wetlands (E.O. 11990) and Floodplains (E.O. 11988) and the Section 404(b)(1) Guidelines. Without a well-defined, well-established and well-justified purpose and need, it will be difficult to determine which alternatives are reasonable, prudent and practicable.

The development of solutions and alternatives to the mobility challenges affecting the RPMC should be focused on the issues covered in this discussion. The purpose of the PEL Study is to conduct analysis and planning activities with resource agencies and the public in order to produce a transportation planning product that effectively serves the community's transportation needs. The results of the study may be used to inform a subsequent project-specific National Environmental Policy Act (NEPA) process.

In order to effectively serve the community's transportation needs, a transportation planning product must address the following general problems as defined by the CCMPO, COCC, Nueces County and other major stakeholders

- Reduce congestion and facilitate regional mobility, connectivity and system linkages
- Facilitate potential economic and population growth and
- Address safety issues including a proposed alternate hurricane evacuation route.

Improvements within Segments A and B may include proposed modifications to connecting facilities such as SH 286, PR 22, and extension of Rodd Field Road with a crossing of Oso

Creek, CR 41, and CR 43. Additionally, a second causeway connecting to North Padre Island, addressing the identified purposes as described below.

Reduce Congestion and Facilitate Regional Mobility, Connectivity and System Linkages

The PEL of Segments A and B will develop and evaluate potential alternative routes and their connections to existing highways and roadways, as well as evaluating an extension of Rodd Field Rd. The proposed project would provide direct connections to SH 286 for traffic traveling to and from Corpus Christi, while alleviating existing congestion issues along SH 358 by providing an alternate travel route to and from North Padre Island and improved connections to the south side by way of Rodd Field Rd. The proposed project would also improve connectivity and system redundancy by constructing an additional bridge over the Laguna Madre, which would supplement the existing crossing provided by the John F. Kennedy Memorial Causeway.

Facilitate Potential Growth and Address Operational Safety Issues

By providing additional connections to SH 286, Rodd Field Rd., and PR 22, the proposed project would play an integral part in the creation of economic development opportunities by providing the transportation infrastructure needed to access and support existing and future land development and regional growth. In addition, because the proposed project is expected to be a limited access facility, the number of ingress/egress conflicts along the corridor would be reduced and the associated growth more controlled.

This alternative major transportation route would also intersect with other roadway facilities, such as SH 286, PR 22, CR 41, CR 43, and Rodd Field Rd. that serve or are proposed to serve military installations and economic development opportunities directly related to tourism (North Padre Island/Port Aransas) and access to higher education institutions (Texas A&M - Corpus Christi & Kingsville campuses, Del Mar College - Southside Campus). The creation of this route will reduce the reliance on the heavily used ferry system in Port Aransas and may also improve the level of service across the existing JFK causeway, where expansion is limited due to the highly built-out environment of the SH 358 corridor. The Regional Parkway will provide for improved bicycle and pedestrian facilities and connections to the Oso Creek greenbelt.

Address Safety Issues and Provide Alternate Hurricane Evacuation Routes

The proposed project would serve an additional purpose of creating transportation alternatives during incidents and during hurricane evacuation actions by providing access to alternate routes, such as FM 665 and FM 70 toward Alice, Bishop and points westward, thereby avoiding the anticipated congestion on SH 358 or I-37/US 77. Furthermore the projects proposed bridge over the Laguna Madre would make available an additional hurricane evacuation route for the vulnerable communities on North Padre and Mustang Islands.

Conclusion

Information on current and projected conditions in the RPMC study area supports the conclusion that substantial transportation infrastructure improvements are needed. Development of proposed improvements to Segments A and B of the RPMC depend on strategies that meet the Purpose and Need of the project:

- Reduce congestion and facilitate regional mobility, connectivity and system linkages
- Facilitate potential economic and population growth and
- Address safety issues and provide an alternate hurricane evacuation route.

The PEL is a transitional step intended to evaluate constraints, define and evaluate alignment alternatives and facilitate Right-of-Way preservation. The PEL will yield a transportation product that would be incorporated into the City of Corpus Christi's Urban Transportation Plan. Using the purpose and need of the RPMC PEL Study Segments A & B as a guide during the PEL process will ensure that ultimately mobility solutions with associated purpose and need elements will be available to move into the formal project development process.

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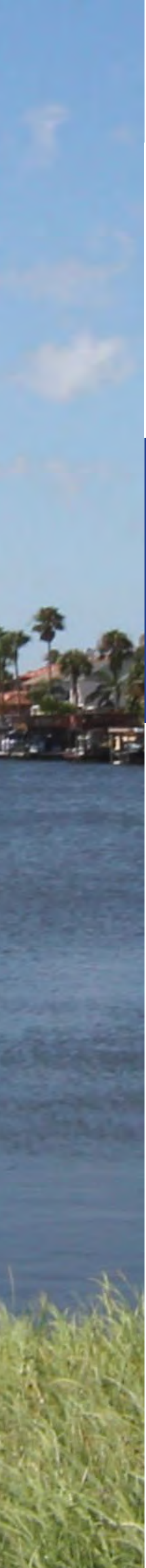


Appendix C

Stakeholder and Public Outreach Report

Stakeholder and Public Outreach Report

Prepared by Olivarri & Associates, Inc.

Regional Parkway - Planning and Environment Linkages (PEL) Study

Corpus Christi Metropolitan Planning Organization

March 7, 2017

HDR Project No. 261300

1.0 Introduction

A comprehensive public involvement process was undertaken as a part of the Regional Parkway PEL Study. The process was conducted to provide proactive outreach to the public in a manner that would enable public input to be easily incorporated into future environmental studies on Regional Parkway.

A comprehensive stakeholder engagement plan was developed and approved for the project. The plan detailed the process and procedures to be utilized recognizing that plans of this type must be flexible and responsive to public input. An overall project team was formed, consisting of officials from the funding agencies (the Corpus Christi Metropolitan Planning Organization (MPO) and the City of Corpus Christi) and Nueces County (the Public Works Director who also chairs the MPO Technical Advisory Committee (TAC) and members of the Study team. Officials from the Texas Department of Transportation (TxDOT) were invited to meetings of the team and did attend select meetings.

Throughout the Study there were numerous opportunities for public involvement. Over 19 stakeholder interviews/meetings were held with 25 people, presentations or meetings were held to 28 local organizations, and a landowner *"open house"* meeting was held. Over 400 people received direct information about the project and certain presentations to public entities were broadcast on public access television. The team met with some stakeholders multiple times. Individuals were encouraged to submit comments. Nine written comments were received.

2.0 Stakeholder Engagement Plan

A stakeholder engagement plan was developed by the Study team to help guide the public involvement process. The plan identified potential audiences, state and federal agencies, methods for engagement, key messages, project schedule, and reporting/review and QA/QC guidelines.

Several stakeholders were identified as key audiences in the planning process and were grouped into three categories: Public Officials, Property Owners and Developers, and Other Groups. Audiences in the public official category included:

- Officials at the city and county level from the City of Corpus Christi, City of Port Aransas and Nueces and Kleberg Counties
- Local planning entities
- Corpus Christi District of the TxDOT
- Corpus Christi Metropolitan Planning Organization;
- Corpus Christi Regional Transportation Authority (CCRTA)
- Del Mar College
- Corpus Christi, Flour Bluff, and London area school districts

- Padre Island National Seashore

Property owners and developers included:

- King Ranch
- Talen Energy (Barney Davis)
- Jones Family
- Developers on Padre Island
- Developers south of Oso Creek

Other groups identified included:

- Flour Bluff, Island, and South Side business associations
- Corpus Christi Chamber of Commerce
- Corpus Christi Regional Economic Development Corporation
- Corpus Christi Convention and Visitors Bureau
- Environmental groups including the Coastal Bend Bays and Estuaries Program, the Coastal Bend Bays Foundation, and the Sierra Club
- City boards including the Island Strategic Action Committee, the Planning Commission, and the City Transportation Advisory Commission
- public safety groups including the Corpus Christi Police Department, the Local Emergency Planning Committee, the Department of Public Safety, and others
- General Public
- Local media

The stakeholder engagement plan identified state and federal agencies that would need to be contacted regarding technical coordination and compliance. These included TxDOT, US Fish and Wildlife, the US Coast Guard, the US Army Corps of Engineers, the General Land Office, Texas Parks and Wildlife Department, US National Marine Fisheries, Environmental Protection Agency, Texas Commission on Environmental Quality, and others as needed.

Methods for public engagement were identified and laid out in the stakeholder engagement plan. These methods included making Web-based information available on the MPO website, conducting stakeholder interviews with key individuals, presenting information at the regularly scheduled meetings with identified audience groups, engaging with the media, and using data to help develop presentations and materials for public consumption. The methods allowed for conducting additional interviews or presentations as needed.

The stakeholder engagement plan also included discussions on key messages, how to brand the project, a tentative project schedule, internal coordination procedures, and quality assurance and quality control.

3.0 Database

A database of key stakeholders was developed. This database included property owners within the Segment A and Segment B study areas (as shown in Figure 1), interested agencies, and public officials identified in the stakeholder engagement plan. The property owner lists were separated into areas and included individual lists for the Southside of Corpus Christi, Padre Island, and along Rodd Field Rd. This database was updated and maintained throughout the project.

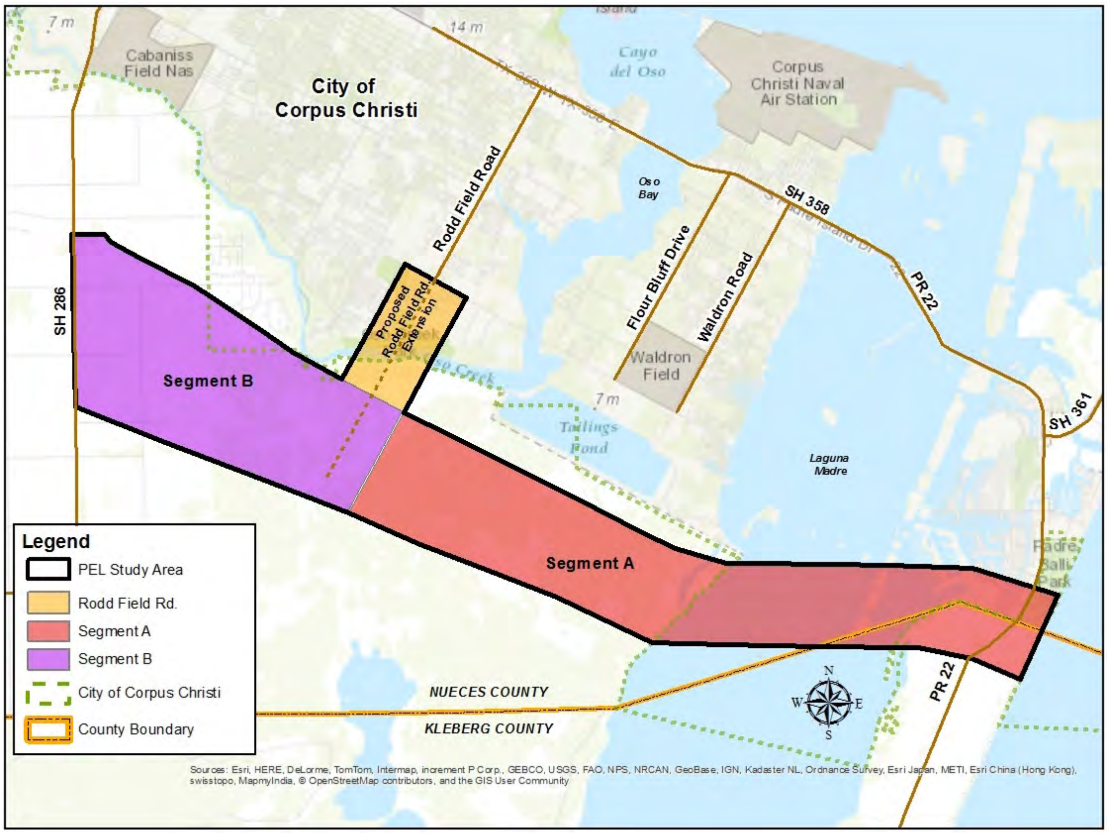


Figure 1: Regional Parkway PEL Study Area

4.0 Stakeholder Outreach

4.1 Website

The MPO website (www.corpuschristi-mpo.org) was updated with information on the project and contained materials for public viewing, including the Regional Parkway Mobility Corridor Feasibility Study (January 2013), the project summary handout, maps of the potential alternatives, slides from presentations, and other materials.

4.2 Project Summary Handout

A handout was created and updated throughout the project period to explain project information. The handout provided background information on the previous feasibility study and current project, an explanation of the PEL process, a project timeline, and maps of the project area.

When specific alternatives were defined, the handout was updated to include these. The original project summary handout and an updated version are included in **Appendix B**.

4.3 Comment Form

A comment form was developed for those who were interviewed and attendees at the presentations and landowner meeting. The comment form was designed to be mailed back and contained contact information for further project information, questions, or to submit another comment. The comment form is included in **Appendix C**.

4.4 Stakeholder Interviews

During the Study period, nineteen (19) in person interviews/meetings were conducted with twenty-five (25) people (e.g. large land owners and developers within the project area, elected and appointed officials, group representatives, etc.) to discuss the PEL Study and receive feedback from them. Summary reports of each interview were produced for internal tracking of key comments and for identification of issues.

Table 1: Stakeholder Interviews

Regional Parkway PEL Stakeholder Interviews			
Name	**Organization**	**Date**	**Major Points/Issues**
Mitch Hutchcraft	King Ranch	August 18, 2015	Some land is leased, would be interested in limited access with more than one access point
Bill Smith	Talen Energy (Barney Davis)	December 10, 2015	Critical infrastructure throughout property, does not want traffic close to plant, canal to LM very important, some wetlands on property
Brud Jones	Jones Property	December 10, 2015	Worried may be visual obstruction in development areas, some development plans underway
Mitch Hutchcraft & Dave Delaney	King Ranch	December 11, 2015	Priority is protecting ranch and continuing historic operations, do not want pastures bisected, some property leased
Maybeth Christensen	Padre Isles Property Owner Association	January 28, 2016	2nd causeway to island is necessary; good amount of support for this in community
Paul Schexnailder	Asset Development Corporation	January 28, 2016	Additional capacity should be added at current causeway, not south. Highway may ruin appeal
Greg Smith	Island business owner, formally ISAC chair	January 28, 2016	Island *needs* 2nd crossing, lots of traffic and growth

Claudia Jackson, August Alfonso, Bill Wilson, & Connie Rivera	Del Mar College	January 29, 2016	Southside campus in early stages of planning, entrances on Yorktown, Rodd Field as a 5-lane road possibly containing a median. Would like ped/bike friendly
David Owen & John Kelly	Cowels, Hight, JCF, Santa Cruz Partnerships, Owen Family Partnership, Owen Family Farm	January 29, 2016	May be CBRA issues on SIU A. Would like connection to Flour Bluff & Kingsville
Libby Edwards & William Goldston	Island Strategic Action Committee	March 4, 2016	Support 2nd crossing, suggested access roads in some areas
Michael Hunter	Corpus Christi City Council	March 30, 2016	Supports project
Eloy Salazar & Rick Martinez	Property Owners	April 6, 2016	Owns property at proposed Rodd Field extension; curious about amount of right-of-way and type of interchange
Bart Braselton	Braselton Homes	April 11, 2016	Has accommodated for extension of Rodd Field in his development plans, said 80% of new rooftops are on Southside, 25% split between Island and Calallen
Mayor Sam Fugate	City of Kingsville	April 12, 2016	Expects that the project will receive support in Kingsville
Judge Rudy Madrid	Kleberg County	April 12, 2016	Sees benefit to Kleberg beaches, supports project
Coleen McIntyre	Corpus Christi City Council	April 18, 2016	Supports concept, especially 2nd crossing & future planning
Rudy Garza, Jr.	Corpus Christi City Council	April 27, 2016	Sees this as support for Southside growth as well as infield growth and redevelopment, has heard no criticisms.
Brent Chesney	Nueces County Commissioner	May 2, 2016	Supports project.
Engineering and Planning staff	City of Corpus Christi	September 23, 2016	Discussed project and concerns on connection to the Island.

4.5 Landowners Meeting

An open house public meeting was held on April 11, 2016 at the Botanical Gardens for landowners within the project area on the Southside. Invitations were mailed to landowners between FM 2444 to the north and FM 70 to the south and between County Road (CR) 47 to the west and CR 41 to the east, and along the proposed extension of Rodd Field Rd. south of Yorktown Blvd. The meeting was attended by 9 people representing 5 properties. Project information boards and schematics for the project were set up, and project team members were available to discuss the PEL Study and answer any questions. Verbal comments were taken, and one written comment was received. A Landowners Meeting summary report was produced and has been delivered for the project record.

4.6 Presentations or Discussion at Meetings with Local Organizations and Officials

Presentations were made to several governmental entities and other local organizations with an interest in the project throughout the Study period. Presentations made prior to June 7, 2016 were concept meetings to define issues with interested groups before the identified alternatives were available. Presentations held from June 7, 2016 onwards presented the various alternatives to be studied and discussed. Summary reports of presentations are included in the appendix. Below is a list of presentations and the dates the presentations were made:

Conceptual and Issue Definition Presentations

- Corpus Christi City Council – Fall, 2015 (initial discussion on project) – televised on public access
- Local Emergency Planning Commission (included Police, Fire and other public safety) – May 3, 2016

Identified Alternatives Presentations

- Corpus Christi Regional Economic Development - Investors – June 7, 2016
- Island Strategic Action Committee – June 7, 2016
- City of Port Aransas (City Manager) – June 7, 2016
- Island Moon Newspaper – June 7, 2016
- Convention & Visitors Bureau – June 8, 2016
- Thursday Morning Southside Property Owner Group – June 9, 2016
- Corpus Christi Board of Realtors – June 9, 2016
- Corpus Christi Chamber Infrastructure Committee – June 10, 2016
- City of Corpus Christi Chamber of Commerce Board – June 15, 2016
- MPO Technical Advisory Committee – June 17, 2016 (other periodic updates)
- Corpus Christi Transportation Advisory Committee – June 27, 2016
- Corpus Christi Regional Transportation Authority – July 6, 2016
- Padre Island Business Association Board – July 12, 2016
- Del Mar College Board of Regents – July 12, 2016
- City of Corpus Christi Planning Commission – July 13, 2016
- MPO Transportation Policy Committee – July 14, 2016 (other periodic updates)(televised on public access)
- Corpus Christi Regional Economic Development - Board – July 14, 2016

- Scott Cross (Nueces County Parks Director) and Jones Family – July 19, 2016
- Nueces County Beach Management Committee – July 27, 2016
- Nueces County Park Board – July 28, 2016
- US Fish and Wildlife Service – August 10, 2016
- Coastal Bend Bays and Estuaries – August 10, 2016
- Nueces County Commissioners Court – August 17, 2016 (televised on public access)
- Padre Island National Seashore – August 17, 2016
- Greater Corpus Christi Hospitality Association – September 7, 2016
- San Patricio County Commissioners Court – September 12, 2016

PEL Result Summary Presentations

Several additional presentations were given once the draft final PEL Study was made available on the Corpus Christi MPO website to provide the final results and recommendations of the Study. Notification on the availability of the draft Study was provided to anyone who attended the stakeholder interviews, presentations, landowner meeting. It was not possible to provide the draft Study to each attendee through email as the file size was very large. Additional presentations were given to:

- Corpus Christi Transportation Advisory Committee – February 27, 2017
- Corpus Christi City Council – February 28, 2017 - televised
- MPO Technical Advisory Committee – February 16, 2017
- MPO Transportation Policy Committee – March 2, 2017 - televised
- Nueces County Commissioners Court – February 15, 2017 - televised
- United Corpus Christi Chamber of Commerce Infrastructure Committee – February 17, 2017

The Kleberg County Judge was also contacted to provide the results of the study and determine availability for a briefing of the Kleberg County Commissioners Court, but no briefing was scheduled. In addition, a meeting was held with the District Engineer of the Corpus Christi District of TxDOT on March 2, 2017.

The presentations were favorably received with the value of long range planning being mentioned at a number of meetings. Nueces County Commissioner Brent Chesney did comment on the need for research on the deed for the property under county control. Members of the Transportation Advisory Committee made specific comments regarding the importance of the effort to transportation planning. In the meeting with the District Engineer, it was agreed that a briefing of the TxDOT Division of Transportation Planning and Programming and other key Austin officials should be scheduled with note of the use of the PEL approach, the local funding of the effort, and hurricane evacuation benefits.

5.0 Public Comments

Throughout the Study, everyone spoken to was encouraged to submit any comments on the project via comment form, letter, or email. Comment forms were made available at each stakeholder interview, presentation, and meeting, and project information materials included contact information for submitting comments. Comments received are included in the table below. The written comments that were received are summarized in **Appendix A,** entitled Regional Parkway PEL Written Comment Table.

Table 2: Summary of Comments

Regional Parkway PEL Comment Summary Table		
Comment	**Date Received**	**Format**
This could be a good opportunity to fix the sheet flooding associated with 100 yr rain.	April 11, 2016	Received at meeting
The area you will be accessing on Hwy 286 floods and Road 286 closes every time the city gets 1" of rain.	June 8, 2016	Received at meeting
Great idea - it's been brought up for at least 30 years. I would like to see it go just outside city so that it's not too far out to discourage use but close enough to pull traffic for many years.	June 9, 2016	Received at meeting
I would prefer County Road 14 A be utilized for the Parkway (over the optional CR14).	June 17, 2016	Email
Thank you for the information on the Regional Parkway. I think this is a fine idea, and very forward thinking. Hope work starts soon.	July 6, 2016	Email
This is a great idea and we will need it – but this city has so many financial issues – sewer, streets, water - that I don't know where money will come from. State or city funds?	July 14, 2016	Received at meeting
The Texas Coastal Bend Surfrider Foundation opposes any short term or long term Regional Parkway plans to connect a new causeway from the mainland to Padre Island if it impacts in any way the newly acquired property that Nueces County recently received from the State of Texas in Dec. 2014. Nueces County accepted this property with certain deed restrictions that require the County to protect this property from being developed and to keep it in its natural state. Statements were made by County officials acknowledging the deed restrictions and pledging to abide by those restrictions. The Texas Coastal Bend Surfrider Foundation expects those deed restrictions to be strictly adhered to.	August 1, 2016	Email
Vigorously object to any alternatives for a new connection to Padre Island that would cross or otherwise impede the full and robust development of the Jones Tract. This would include the yellow and green routes.	August 10, 2016	Email/Letter
Does not support connection at Sea Pines as it is a residential collector. Thinks connection should be at the Nueces/Kleberg county line or south end property of owned by Jones. Any property should be acquired at fair market value.	October 13, 2016	Comment Form/email

Records of the individual stakeholder interviews and group meetings were also maintained and discussions and verbal comments from these meetings were considered in the evaluation of various alternatives. Concerns about given alternatives were captured in specific comments and were used in the alternatives evaluation matrix.

During meetings with public groups, multiple individuals expressed support for the Regional Parkway citing the need for additional access, congestion relief, hurricane evacuation, responsible planning for growth among the reasons for supporting the effort. Mentioned concerns included:

- Connection to North Padre Island at Sea Pines
- Potential conflicts with deed restrictions on land managed by Nueces County
- Environmental impact on Nueces County Park land and spoil islands in Laguna Madre, critical habitat for threatened species red knot and endangered species piping plover

6.0 Additional Outreach

Additional outreach was performed on a more informal basis with individuals and groups in various settings. Project team members had phone calls and in person discussions with individuals throughout the PEL effort.

7.0 Media Coverage

Media coverage of the PEL project included articles in the *Island Moon* and the *Corpus Christi Caller Times* and stories on television including Channel 6 – KRISTV.

REGIONAL PARKWAY PEL STUDY

STAKEHOLDER AND PUBLIC OUTREACH REPORT

APPENDIX A:

REGIONAL PARKWAY PEL WRITTEN COMMENTS

Stakeholder Considerations: Regional Parkway PEL Written Comment Table

	Name	Comment	Segment	Receipt of Comment			Date
				Meeting	**Mail**	**Email**	
1	David Ocker	This could be a good opportunity to fix the sheet flooding associated with 100 yr rain.	B	X			11-Apr-16
2	Marsha Williams	Great idea – it has been brought up for at least 30 years. I would like to see it go just outside city so that it's not too far out to discourage use but close enough to pull traffic for many years.	O	X			9-Jun-16
3	Alex Harris	The area you will be accessing on Hwy 286 floods and Road 286 closes every time the city gets 1" of rain.	B	X			8-Jun-16
4	David Ocker	I would prefer CR14A be utilized for the Parkway (over an optional CR14)	B			X	17-Jun-16
5	Bob Wilson	Thank you for the information on the Regional Parkway. I think this is a fine idea, and very forward thinking. Hope work starts soon.	O			X	6-Jul-16
6	Marsha Williams	This is a great idea and we will need it – but this city has so many financial issues – sewer, streets, water that I don't know where money will come from. State or city funds?	O	X			14-Jul-16
7	Cliff Schlabach	The Texas Coastal Bend Surfrider Foundation opposes any short term or long term Regional Parkway plans to connect a new causeway from the mainland to Padre Island if it impacts in any way the newly acquired property that Nueces County recently received from the State of Texas in Dec. 2014. Nueces County accepted this property with certain deed restrictions that requires the County to protect this property from being developed and to keep it in its natural state. Statements were made by County officials acknowledging the deed restrictions and pledging to abide by those restrictions. The Texas Coastal Bend Surfrider Foundation expects those deed restrictions to be strictly adhered to.	A		X		1-Aug-16
8	Melissa Hoag-Sherman	(SUMMARY) Firm represents the Jones Family as they relate to the 1,260 acre Vista Del Mar tract on North Padre Island in Corpus Christi. In summary, Jones Family plans to develop a mixed-use resort community on the land which has been previously approved by the City of Corpus Christi. The client vigorously objects to any alternatives for a new causeway or connection to North Padre Island that would cross or otherwise impede the full and robust development of the Jones Tract. As presently conceptualized, this would include the yellow and green routes. See letter for full details.	A			X	10-Aug-16
9	E. Jay Ellington	I think the connection to Sea Pines should not be considered. This is a residential collection. The Parkway should join PR 22 at or near the Kleberg/Nueces County line or at the south end of the Jones Tract. Property should be purchased at fair market value.	A			X	13-Oct-16

REGIONAL PARKWAY PEL STUDY

STAKEHOLDER AND PUBLIC OUTREACH REPORT

APPENDIX B:
PROJECT SUMMARY HANDOUT

Project Summary Handout Version 1 – April 2016

Regional Parkway

April 2016 — Planning & Environmental Linkages Study

What is the Regional Parkway?

Responsible planning demands anticipating the future. As Corpus Christi, Nueces and San Patricio Counties and other surrounding communities grow, additional transportation infrastructure will be needed to accommodate this growth. Several years ago, transportation planning entities in this region undertook a Feasibility Study of a facility which could create a second connection to North Padre Island swinging around through Nueces County and ultimately connecting to I-37 in San Patricio County via a new crossing of the Nueces River. The Feasibility Study was completed in 2013.

As envisioned, this parkway would be an at-grade facility with limited access. It could accommodate vehicles and possibly mass transit, bicycles, and/or pedestrians. As practical, it might incorporate existing roadways as well as include construction of new roadways and bridges. It is likely to be phased.

The Study determined that the parkway was feasible and identified seven segments. These segments each encompass a broad area, but the study did not identify a specific path for the facility within each segment. It did set the stage for future work and also identified two segments as potential priorities for additional efforts given the growth in those areas. These are:

Segment A from Park Road (PR) 22 to a proposed Rodd Field Rd Extension (approx. 9.5 miles); and

Segment B from a proposed Rodd Field Rd Extension to State Highway (SH) 286 (approx. 6.2 miles).

The City of Corpus Christi (City) and the Corpus Christi Metropolitan Planning Organization (MPO), two of the original partners in the Feasibility Study, wished to move forward on the next level of study for Segments A and B and have funded a Planning and Environmental Linkage (PEL) Study on these two segments.

What is a PEL?

A PEL Study is a step in the national and state defined environmental review process at the corridor level. The goal of a PEL Study is to inform the environmental review process on the environmental, community, and economic goals of the area. It helps minimize duplication of effort, promotes environmental stewardship, encourages meaningful public engagement, and reduces delays in project implementation.

This PEL Study will identify up to three route alternatives, including a no-build option, in each segment. It is a long-range planning effort; construction of the proposed parkway, if built, would not take place for many years. Design and construction funding have not been identified.

The graphic on the next page shows the development process beginning with the Feasibility Study and continuing through the PEL Study and other future possible steps. The NEPA (National Environmental Policy Act) process would require an Environmental Impact Study (EIS) or studies to be undertaken if any federal funds will be used in the project. Again, no funding has been identified for future phases, if any.

What are the Potential Benefits?

Constructing this proposed parkway would link key destinations in or near Corpus Christi and provide other potential benefits including:

- Relieve current congestion on SH 358 (S.P.I.D.), and facilitate regional mobility, connectivity, and system linkages;
- Address safety issues and improve hurricane evacuation for the area by providing a reliable, alternate evacuation route for North Padre Island and the South Side;
- Accommodate the region's projected population growth, which is estimated to increase 21% by 2050 (Texas State Data Center).

FOR MORE INFORMATION, VISIT WWW.CORPUSCHRISTI-MPO.ORG

Map of all segments of Regional Parkway

Development Process

Feasibility Study	Complete	2013
PEL Study for Segments A&B	In Progress	Complete 2016
NEPA Process	Environmental Impact Study; Record of Decision	TBD
Possible Construction of Regional Parkway	Long Term	

Map of Segment A from PR 22 to Rodd Field Rd and Segment B from Rodd Field Rd to SH 286 showing the identified corridor planning areas. Actual facility would require only a small area within the highlighted segments.

FOR MORE INFORMATION, VISIT WWW.CORPUSCHRISTI-MPO.ORG

Project Summary Handout Version 2 – July 2016

SUBJECT TO REVISION 0614

Regional Parkway

June 2016 **Planning & Environmental Linkages Study**

What is the Regional Parkway?

The City of Corpus Christi (City) and the Corpus Christi Metropolitan Planning Organization (MPO) have been working the past several months on a Planning and Environmental Linkages (PEL) Study of two segments of a possible future roadway referred to as the *Regional Parkway*. The overall corridor could create a second connection to North Padre Island, provide a connection to Rodd Field across Oso Creek, swing around through Nueces County, and ultimately connect to I-37 in San Patricio County via a new Nueces River crossing. The parkway is envisioned as a phased, at-grade facility with limited access. It could accommodate vehicles and possibly mass transit, bicycles, and/or pedestrians. As practical, it might incorporate existing roadways as well as include construction of new roadways and bridges.

A feasibility study, completed in 2013, deemed the overall corridor feasible so two planning entities have funded the next stage in the environmental process, the PEL study. A PEL Study is a step in the national and state defined environmental review process at the corridor level. The goal of a PEL Study is to inform the environmental review process on the environmental, community, and economic goals of the area. This study is looking at two of the seven segments previously identified by the feasibility study. These are:

SEGMENT A	SEGMENT B
Approx. 9.5 miles	Approx. 6.2 miles

Segments A and B were identified as potential priorities due to the growth predicted in the area. With a desire to incorporate the results into the Master Transportation Plan, the City became a partner in the PEL study.

This PEL Study will identify alternatives, including a no-build option, in the two segments. This is a long-range planning effort; construction of the proposed parkway, if built, would not take place for many years. Design and construction funding have not been identified.

Evaluation Process

As a result of the initial work on this study, a number of alternatives have been identified. Meetings have been held with landowners whose property might be directly affected by these segments as well as other key stakeholders. These discussions have been important in defining the alternatives shown in the image on the reverse side of this handout.

The alternatives are now being evaluated from the perspective of environmental impacts utilizing existing state and national databases. Engineering issues associated with each are also being analyzed. A third key criterion will be public input received through meetings and comments of groups and individuals over the summer.

The objective is to define a recommended preferred alternative to present to the MPO Policy Board and the City of Corpus Christi. The City can then choose to adopt an alternative, which could then be incorporated into the Master Transportation Plan.

What are the Potential Benefits?

Constructing this proposed parkway would link key destinations in or near Corpus Christi and provide other potential benefits including:

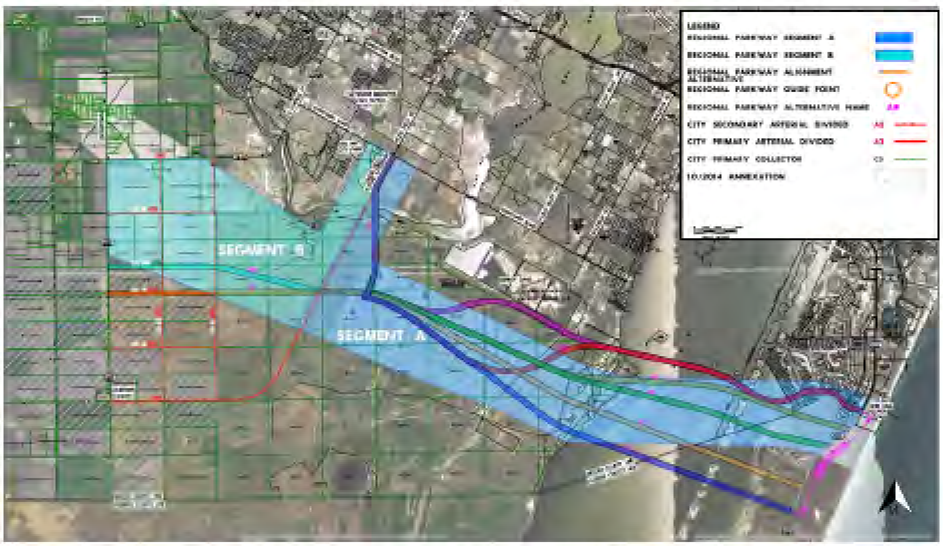
- Relieve current congestion on SH 358 (S.P.I.D.), and facilitate regional mobility, connectivity, and system linkages;
- Address safety issues and improve hurricane evacuation for the area by providing a reliable, alternate evacuation route for North Padre Island and the South Side;
- Accommodate the region's projected population growth, which is estimated to increase 21% by 2050 (Texas State Data Center).

Decision Process		
Feasibility Study	Complete	2013
PEL for Segments A&B	In Progress	Complete 2016
NEPA Process	Environmental Impact Study & Record of Decision	TBD
Possible Construction		Long Term

SUBJECT TO REVISION

The seven segments of Regional Parkway concept. Each segment is a large area requiring study to define location of an actual roadway.

Segments A and B provide an alternate evacuation route, address growth, and SPID congestion.



Map of Segment A from PR 22 to Rodd Field Rd and Segment B from Rodd Field Rd to SH 286 showing the identified alternatives.

If you have any questions, please contact Leah Olivarri at 361-884-5000.
Your comments on this project are important to us. If you would like to submit a comment, it can be sent by email to Leah Olivarri at leah.olivarri@olivarri.com or mailed to:
Regional Parkway Project, c/o Olivarri & Associates, PO Box 60576, Corpus Christi, Texas 78466.

FOR MORE INFORMATION, VISIT WWW.CORPUSCHRISTI-MPO.ORG

REGIONAL PARKWAY PEL STUDY

STAKEHOLDER AND PUBLIC OUTREACH REPORT

APPENDIX C:

COMMENT FORM

Comment Form

Regional Parkway

COMMENT FORM

(PLEASE PRINT)

NAME: ____________________

ADDRESS: ____________________

PHONE NUMBER ____________ EMAIL: ____________________

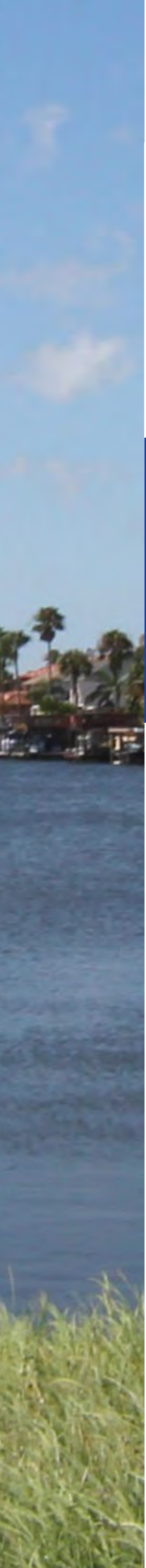
REPRESENTING: ____________________

QUESTIONS/COMMENTS/THOUGHTS/SUGGESTIONS (use back as needed)::

If you need further information about the project or have any questions, please call 361-884-5000.
Comments can also be emailed to Leah Olivarri at leah.olivarri@olivarri.com.
Please check www.corpuschristi-mpo.com for updates.

- FOLD HERE- -

Regional Parkway Project
c/o Olivarri & Associates, Inc.
PO Box 60576
Corpus Christi, Texas 78466



Appendix D

Affected Environment and Environmental Consequences Technical Memorandum

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES TECHNICAL MEMORANDUM

Regional Parkway - Planning and Environmental Linkages (PEL) Study

Corpus Christi Metropolitan Planning Organization
City of Corpus Christi

May 2016

CSJ: 0916-00-066

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Appendices

Appendix A: Acronyms and Abbreviations

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1.0 Introduction and Environmental Setting

The Corpus Christi Metropolitan Planning Organization (CCMPO), City of Corpus Christi (COCC), Nueces and San Patricio Counties, and other interested parties have been in discussion since the mid-eighties concerning the need for an alternate major transportation route within Nueces County, particularly on the south side of the COCC. This alternate route would be designed to address the area's expanding housing, industrial and commercial developments and the resulting traffic congestion and safety issues. The Regional Parkway Mobility Corridor (RPMC) project was proposed to meet these and other transportation needs when completed.

Corpus Christi is the largest city on the Texas Coast and the sixth largest port in the nation (COCC, 2016a). Traffic congestion within the COCC has increased as growth and development have overtaken transportation infrastructure development. The COCC provides a number of facilities and services to its residents and visitors including multiple venues and events within the Sports, Entertainment and Arts District, parks and recreation areas, botanical gardens, libraries, an airport, and a marina..

The population of the Corpus Christi Metropolitan Area is projected to increase by 21 percent by 2050 (Texas State Data Center, 2016). This projected population growth and its accompanying development activity is anticipated to result in a substantial increase in future traffic volumes by the year 2035 along existing roadways in Nueces County and would result in an rise in traffic congestion and associated safety issues. In addition the growth and development of residential communities and vacation destinations located on Mustang-Padre Island is anticipated to continue. These areas are vulnerable to floods and wind damage resulting from severe weather events such as tropical storms and hurricanes. The RPMC project would provide an additional crossing of the Laguna Madre and allow for redundancy in evacuation routes.

The RPMC Feasibility Study, completed in January 2013, concluded that the RPMC was feasible and merited if constructed in segments of independent utility. Two of the seven study segments identified were selected for the next phase in planning, a Planning and Environmental Linkages Study (PEL). The selection of Segments A and B was based on the examination of projected traffic volumes, reduction of travel time, and determination of the benefit/cost ratio for each segment of independent utility. Since that time, substantial increases in residential, commercial and planned developments within the area have reinforced this evaluation.

The Regional Parkway PEL study area begins from Park Road (PR) 22 in the east crosses the Laguna Madre and terminates at State Highway (SH) 286 in the west. The PEL study includes the analysis of Segments A and B, in addition to a one mile wide corridor extending from the intersection of Rodd Field Road (Rd.) at Yorktown Blvd. southwest to the project corridor. A portion of each of these areas lies within the boundary of the COCC, and all of these areas are within its Extraterritorial Jurisdiction (ETJ). For the purpose of this report these three areas are considered to be the study area (Study Area) (**Figure 1-1**). Descriptions of each area are included below:

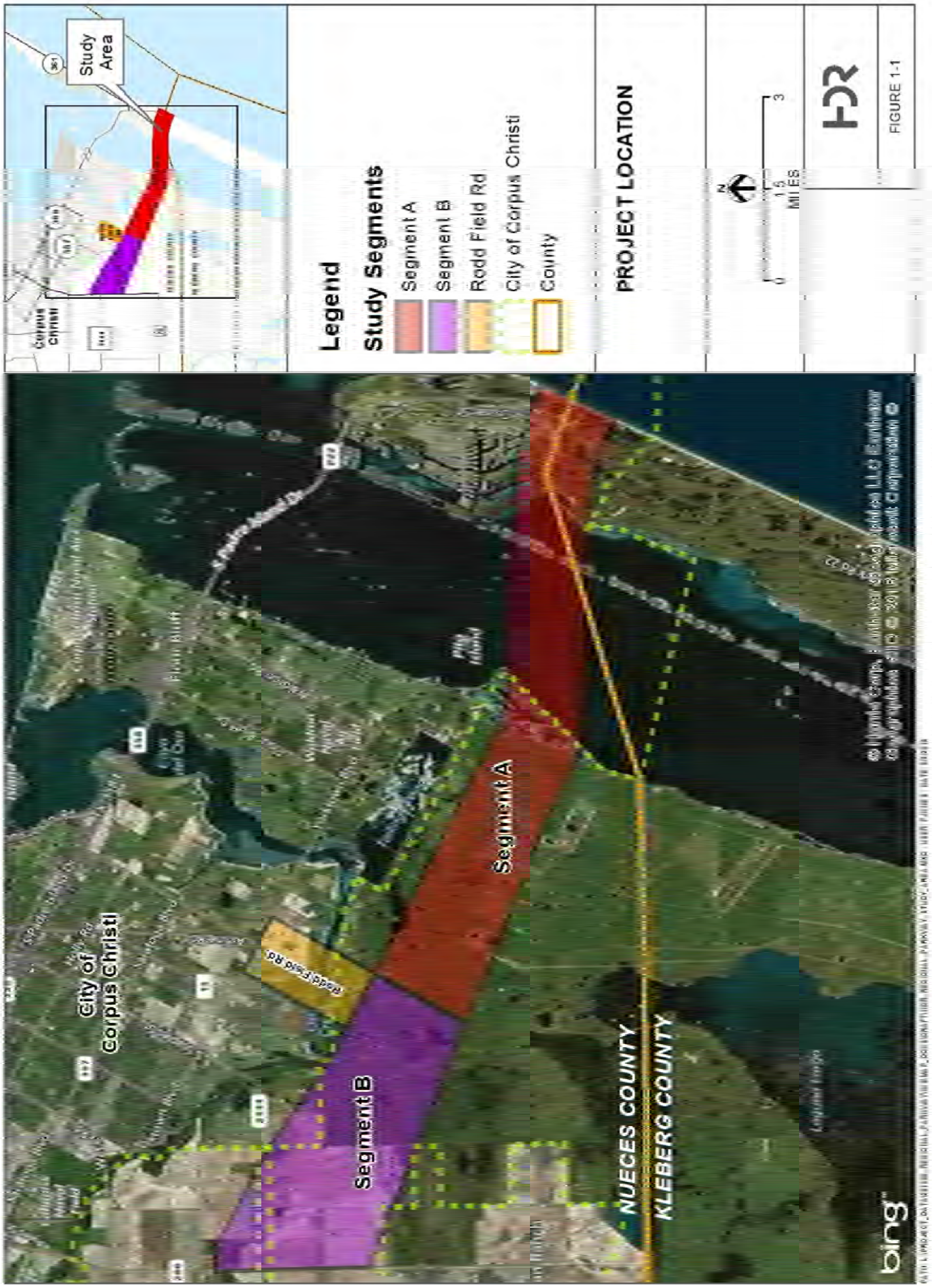

Figure 1-1. Project Location

- Segment A begins on North Padre Island and extends west approximately 10 miles inland. This segment ranges in width from approximately 1.3 miles in the east to about 1.7 miles wide in the west and includes about 9,000 acres. The majority of this segment occurs within Nueces County; however, a small portion of the southeastern edge of this segment lies within Kleberg County.

- Segment B, which follows Segment A within the project corridor, continues to the northwest and terminates at SH 286. This segment ranges from approximately 4.5 to 5.8 miles in length, and includes a varied width of about 1.7 miles in the east to 2.6 miles in the west. Segment B occurs entirely within Nueces County and contains approximately 6,500 acres.

- Rodd Field Rd. would be extended south from its intersection with Yorktown Blvd., crossing Oso Creek and connecting to the project corridor. A corridor incorporating approximately 0.5 mile on either side of this roadway extension would also be evaluated for potential environmental impacts. Rodd Field Rd. is currently included in the Corpus Christi Urban Transportation Plan which displays its extension intersecting with Hwy. 70.

This Affected Environment and Environmental Consequences Technical Report, completed as part of the Regional Parkway PEL provides information about the project Study Area in relation to applicable environmental laws and policies.

Although this report discusses many aspects of the Study Area, any proposed mobility solutions will be assessed in subsequent stages of the PEL study. These assessments will be developed through the use of robust community and stakeholder involvement, and utilization of the background information provided in this report.

2.0 Land Use and Planning

This section describes the methodology used to identify existing land uses specific within the Study Area and the local and regional transportation plans and policies relevant to the Regional Parkway PEL. The concepts proposed in this PEL study are consistent with local transportation planning efforts and with the CCMPO's Mobility Transportation Plan (MTP) 2015-2040. The proposed Regional Parkway Mobility Corridor is included as a priority corridor within this MTP. The Regional Parkway PEL study is listed as a "Special Studies Subtask 5.0" in the CCMPO FY 2016 Unified Planning Work Program (UPWP) (CCMPO 2016a).

2.1 Methodology

Land uses were identified for the Study Area using Geographic Information System (GIS) layers developed by reviewing and categorizing recent aerial photography. Current and Future land use GIS shapefile layers were also obtained from the COCC (COCC, 2015). Both sets of land use shapefile were analyzed for the study area and it was determined that the groupings associated with the aerial photography were more appropriate for the analysis included in this report. Land uses were not verified by windshield surveys during this phase of the project.

2.2 Existing Conditions – Land Use

Recent land uses found within the Study Area are included in **Table 2-1** and shown on **Figure 2-1**. Land use within Segment A includes primarily undeveloped (53.6 percent) areas but also includes a substantial amount of open water (31.7 percent) and agricultural areas (12.8 percent).

Table 2-1. Land Use Types within the Study Area

Land Use Type	Total Acres	% of Area
Segment A		
Agriculture (Old Field)	1,168.7	12.8
Commercial	11.6	0.1
Industrial	0.9	0.01
Oil Facility	12.9	0.1
Open Water	2,893.6	31.7
Residential	137.7	1.5
Transportation (Roadway)	14.5	0.2
Undeveloped	4,898.0	53.6
Grand Total	*9,137.7*	*100.0*
Segment B		
Agriculture (Old Field)	14.1	0.2
Agriculture (Pasture)	153.5	2.3
Agriculture (Row Crops)	3,298.0	50.5
Commercial	4.2	0.1
Conservation Easement	51.4	0.8
Gravel/Sand Mining	5.0	0.1
Open Water	27.1	0.4
Public	27.4	0.4
Residential	91.1	1.4
Undeveloped	2,855.9	43.7
Grand Total	*6,527.8*	*100.0*
Rodd Field Rd.		
Agriculture (Pasture)	131.8	10.4
Agriculture (Row Crops)	91.4	7.2
Commercial	53.8	4.2
Conservation Easement	91.1	7.2
Open Water	146.2	11.5
Park	62.5	4.9
Residential	289.2	22.8
Undeveloped	404.0	31.8
Grand Total	*1270.0*	*100.0*

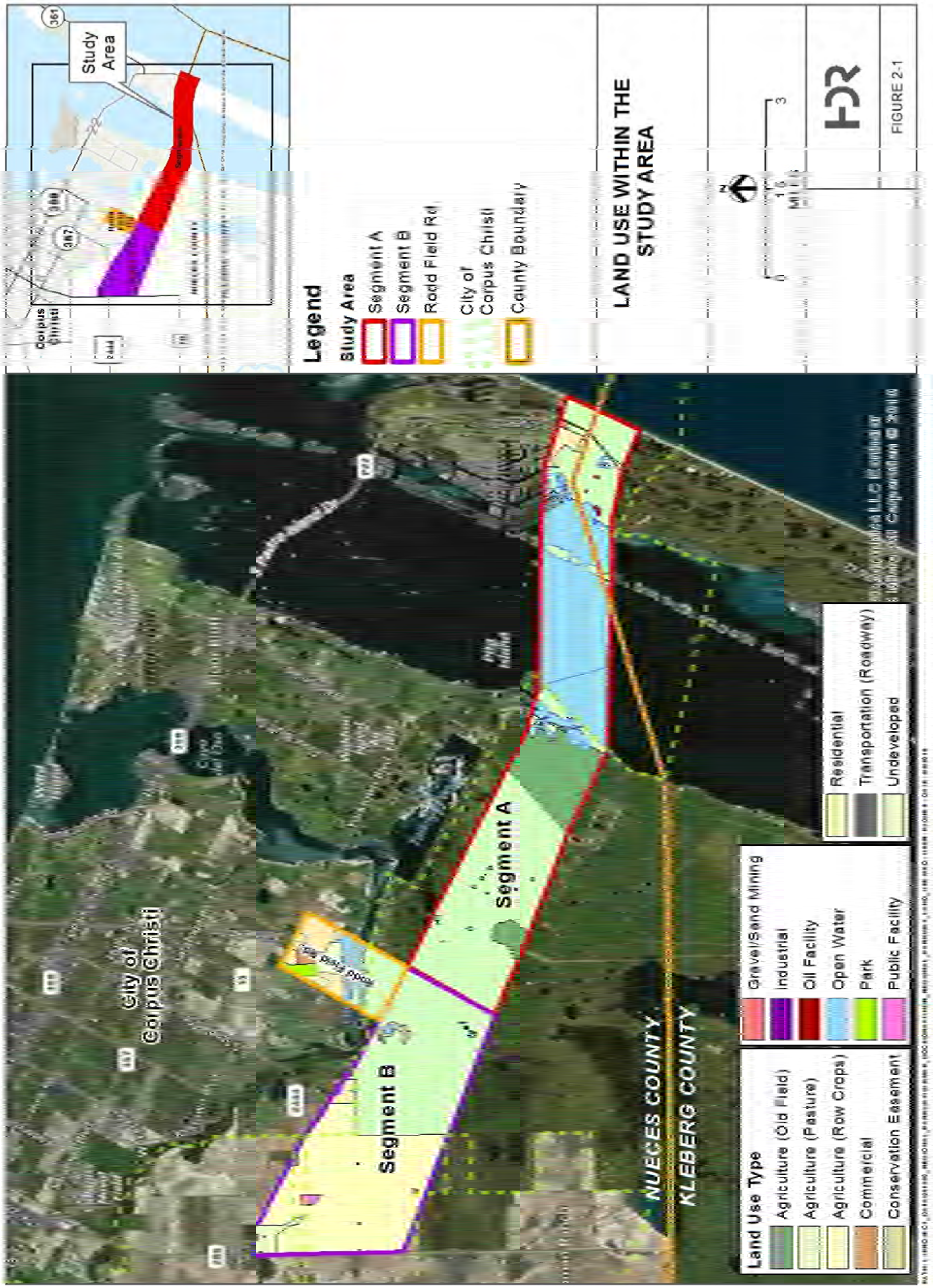

Figure 2-1. Land Use within the Study Area

Residential areas occur on North Padre Island near the eastern terminus of Segment A but residences are limited in the mainland portion of this area. No major roadways occur within the mainland portion of Segment A.

Segment B includes two predominant land use types, agricultural (53.0 percent) and undeveloped (43.7 percent) in addition to a number of smaller ones. A few County Road (CR) and Farm-to-Market (FM) roads occur in the western one third of this segment along with a limited number of residences.

The one mile wide corridor extending from the intersection of Rodd Field Rd. with Yorktown Blvd. southwest to the project corridor includes residential developments and Oso Creek Park in the northern section, with Oso Creek and undeveloped areas occurring in the south. The land uses with the highest percentages within the Rodd Field Rd. corridor include undeveloped (31.8 percent), residential (22.8 percent), open water (11.5 percent), and agriculture (17.6 percent). This area includes residential roadways, and the northern border abuts the intersection of Yorktown Boulevard (Blvd.) (FM 24) and Rodd Field Rd. (SH 357).

Because the Study Area lies primarily outside of the COCC limits, limited zoning information is available for this area. However a review of recent aerial imagery of the Study Area revealed that areas not included in the COCC zoning limits (COCC, 2015) are almost exclusively used for agricultural purposes. COCC zoned, and unzoned areas within the Study Area are included in **Table 2-2** and shown in **Figure 2-2**.

Table 2-2. Zoning in the Study Area

Zoning Type*	Area (acres)	Area Percent
Segment A		
Unzoned	4,823.7	53.6
Single-Family**	3,727.5	41.4
Multifamily	328.1	3.6
Farm-Rural	81.7	0.9
Resort Commercial (Barrier Island)	45.1	0.5
Totals	9,006.1	100.0
Segment B		
Unzoned	6,184.90	94.7
Residential Estate	327.78	5.0
Farm-Rural	0.46	0.01
Neighborhood Commercial	5.41	0.1
Single-Family	10.33	0.2
Totals	6,528.88	100.0

Table 2 2. Zoning in the Study Area cont.

Zoning Type*	Area (acres)	Area Percent
Rodd Field Road		
Single-Family	179.2	42.2
Unzoned	303.70	24.0
Farm-Rural	270.9	21.4
Light Industrial	122.3	9.7
General Commercial	19.1	1.5
Neighborhood Commercial	8.4	0.7
Two Family	7.2	0.6
Totals	1,266.1	100.0

* City of Corpus Christi Zoning data provided by the City on 11/12/2015. Areas outside of the COCC zoning areas are considered unzoned.

**Although zoned by COCC as Single Family, approximately 2,571 acres of this area actually occurs over the Laguna Madre and is subsequently mapped as water.

Segment A includes approximately 54 percent unzoned land in addition to 41percent Single-Family and 4 percent multifamily areas. Farm-Rural and Resort Commercial areas each contain less than one percent of the Segment A area. Segment B is predominately unzoned (95 percent), including only 5 percent Residential Estate areas and less than one percent each of Single Family, Neighborhood Commercial and Farm-Rural areas. Rodd Field Rd. is the only portion of the Study Area that includes a substantial area within the COCC zoning region. Analysis of this area revealed that approximately 42 percent is zoned Single Family, 24 percent is unzoned, 21 percent is farm-rural, and ten percent is light industrial. Areas zoned general commercial, neighborhood commercial and two family make up less than 1.5 percent each of this area.

2.3 Local Government Plans and Policies

This section briefly summarizes plans and policies that have been adopted by local governments and other governmental entities that would need to be considered once specific mobility solutions are identified. Local jurisdiction over the project area for zoning and planning is distributed among the CCMPO, COCC, Nueces County and Kleberg County. This section presents transit, roadway, and land use plans within the Study Area. Publicly available information was accessed using online resources from the COCC, CCMPO, Texas Department of Transportation (TxDOT) Corpus Christi District Project Tracker, the Port of Corpus Christi Authority, and the Corpus Christi Regional Transportation Authority.

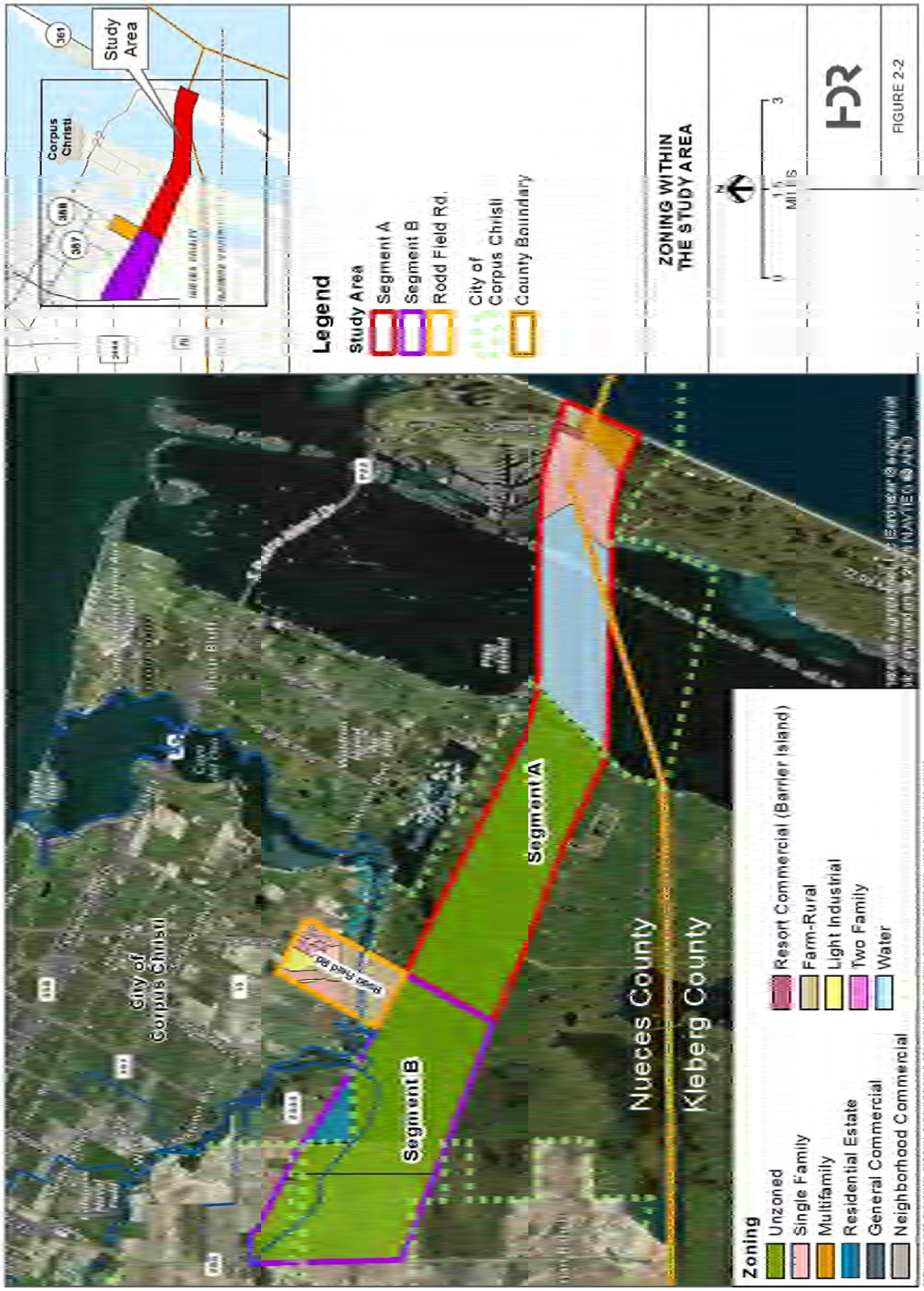

Figure 2-2. Zoning within the Study Area

One project within the Study Area, improvements to SH 286, was listed in the financially constrained 2040 forecast network section of the Metropolitan Transportation Plan (MTP) 2015-2040. In addition, the Corpus Christ District Project Tracker included a few seal coat construction jobs (Park Rd. 22, SH 286, and FM 70) and improvements to FM 2444 including constructing an additional lane and access management (CCMPO 2014). These projects are primarily located in the vicinity of the Study Area.

The Corpus Christi Regional Transportation Authority (known as "The B") provides public transportation services to the citizens of the Coastal Bend, including the cities of Agua Dulce, Banquete, Bishop, Corpus Christi, Driscoll, Gregory, Port Aransas, Robstown, and San Patricio. The B operates fixed route bus services, provides commuter services to federal agencies in the area, provides transportation services to rural communities, assists citizens with creating vanpools and rideshare programs, and provides demand-response curb-to-curb service for qualified individuals with a disability. The B is currently in the process of performing a comprehensive evaluation of its entire transit system. The findings of this planning effort will result in a strategic plan (*Transit Plan 20/20*) which will be used to optimize and grow transit services over the next five years (CCRTA, 2015).

During the National Environmental Policy Act (NEPA) phase of project development, local plans and policies need to be reexamined as they are dynamic documents that are continually revised and updated. Individual mobility solutions would need to be evaluated at that time for their compatibility with existing plans and policies.

The CCMPO FY 2016 Unified Planning Work Program (CCMPO, 2016a) includes the current Regional Parkway Segments A & B PEL. This study was initiated in 2015 using Category 7 funds and is scheduled to be completed in 2016.

Other major long-planned projects that are currently underway or planned within or in the vicinity of the Study Area include the following:

- **The CCMPO Strategic Plan for Active Mobility, Phase 1—Bicycle Mobility (Plan)** (CCMPO, 2016b) is intended to promote cycling as a meaningful transportation alternative for riders of varying abilities. This plan prescribes a 290-mile Bicycle Mobility Network designed to connect residents and visitors to key destinations around the greater Corpus Christi area.

  The Bicycle Mobility Network map (CCMPO, 2016c) shows a one-way cycle track on both sides of Rodd Field Rd. and along Oso Parkway. Unlike on-street bike lanes, Cycle Tracks are constructed adjacent to roadways, separating them from vehicles and providing a low-stress cycling experience. The Plan also calls for a Bicycle Boulevard on the yet-to-be constructed southeastern portion of King George Rd. which will connect to the proposed extension of Oso Parkway. The Plan also identifies an off-road multi-use trail northwest of this area which will extend along a stormwater easement from Yorktown Boulevard to Oso Parkway. These existing and planned bicycle facilities are located within or near the Rodd Field Rd. corridor portion of the Study Area.

- **Plan CC 2035:** This is the City's updated 20-year comprehensive plan which will create a 20-year policy and strategic framework for the entire City. This plan was provided to the public on July 2015 for review and comment as a second draft. As a result of public comments received on the first draft, the second draft was revised to focus on broader vision, goals and policies. The plan is anticipated to be approved and adopted in the near future.

- **Mobility CC:** This plan supplies the transportation element of the COCCs existing Comprehensive Plan. It provides a strategic framework for mobility in the COCC by synthesizing a number of individual plans, including the Americans with Disabilities Act (ADA) Master Plan and Urban Transportation Plan (UTP). It is intended to be used in combination with currently adopted, future, and revised COCC plans (COCC, 2013) thereby creating the framework for a comprehensive, integrated, multi-modal transportation network.

- **2008 Bond Projects:** The Oso Creek/Oso Bay Area Park Development, and Hike and Bike Trails, both currently under construction, were included in Proposition 6 of the 2008 Bond Package. The Oso Creek/Oso Bay Area Park Development plan includes the design and construction of a COCC Interpretive / Conservation Nature Park along the Oso Creek / Oso Bay area. This park will include an interpretive conservation center, trails with signage, wetland development and viewing areas, information kiosks, restrooms and other amenities, and will incorporate a site for a Birding Trail. The hike and bike trails will utilize existing facilities including drainage easements, existing parkways and Oso Creek and will provide access from nearby neighborhoods to several area schools. It will also establish a connection with existing roadways within the transportation system and provide a new passage for pedestrians and bicyclists without having to redesign existing roadways.

- **2012 Bond Projects:** Upgrades and extensions to Bill Witt Park and the completion of the Bear Creek/Oso Creek Park Trail, which is still under construction, were included within Proposition 4 of the 2012 Bond Package. Proposition 1 of this Bond Package included street improvements to Yorktown Blvd. from Rodd Field Rd. to Cimarron Rd. which is currently in the design phase.

- **2014 Bond Projects:** Proposition 2 of the 2014 Bond Package includes the expansion of Rodd Field Rd. from Saratoga to Yorktown, and the North Padre Island Beach Facility improvement. Rodd Field Rd. will be upgraded from the existing two lane roadway to two travel lanes in each direction with a divided median. A Parks Beach Maintenance Facility will be constructed in the vicinity of Sea Pines Drive/Coral Vine Street at Beach Access Rd. 6. These projects are currently in the design phase.

In addition to transportation agency plans, there are several neighborhood and community-driven plans in Corpus Christi which occur within or in the vicinity of the Study Area. These plans include the following:

- Oso Creek Parkway Plan: The Cayo Del Oso and Oso Creek combine to provide one of the most important natural drainage ways, diverse wildlife habitats and richest archeological areas in Nueces County (COCC, 1993). This project focuses on the preservation of public access to these areas and protection of the existing habitats. The Oso Creek Parkway Plan is a major focus for environmental conservation in Corpus Christi. The proposed parkway plan extends from the Cayo Del Oso's connection with Corpus Christi Bay to the south and then extends to the west, ending near County Rd. 26. The Oso Creek Parkway Plan is a component of the COCC Comprehensive Plan.

3.0 Socioeconomic Factors including Population, Minority Population, and Employment

This section summarizes the applicable federal and state guidance for socioeconomic factors and the methodology used to gather data on the social and economic conditions relevant to the Regional Parkway PEL Study. It also compares socioeconomic factors such as population, demographic, employment, and income characteristics within the Study Area to those of the COCC, Nueces and Kleberg counties, and the State of Texas. The Socioeconomic study area, shown in Figure 3-1 includes those Census Block Groups that occur within or intersect the Study Area boundary as described in Section 1.0.

3.1 Legal and Regulatory Context

The following State and Federal executive orders and policies apply to socioeconomic considerations.

3.1.1 Environmental Justice

Executive Order (EO) 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations", requires each Federal agency to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low-income populations" (EO, 1994). In May 2012, the U.S. Department of Transportation (USDOT) released a revised version of USDOT Order 5610.2(a) entitled "Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," which updated the original Order published in 1997. Subsequently, in June 2012, the Federal Highway Administration (FHWA) released FHWA Order 6640.23A, "FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations", which replaces the original FHWA Order 6640.23 signed in 1998. The updated FHWA Order 6640.23A demonstrates FHWA's continued commitment to environmental justice. As noted in revised FHWA Order 6640.23A, "It is FHWA's longstanding policy to ensure nondiscrimination in federally funded activities. Furthermore, it is FHWA's continuing policy to identify and prevent discriminatory effects by actively administering its programs, policies, and activities to ensure that social impacts to communities and people are recognized early and continually throughout the transportation decision-making process – from early planning through implementation." The FHWA has identified three fundamental principles of environmental justice:

1. To avoid, minimize, or mitigate disproportionately high and adverse human health or environmental effects, including social and economic effects, on minority populations and low-income populations;
2. To ensure full and fair participation by all potentially affected communities in the transportation decision-making process; and
3. To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority populations and low-income populations.

Disproportionately high and adverse human health or environmental effects are defined by FHWA as adverse effects that:

1. Are predominately borne by a minority population and/or a low-income population, or
2. Will be suffered by the minority population and/or low-income population and are appreciably more severe or greater in magnitude than the adverse effects that will be suffered by the non-minority population and/or non-low-income population.

For the purposes of this study, “minority” populations are defined as non-white populations including Black or African American; American Indian and Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; Some Other Race; Two or More Races; and Hispanic persons (who can be of any race). **Figure 3-1** shows the Study Area census block groups used for the socioeconomic analysis.

The U.S. Department of Health and Human Services poverty guideline for a family of four was determined to be $24,300 in 2016 (HHS 2016). Census block groups with a median household income of less than or equal to $24,300 as determined by the 2009-2013 American Community Survey (ACS) were considered to be low-income for the purposes of this study. Median household income is included in the ACS which is an annual survey of a subset of the population. Although the data obtained from the ACS are estimates, not counts, this information is available more frequently than that of the decennial census.

Although it is not practical to conduct a comprehensive environmental justice analysis for a PEL study at this scale, the data presented here provide an overview of social and economic conditions within the socioeconomic Study Area and could be utilized as a backdrop for the socioeconomic analysis of projects that advance to the NEPA stage of project development.

3.1.2 Limited English Proficiency

EO 13166, “Improving Access to Services for Persons with Limited English Proficiency”, requires agencies to examine the services they provide, identify any need for services to those with limited English proficiency (LEP), and develop and implement a system to provide those services so that LEP persons can have meaningful access to them (EO, 2000). The U.S. Department of Justice defines LEP individuals as those “who do not speak English as their primary language and who have a limited ability to read, write, speak, or understand English” (67 FR 41459). USDOT published guidance in 2005 stating that funding recipients “are required to take reasonable steps to ensure meaningful access to their programs and activities by LEP persons.”

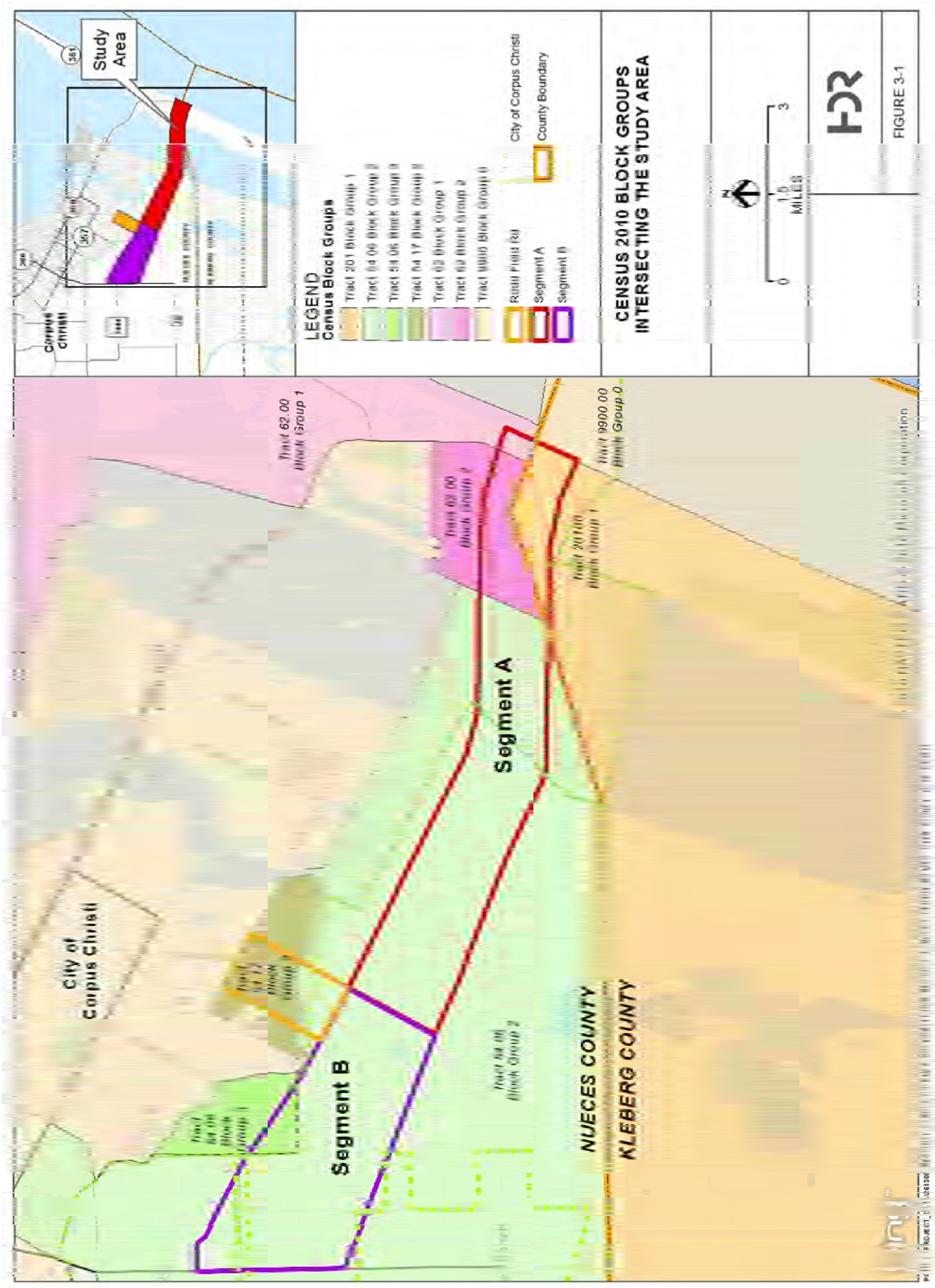

Figure 3-1. Census 2010 Block Groups

Because it is not reasonable or practicable to complete a comprehensive assessment of potential language needs at the corridor planning level of analysis, only initial data collection of LEP populations occurred for this study.

3.2 Methodology

Demographic and socioeconomic data were obtained from the 2010 U.S. Census and the ACS 2009-2013. Information summarized in this section includes general population data and data characterizing occurrences of minorities, low-income, LEP, and employment within the socioeconomic Study Area, the COCC, Nueces and Kleberg counties, and the state of Texas.

3.3 Existing Conditions

The following discussion is a comparison of the socioeconomic characteristics within the socioeconomic Study Area, the COCC, Nueces and Kleberg counties, and the State of Texas.

3.3.1 Environmental Justice Populations and Growth

Table 3-1 furnishes race and ethnicity census data for all census block groups, including minority populations, for the socioeconomic Study Area, individual segments, Rodd Field Rd., the COCC, Nueces and Kleberg counties and the state of Texas. This table reflects the sparse and scattered populations which occur within the Study Area.

The estimated population of the COCC was 308,993 people in 2013, of which 67.4 percent were minority. In 2013 the population of Nueces County was approximately 344,257 people of which 67.7 percent were minority and Kleberg County included 32,052 people with 77.3 percent minority.

Table 3-1. Race and Ethnicity in the Study Area (2009-2013 ACS)

Census 2010 Geography	# or %	Total for Study Area Block Groups	Total for Segment A	Total for Segment B	Total for Rodd Field Rd.	City of Corpus Christi	Nueces County	Kleberg County[1]	State of Texas
Total Population	#	13,567	9,717	2,359	3,869	308,993	344,257	32,052	25,639,373
White	#	7,784	6,201	1,024	1,415	100,884	111,147	7,268	11,488,269
	%	57.4	63.8	43.4	36.6	32.6	32.3	22.7	44.8
Black*	#	202	99	18	85	12,541	12,686	1,167	2,956,545
	%	1.5	1	0.8	2.2	4.1	3.7	3.6	11.5

Table 3 1. Race and Ethnicity in the Study Area (2009-2013 ACS) cont.

Census 2010 Geography	# or %	Total for Study Area Block Groups	Total for Segment A	Total for Segment B	Total for Rodd Field Rd.	City of Corpus Christi	Nueces County	Kleberg County1	State of Texas
Indian*	#	11	0	11	0	533	598	94	66,100
	%	0.1	0	0.5	0	0.2	0.2	0.3	0.3
Asian*	#	341	114	77	298	5,440	5,511	698	1,005,797
	%	2.5	1.2	3.3	7.7	1.8	1.6	2.2	3.9
Islander*	#	0	0	0	0	124	221	0	18,011
	%	0	0	0	0	0.04	0.1	0	0.1
Other*	#	97	97	0	0	377	378	48	34,413
	%	0.7	1	0	0	0.1	0.1	0.2	0.1
Two*	#	215	41	0	174	3,005	3,100	159	352,511
	%	1.6	0.4	0	4.5	1	0.9	0.5	1.4
Hispanic**	#	5,058	3,165	1,229	2,038	186,089	210,616	22,618	9,717,727
	%	37.3	32.6	52.1	52.7	60.2	61.2	70.6	37.9
Total Minority	**#**	5,924	3,516	1,335	2,595	203,622	233,110	24,784	13,748,216
Percent Minority	**%**	43.7	36.2	56.6	67.1	67.4	67.7	77.3	55.2

Source: American Community Survey, 2013. Table B03002. Accessed http://factfinder.census.gov/faces/nav/jsf/pages/download_center.xhtml 10/27/2015.

*The full definitions of race in the census include Black or African American; American Indian and Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; Some Other Race; and Two or More Races.

**Hispanic persons can be of any race.

[1] Kleberg County comprises approximately 6% of the total Study Area.

Both counties included a higher percentage of minorities compared to the 55.2 percent minority population in the state of Texas overall. The 2015 population of the state of Texas includes an estimated 25.6 million people. The total population of the socioeconomic Study Area, which includes all block groups which occurred within or intersected the Study Area boundary, was approximately 13,567 people, which included 43.7 percent minority.

Three Study Area census block groups (Census tract 201, block group 1, Census tract 54.17, block group 2, and Census tract 54.06, block group 2) included a total minority population exceeding 50 percent in 2013 (see **Figure 3-2**).

Table 3-2 contains information on the projected population growth by race/ethnicity for Kleberg and Nueces counties and the state of Texas. The total population of Kleberg County is projected to grow more than 41 percent between 2010 and 2050, Nueces County more than 30 percent, and the state of Texas more than 64 percent. During this same period the Anglo population of both counties and the state is expected to decline, while Black, Hispanic, and Other Race/Ethnicity populations are expected to increase, in some cases dramatically (> 160 percent).

Table 3-2. 2010-2050 Projected County and State Population Growth

Kleberg County	2010	2020	2030	2040	2050	% Change
Total Population	32,061	35,597	39,018	42,231	45,268	41.2%
Anglo	7,479	7,504	7,416	7,351	7,347	-1.8%
Black	1,070	1,234	1,330	1,441	1,523	42.3%
Hispanic	22,495	25,637	28,847	31,882	34,670	54.1%
Other	1,017	1,222	1,425	1,557	1,728	69.9%
Nueces County	**2010**	**2020**	**2030**	**2040**	**2050**	**% Change**
Total Population	340,223	370,473	399,947	421,032	438,408	28.9%
Anglo	111,870	106,909	100,199	91,113	82,178	-26.5%
Black	12,178	12,614	12,930	12,810	12,561	3.1%
Hispanic	206,293	238,362	271,342	298,668	322,198	56.2%
Other	9,882	12,588	15,476	18,441	21,471	117.3%
State of Texas	**2010**	**2020**	**2030**	**2040**	**2050**	**% Change**
Total Population	25,145,561	28,813,282	32,680,217	36,550,595	40,502,749	61.1%
Anglo	11,397,345	11,723,184	11,792,588	11,593,202	11,265,371	-1.2%
Black	2,886,825	3,274,738	3,616,745	3,876,830	4,065,757	40.8%
Hispanic	9,460,921	11,963,951	14,900,906	18,095,574	21,516,362	127.4%
Other	1,400,470	1,851,409	2,369,978	2,984,989	3,655,259	161.0%

Source: Texas State Data Center (TSDC). http://txsdc.utsa.edu/Data/TPEPP/Projections/Index.aspx., Race/Ethnicity Total Population by Migration Scenario for 2010-2050 (2014, 0.5 Migration Scenario). TSDC recommends utilizing the 0.5 migration scenario for long-range planning efforts.

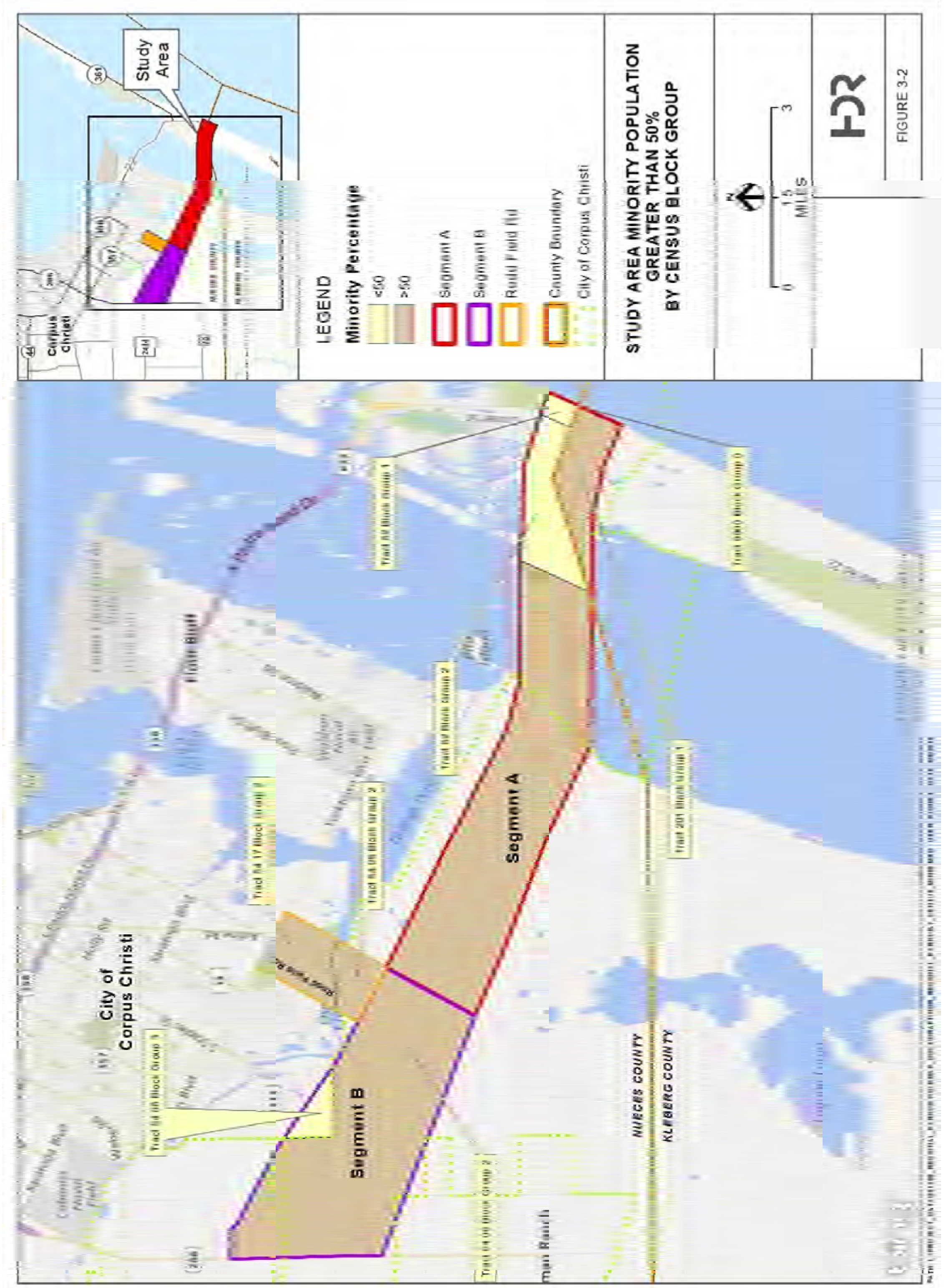

Figure 3-2. Study Area Minority Population Greater than 50 Percent by Census Block Group

Table 3-3 includes the median family income and total number of households for the state of Texas, Nueces and Kleberg counties, the city Corpus Christi, and the census block groups that encompass the Study Area. The most recent data was obtained from the 2009-2013 American Community Survey which only contains data to the census block group level. The data indicate that median family income in the census block groups within the proposed Study Area is above the national poverty level for a family of four, which indicates that there are not a substantial number of low-income families within this area.

Table 3-3. Median Household Income by Block Group (2009-2013 ACS)

Census Tract	Block Group	Total # of Households	Median Household Income (2013 inflation adjusted dollars)*
62	1	656	$49,760
62	2	1,946	$106,321
54.06	2	496	$43,125
54.06	3	348	$140,278
54.17	2	866	$100,682
201	1	856	$56,875
9900	0	0	--
City of Corpus Christi		111,741	$47,481
Nueces County		123,915	$47,057
Kleberg County		11,241	$40,566
State of Texas		8,886,471	$51,900

Source: U.S. Census Bureau, 2009-2013 American Community Survey, Tables S1903, B11001 and B19013. ACS data are estimates; they are not counts. Income data is provided in 2013 inflation adjusted dollars.

LEP individuals are defined as those who speak English “not well” or “not at all.” Approximately 1.9 percent of the population in the Study Area block groups is considered to be LEP (**Table 3-4**). This percentage is lower than the percentage found within Nueces and Kleberg counties, the COCC or the state of Texas.

Table 3-4. Limited English Proficiency (Population Age 5 and Older)

Geographic Area	Population age 5 years and older	Population age 5 and older who speak English less than well (all LEP)	Percent of Population age 5 and older who speak English less than well (all LEP)
Total Study Area Block Groups	**12,983**	**241**	**1.9**
City of Corpus Christi	**287,603**	**13,473**	**4.7**
Nueces County	**320,314**	**15,596**	**4.9**
Kleberg County	**29,648**	**1,543**	**3.2**
State of Texas	**23,704,400**	**1,899,095**	**8.0**

Source: U.S. Census Bureau, 2009-2013 American Community Survey Table B16004. ACS data are estimates; they are not counts.

3.3.2 Employment

Data was gathered for Census block groups to reflect persons in the labor force, including civilians and armed forces members, and those not in the labor force. The percent of unemployed persons within the overall labor force was then estimated for each geography (See **Table 3-5**). The percentage of unemployed persons varied within the Study Area, from approximately 3.8 percent to almost 13 percent. Because of significant economic fluctuations which have occurred in recent years, it will be important to update these data as the project is further developed through the NEPA process.

Table 3-6 lists employment by industries in the Study Area block groups, Segment A, Segment B, Rodd Field Rd., the COCC, Nueces and Kleberg counties and the state of Texas. The industry reporting the largest employment numbers in the Study Area block groups was Educational Services, and Health Care and Social Assistance, followed by Public Administration and Retail Trade. Public Administration was the largest employer within Segment A and Retail Trade employed the most individuals in Segment B. Regional comparison of Corpus Christi, Nueces County and Kleberg County revealed that the three largest industries were Educational Services, and Health Care and Social Assistance, Retail Trade, and Arts, Entertainment and Recreation, and Accommodation and Food Services. Texas differed slightly from these three areas with Professional, Scientific, and Mgmt., and Administrative and Waste Management Services replacing the Arts, Entertainment and Recreation, and Accommodation and Food Services industry.

Table 3-5. Employment and Unemployment in Study Area Census Block Groups (2009-2013)

Geography	Total Pop.	Total in Labor Force	Total in Labor Force						Not in Labor Force
			Civilian Labor Force					Armed Forces	
			Total in Civilian Labor Force	Employed	Un-employed	*% Unemployed in Total Labor Force*			
CT 54.06, BG 2	967	677	677	590	87	*12.9*		0	290
CT 54.06, BG 3	889	671	669	640	29	*4.3*		2	218
CT 54.17, BG2	2035	1421	1345	1290	55	*3.9*		76	614
CT 62, BG 1	1,164	815	727	636	91	*11.2*		88	349

Table 3 5. Employment and Unemployment in Study Area Census Block Groups (2009-2013) cont.

Geography	Total Pop.	Total in Labor Force	Total in Labor Force					Not in Labor Force
			Civilian Labor Force				Armed Forces	
			Total in Civilian Labor Force	Employed	Un-employed	*% Unemployed in Total Labor Force*		
CT 62, BG 2	3,910	2,775	2,382	2,276	106	*3.8*	393	1,135
CT 201, BG 1	2,145	1,402	1,279	1,130	149	*10.6*	123	743
CT 9900, BG 0	0	0	0	0	0	0	0	0
City of Corpus Christi	238,265	154,358	152,150	139,944	12,206	*7.9*	2,208	83,907
Nueces County	265,949	170,493	168,238	154,603	13,635	*8.0*	2,255	95,456
Kleberg County	25,010	15,408	15,007	13,437	1,570	*10.2*	401	9,602
Texas	19,468,136	12,691,031	12,589,173	11,569,041	1,020,132	*8.0*	101,858	6,777,105

Source: U.S. Census Bureau, 2009-2013 American Community Survey, Table B23025. ACS data are estimates; they are not counts.

Table 3-6. Employment by Industry in Study Area Block Groups and Surrounding Geographies (ACS 2009-2013)

Industry	Total for Study Area Block Groups	Seg. A	Seg. B	Rodd Field Rd.	City of Corpus Christi	Nueces County	Kleberg County	Texas
Total	6,562	4,632	1,230	1,880	139,944	154,603	13,437	11,569,041
Agriculture, forestry, fishing and hunting, and mining	484	435	96	89	4,472	5,535	1,346	359,977
Construction	506	278	139	187	11,106	12,377	799	914,460
Manufacturing	397	200	91	218	8,945	10,085	583	1,083,079
Wholesale trade	302	218	58	104	3,432	3,713	134	347,982
Retail trade	574	387	198	231	17,111	18,563	1,547	1,345,939
Transportation and warehousing, and utilities	324	144	57	167	7,237	8,134	442	629,548
Information	55	42	31	18	2,455	2,582	52	213,097
Finance and insurance, and real estate and rental and leasing	383	325	39	19	7,225	7,890	260	769,050
Professional, scientific, and mgmt., and administrative and waste mgmt. services	445	330	94	97	11,320	12,296	710	1,251,791
Educational services, and health care and social assistance	1,724	1318	284	388	34,249	37,763	4,203	2,514,011
Arts, entertainment, and recreation, and accommodation and food services	445	307	39	107	15,597	17,033	1,779	1,001,258
Other services, except public administration	238	129	34	119	7,478	8,533	598	621,998
Public administration	685	519	70	136	9,317	10,099	984	516,851

Source: U.S. Census Bureau, 2009-2013 American Community Survey, Table C24030. ACS data are estimates; they are not counts.

4.0 Neighborhoods and Community Resources

This section describes the neighborhood and community resources within the Study Area. The following discussions provide general information about the distribution of these resources as well as site specific data.

4.1 Hospitals

No hospitals are located within Segment A, Segment B, or the Rodd Field Rd. corridor (U.S. Geological Survey [USGS] Names Information System [(GNIS, 2015)], Texas Natural Resources Information Service [TNRIS], 2015, Google Maps, 2015).

4.2 Schools and Universities

No existing schools or universities are located within Segment A, Segment B, or the Rodd Field Rd. corridor (Texas Education Agency, 2014). However Del Mar College is planning a future campus at the intersection of Yorktown Blvd. and Rodd Field Rd., and a new elementary and high school have recently been constructed along Rodd Field Rd. north of the project area.

4.3 Places of Worship

There no places of worship located within Segment A, Segment B, or the Rodd Field Rd. corridor (USGSa, 2015, TNRIS, 2015, Google Maps, 2015).

4.4 Military Land

No military land is located within Segment A, Segment B, or the Rodd Field Rd. corridor (USGS, 2015a, TNRIS, 2015, Google Maps, 2015).

4.5 Libraries and Museums

No libraries or museums are located within Segment A, Segment B, or the Rodd Field Rd. corridor (USGSa, 2015, TNRIS, 2015, Google Maps, 2015).

4.6 Neighborhoods

One neighborhood occurs within Segment A, the Sea Pines Subdivision. Located on the northeast portion of the eastern terminus of this segment on North Padre Island, this subdivision includes high-quality homes in a marina-type subdivision. Segment B includes a portion of the King Estates Neighborhood in the central portion of its northern boundary. The King Estates Neighborhood includes approximately 80 larger custom homes on one-acre lots. The Rodd Field Rd. corridor encompasses two established neighborhoods, Royal Creek Estates, and Rancho Vista. Royal Creek Estates occurs near the central portion of this area along the northwest boundary and when fully developed will extend nearly to Oso Creek. Rancho Vista is a new development situated in the northeast corner of the Rodd Field Rd. corridor. Plans for this development include a range of home sizes, a nature preserve on Oso Creek and a park and lake system which will extend to Oso Creek. This area also includes a primarily industrial/commercial area within the northwest corner on the site of the original Rodd Field Naval Airfield.

5.0 Visual and Aesthetic Qualities

This section summarizes the applicable policies and goals for visual and aesthetic quality, describes the methodology used to measure visual and aesthetic quality, and identifies high level, initial visual resources assessment units in the Study Area.

5.1 Legal and regulatory context

The following federal and local policies and goals apply to visual and aesthetic qualities.

5.1.1 Federal Highway Administration (FHWA)

According to FHWA's Technical Advisory T6640.8A, whenever a potential for visual impacts exists from a proposed transportation project, the environmental study should identify the potential visual impacts to the adjacent land uses as well as measures to avoid, minimize or mitigate these potential visual impacts.

Overall, the concept of Context Sensitive Solutions (CSS) encompasses FHWA's overarching goal of designing roadways that are developed collaboratively with the community, especially those most directly affected by infrastructure projects. According to the FHWA:

"Transportation investments, if properly conceived, can be catalysts to create lasting value in a community or countryside. Scenic, aesthetic, historic and environmental resources do not exist just as isolated elements. They exist in part, because a community values these features (i.e. a historic landmark in the center of Main Street or trees that line a rural road), or because they are linked to intangible qualities (i.e. pride in a town's cultural history and reputation.). The process of understanding people's value is an important part of CSS. By definition and practice, therefore, CSS requires sensitivity to the total context within which a transportation project will exist."

CSS is a process that can be incorporated into public involvement, and a design ethic that can provide information to both planning and project development processes.

5.1.2 U.S. Fish and Wildlife Service (USFWS)

The Coastal Barrier Resources Act (CBRA) of 1982 designated relatively undeveloped coastal barriers along the Atlantic and Gulf coasts as part of the John H. Chafee Coastal Barrier Resources System, and made these areas ineligible for most new federal expenditures and financial assistance. This act encourages the conservation of hurricane prone, biologically rich coastal barriers by restricting federal expenditures that encourage development such as federal flood insurance. These areas can be developed provided that private developers or other non-federal parties bear the full cost.

5.1.3 Local Policies and Goals

Visual resources and aesthetic guidelines are included in documents associated with the COCC and the CCMPO. **Table 5-1** summarizes the relevant visual resource guidelines included in planning documents for the Regional Parkway Study Area.

Table 5-1. Summary of Visual and Aesthetic Plans, Policies, and Goals

Document	Policies and Goals	Requirements
Plan CC DRAFT Comprehensive 2035 --City of Corpus Christi	Annexation plans provide for orderly growth in the southern ETJ.	Adopt policies and regulations that ensure orderly development in annexed areas.
MPO 2015-2040 Plan	MPO will also work cooperatively with local communities to ensure facilities are safe, accessible and comfortable environments for passengers through effective design, and location.	To meet the public transportation service needs of the citizens of the metropolitan area.

5.2 Methodology

The proposed visual and aesthetic analysis methodology was outlined by the USDOT and Federal Highway Administration (FHWA) Office of Environmental Policy in the report, *Visual Impact Assessment of Highway Projects*. The five steps in the assessment process are (1) identification of components of the project, (2) description of the visual environment of the project, (3) identification of significant visual resources, (4) determination of the responses and values of viewers, and (5) summary of major visual effects and how to manage those impacts. Although much of this process would take place during the NEPA phase, the visual context can be largely established for the Study Area.

In the project development phase, potential impacts would be rated as significant, potentially significant, or generally not significant. According to the Visual Impact Assessment of Highway Projects factors which are considered include impacts to existing visual quality, sensitivity, and the presence of sensitive receptors/assets. Each assessment unit (and sub-units identified for specific projects) would be assessed in terms of sensitive receptors/assets, potential impacts for primary viewers, architectural elements, elevated structures/bridges, and other vertical elements. Primary viewers can include arterial motorists, single family residents, commercial tenants, industrial tenants, and pedestrians. Other factors used to assess a person's visual experience may include uniqueness of the landscape in relation to the region; whether the scenic area is a foreground, middle ground, or background view; focus of the view; scale of the elements in the scene; number of potential viewers; duration of the view; and amount of disturbance to the landscape. The level of visual sensitivity associated with the visual resources of an area determines whether an aesthetic change would or would not be considered a significant effect.

Visual sensitivity can be determined by considering the overall visual character of an area, the number of viewers, and the duration of the viewing time offered of the scene. A high visual sensitivity rating exists in areas where views are rare, unique or in other ways special, such as in remote or pristine environments where signature landforms, vegetation, water bodies, rock formations, or other features of unusual or outstanding quality (i.e., natural coastlines, streams and other river corridors, designated historic districts, and designated scenic vistas) occur.

A moderate visual sensitivity rating is given to landscapes that have some areas of land development present. In a moderately sensitive area, human influence is more apparent, and the presence of manmade structures is common. Areas of low visual sensitivity commonly lack scenic, rare, or otherwise unique landscape features. These areas are typically urban or suburban areas, agricultural and farming areas, industrial and commercial development areas, and other areas that do not contain resources typically associated with moderate or high sensitivity areas. Once the sensitivity levels are established, potential impacts from individual mobility projects can be rated as significant, potentially significant, or generally not significant.

5.3 Existing Conditions

For the purpose of this initial existing conditions section, the Study Area has been divided into three general assessment units; Segment A, Segment B, and the Rodd Field Rd. corridor (see Figure 1-1). Segment A and B primarily includes rural areas with limited urban development, with the exception of the Segment A areas on North Padre Island. However the Rodd Field Rd. corridor includes a significant amount of urban development north of Oso Creek. Given the primarily rural setting of the Study Area and its minor topographic differences, existing views within populated areas include limited variation with the exception of those with a waterfront view located on North Padre Island. The limited elevation changes within the rural portions of Segments A and B, and Rodd Field Rd. offer limited vantage points which provide an opportunity for uninterrupted midground or background vistas. However urban areas located on North Padre Island, because of their close proximity to the Laguna Madre or oceanfront, are in a position to have a more extended view of the area. Specific mobility solutions may affect nearby property owners, particularly if the proposed solutions would alter the views available from North Padre Island.

The following paragraphs summarize the visual characteristics present in the Study Area assessment units. The current selected areas would be reevaluated as necessary based on individual project requirements.

- **Segment A:** The majority of Segment A is located southwest of the COCC, although the portion which crosses the Laguna Madre and the area on Padre Island occurs within the COCC limits. A significant portion of Segment A occurs within the area of the King Ranch National Register District. The mainland portion of this segment is undeveloped and includes rangeland and old field areas. One ranch home with its associated outbuildings is also located in this area. The expanse of Segment A which crosses the Laguna Madre will require the construction of a bridge and its associated approaches.

  The area of Segment A located on Padre Island contains urban areas which include both residential and commercial structures with scenic views of both the Laguna Madre and the Gulf of Mexico. Padre Bali Park, a Nueces County park, is located along the ocean side of Padre Island within Segment A. In addition approximately one-half of this area occurs within Kleberg County, where a major portion is designated by the U.S. Fish and Wildlife Service (USFWS) as critical habitat for the piping plover (*Charadrius melodus*). One private road crosses Segment A on the eastern portion of the mainland, and the North Padre Island area includes PR 22 and other residential and local access roads. Areas within this assessment unit range from low to high levels of visual sensitivity. The low sensitivity areas generally include mainland areas currently in use as pasture. High levels of visual sensitivity occur within those areas with waterfront views of either the Laguna Madre or Gulf of Mexico.

- **Segment B:** Approximately one half of Segment B includes undeveloped areas which may be used as rangeland. Areas of agricultural use including crops and pastures make up the majority of the remaining area of this segment. Segment B also includes a small area of residential development near the intersection of FM 2444 and CR41 within the COCC. Occasional scattered farmhouses and outbuildings also occur within this segment. A large gravel and sand operation is located near the northwest corner of the segment and a large water storage tank facility is situated adjacent to the intersection of S. Staples Street (FM2444) and CR 43.

  This segment includes tributaries of Oso Creek and is located adjacent to Oso Creek itself. The majority of this segment is situated within the King Ranch Historical District. Areas within this assessment unit range from low to moderate levels of visual sensitivity. The low sensitivity areas generally include agricultural and farming areas and industrial or commercial development areas. Moderate levels of visual sensitivity occur within the residential areas.

- **Rodd Field Road:** The area north of Oso Creek, or approximately two thirds of the Rodd Field Rd. corridor, occurs within the COCC limits. The northwest portion of this area includes a section of Bill Witt Park which at one time was the location of the Rodd Field Naval Airfield. A commercial area east of Bill Witt Park also occurs on the original airfield site. Residential construction exists and is ongoing within the northeast and central portions of this area.

  Oso Creek Park is situated between the developed residential areas and Oso Creek. This area and areas south of Oso Creek are included in the Oso Creek Park Plan. This plan includes the development of this area into a greenbelt including pocket parks, trails and bicycle paths. The portion of the Rodd Field Road corridor south of Oso Creek is currently undeveloped, however approximately one half is situated within the King Ranch Historic District. This area should be considered to be of moderate visual sensitivity within residential areas and high levels along Oso Creek.

6.0 Existing Transportation Infrastructure

This section summarizes the existing transportation infrastructure and future plans for transportation improvements within Segment A and B and the Rodd Field Rd. corridor. Discussion is provided for major roadway, rail, transit, and intermodal transportation modes located within and around the Study Area.

6.1 Methodology

Data was obtained from multiple existing sources which provided current information on the road, rail, transit, intermodal, and air facilities located in and around the Study Area. Specific sources utilized for the description of each transportation mode are cited in their respective sections.

6.2 Roadway System

The roadway system within the Corpus Christi area includes several major roadways including U.S. Highway (US) 77, State Highway (SH) 44, SH 358 (South Padre Island Drive), SH 286, and PR 22. The proposed facility would provide direct connections to SH 286 for traffic traveling to and from Corpus Christi, while alleviating existing congestion issues along SH 358 by providing an alternate travel route to Padre Island. An additional bridge crossing of the Laguna Madre would help reduce congestion, as well as provide an additional hurricane evacuation route from the island. The proposed project would be expected to provide needed infrastructure connecting to existing roadways which would support future land development and the area's regional growth.

6.2.1 Major roadways in the Study Area

Currently Segments A and B are largely agricultural and include limited transportation infrastructure. Roadways in Segment A are mainly confined to a small area on North Padre Island. PR 22 is a major roadway within this area that runs in a north-south direction on the island. Several other residential streets are also included within Segment A. SH 286 is a major roadway within these segments, forming the western boundary of Segment B and connecting areas from south of the Study Area to downtown Corpus Christi. SH 286 originates as a state highway which upgrades to a freeway (Crosstown Expressway) just south of SH 357 (Saratoga Blvd.) approximately 3.5 miles north of the Study Area. SH 286 intersects with FM 2444 (Staples Street), FM 43, and SH 358 (South Padre Island Drive) and terminates at IH 37. FM 2444 (Staples St.) crosses Segment B in an east-west direction. Other roadways which occur within Segment B include CR 14A, CR 18, CR 41 and CR 43. The Rodd Field Road corridor originates at the intersection of Rodd Field Rd. and Yorktown Boulevard and includes a number of residential roads. By providing additional connections to SH 286, Rodd Field Road, and PR 22, the proposed project would provide the transportation infrastructure needed to access and support existing and future land development and regional growth.

6.2.2 TDM/TSM/ITS

The current CCMPO Metropolitan Transportation Plan includes planning for Transportation Demand Management (TDM), Transportation System Management (TSM), and Intelligent Transportation Systems (ITS) within the area (CCMPO, 2014). TDM systems focus on reducing the number of vehicles using the road system while providing other mobility options to those who want to travel. These programs must rely on incentives or disincentives to produce the desired shifts in behavior attractive to the travelling public. Examples of employer-based TDM programs proposed for the CCMPO area include carpools and vanpools, non-motorized travel such as bicycling and walking, the use of high occupancy vehicle lanes, financial incentives and alternative work hour programs.

TSM focuses on minor improvements, generally within existing right-of-way (ROW), such as regulation of pickup and delivery times for freight delivery, fast removal of disabled vehicles from travel lanes, traffic signal improvements and intersection improvements, or minor construction that enables the existing system to operate more efficiently and safely.

ITS focus is on computers, communication systems and displays. Advanced systems such as surveillance cameras, message signs, and web-based alerts enable drivers to operate vehicles with more information concerning existing traffic conditions such as congestion, construction, accidents, and emergencies. The COCC contains more than 80 miles of fiber optic cables which were installed along urban area streets, making it a valuable tool for mitigating congestion within the COCC. In addition, dynamic sign message systems and condition monitoring cameras at selected locations help make appropriate real-time decisions to manage congestion. The Corpus Christi area has multiple surveillance cameras and dynamic message signs along IH 37, SH 181, SH 77, SH 286 and SH 358. Segments A and B occur south of the ITS elements located within Corpus Christi.

The CCMPO 2016 Unified Planning Work Program (CCMPO, 2016a), also included a discussion of future ITS needs and opportunities. Several ITS related projects were identified in 2013 during a review of the ITS Regional Architecture Memorandum of Agreement (MOA). These included 1) a link from TxDOT's SH 286 fiber network to the COCC Emergency Operations Center, 2) coordination of the COCC's 911 center with TxDOT message signs for posting of information that may impact traffic flow, 3) the potential for direct access to Crash Records Information System data for the MPO, 4) Feasibility of a wind monitoring system on bridges to warn high profile vehicles, 5) the feasibility of locations for additional permanent traffic counters, and 6) the potential for traffic queue warning for freeway exits with frequent backups which may impact freeway traffic. These projects are currently in various phases of evaluation and implementation.

6.2.3 Major Traffic Generators

The Study Area is located in what is currently primarily a rural/agricultural area. One of the purposes of the proposed project would be to improve the infrastructure needed for residential and economic development within and beyond the Study Area. Additionally, the proposed facility would be anticipated to be used as another hurricane evacuation route for the COCC as well as provide another crossing of the Laguna Madre. COCC future plans include an increase in development within the Southside and North Padre Island areas, and Del Mar College is planning a south campus which will include an anticipated 20,000 students at build-out. These activities could potentially result in major traffic generators. Currently no major traffic generators occur within the Study Area,

6.2.4 Operational Characteristics

The high rate of population growth in the region has resulted in a significant increase in traffic volumes for the major traffic generators located within the Corpus Christi metropolitan area. As shown in **Table 6-1**, the average daily traffic (ADT) volumes on significant roadway segments within Corpus Christi are anticipated to increase by 2035. Significant roadway segments located in the vicinity of or within the Study Area are anticipated to experience an increase in ADT of up to 157 percent during this period.

Table 6-1. Average Daily Traffic Volume Estimates for Major Roadways Near the Study Area in 2014 and 2035

Roadway	From	To	2014	2035	% Change 2014 to 2035
SH 286	SH 358	Saratoga Blvd.	29,000	70,825	144
	Saratoga Blvd.	FM 2444	12,088	29,736	146
SH 358	IH 37	SH 286	85,286	136,198	60
	SH 286	Weber Rd	137,254	158,657	16
	Weber Rd	Staples St	123,678	141,020	14
	Staples St	Rodd Field Rd	73,043	98,896-	35
Park Rd 22	Naval Air Station	SH 361	22,056	56,265	155
	Jackfish Ave	SH 361	21,409	43,735	104
	SH 361	Whitecap Blvd	13,798	35,440	157

Sources: CCMPO TransCad model 2035 Data (2016d), and TXDOT 2014.

6.2.5 Future Planned Improvements

The CCMPO is responsible for long-range transportation planning in the greater Corpus Christi area. Their most recent MTP is the Metropolitan Transportation Plan 2015-2040 (CCMPO 2014). The 25 year long-range plan explains the MPOs transportation policies and goals, estimates future needs and resources, and lays out a detailed program for preserving and expanding the transportation system. This report also forms the basis of project selection for the short-range (4 year) Transportation Improvement Program (TIP). The Unified Transportation Plan (UTP) which is the state's 10 year Transportation Plan includes estimated available funding levels of $1.1 billion for the 2015-2040 time period. Federally funded highway projects incorporated in the 25 year long-range plan include an extension of SH 286 from FM 43 to FM 2444 located along the western boundary of Segment B.

An Island Mobility & Access Management Study designed to identify mobility and access management issues and develop applicable transportation management strategies for priority corridors on the barrier islands in the MPO area is forthcoming, along with an update of the CCMPO Travel Demand Model to a 2045 horizon.

6.3 Rail System

No freight or passenger rail networks are located in or in close proximity to the Study Area.

6.4 Transit System

Corpus Christi Regional Transportation Authority (CCRTA or "The B") operates within the region, but the service area only extends to a small portion of the Rodd Field Road corridor. The remainder of the Study Area does not include local transit service.

6.4.1 Intercity Transit Service

Greyhound Lines, Inc. operates intercity bus service from its bus station on N. Chaparral Street in downtown Corpus Christi (GLI 2016). Bus service operates Monday through Sunday from 8:00 AM to 11:59 PM.

Valley Transit Company is a full-service bus company serving south central Texas and northern Mexico with more than 50 daily schedules (VTC, 2016). It also serves as a connector service to nationwide travel via Greyhound Lines, Inc. from two travel centers in Corpus Christi.

6.5 Intermodal Facilities

An intermodal facility as defined is a place where interface occurs between transportation systems. The term "intermodal" implies not only several transportation modes but also substantial connectivity and interchange between them. Passenger terminal modes include people entering the facility by one mode of access (e.g., on foot, riding a bicycle, by car, by bus or train, etc.) and leaving by another. Freight intermodal facilities or terminals are sites where freight is conveyed from one mode of freight transportation to another. Intermodal operations can include highway, rail, water, and air modes. Utilizing these different modes creates an opportunity to utilize the efficiency and technology that permit the different modes to work in unison. Corpus Christi includes the fifth largest deep-water port in the country and a number of intermodal facilities. This section will focus on the discussion of freight intermodal facilities in and around the Study Area.

6.5.1 Existing Intermodal Facilities

The Port of Corpus Christi Authority (Authority) and the CCMPO are focused on promoting and encouraging the expansion and diversification of services and cargo by developing the infrastructure necessary to meet current and anticipated customer needs. The Joe Fulton International Trade Corridor on the north side of the Corpus Christi Ship Channel connects two major highways, U.S. Highway (US) 181 and IH 37. These highways provide an intermodal link between highway, marine and rail transportation systems within the greater Corpus Christi area. The Port of Corpus Christi (Port) is serviced by three railroads, the Union Pacific Railroad (UPRR), Kansas City Southern (KCS), and Burlington Northern and Santa Fe Railway (BNSF) which provide intermodal transportation links for cargo distributed throughout the United States and Mexico (CCMPO 2014). The Port includes the Southside and Northside Intermodal Terminals and has a major impact on regional intermodal shipping activities. The proposed project would potentially provide additional routes for intermodal shipping activities; however, no intermodal facilities are currently located within the Study Area.

6.5.2 Planned Intermodal Facilities

The Authority has completed preliminary designs and initiated the final design for a multipurpose dock and general cargo storage and transit facility at the end of the La Quinta Channel located in Ingleside, San Patricio County. In addition the first phase of the Nueces River Rail Interchange Yard began construction in 2014 and design and funding has been identified for a second phase which will provide eight unit train sidings and additional rail car handling and storage capacity. These projects are anticipated to improve transit accessibility, connect existing and future transit modes, and spur economic growth.

6.6 Air Facilities

There are no airport facilities located in the Study Area. However, in support of the Naval Air Station at Corpus Christi’s training mission there are two outlying landing fields; Waldron Naval Air Field and Cabaniss Naval Air Field. These outlying landing fields are approximately 2.0 mile and 2.5 miles north of the Study Area, respectively. Additionally, there is a small private airstrip west of the project area, several heliports and Corpus Christi International Airport in the region outside the Study Area. The location of these air fields and heliports in relation to the Study Area is depicted in **Figure 6-1** (City Data, 2016). These air facilities have minimal impacts on vehicular travel in the Study Area.

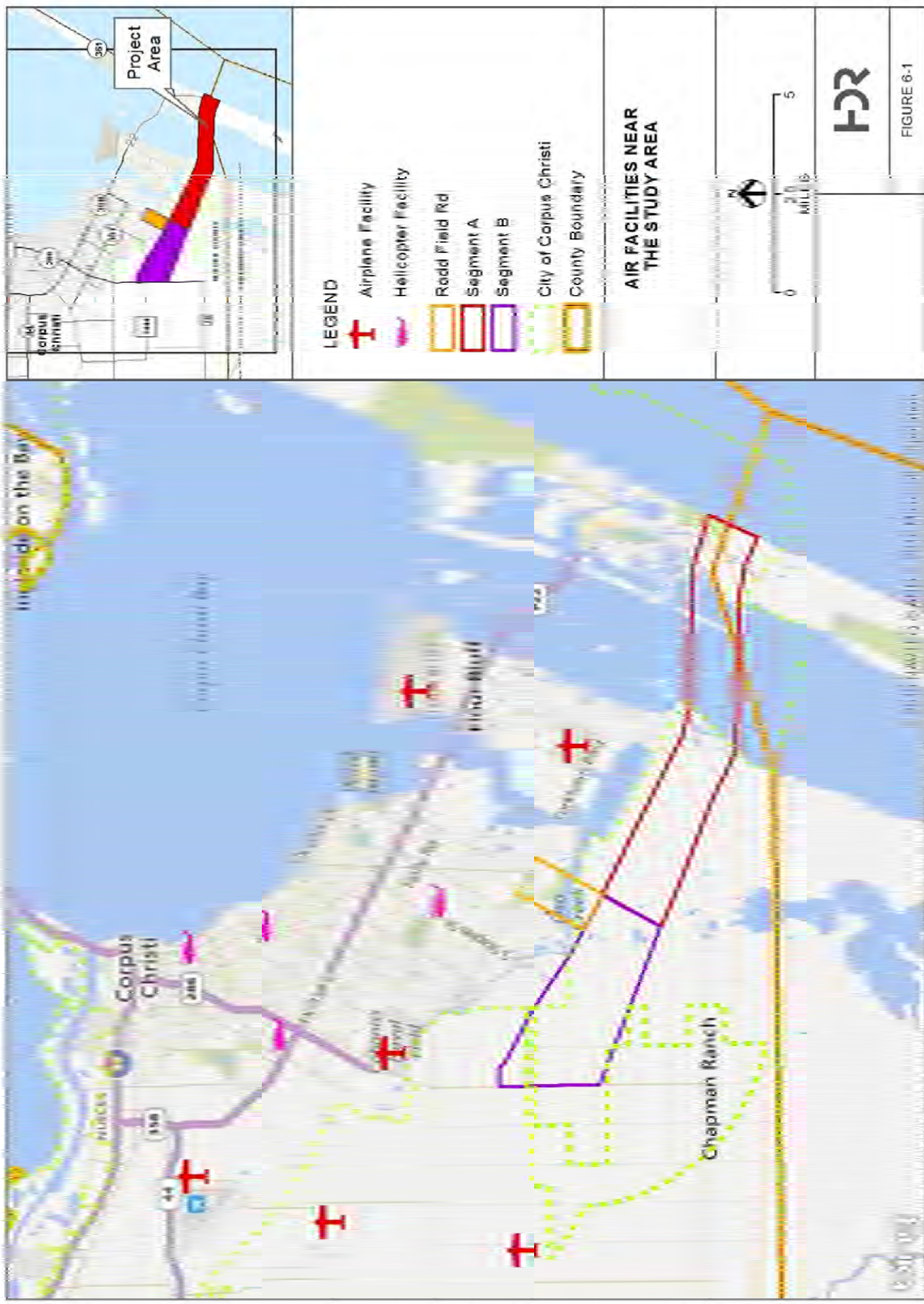

Figure 6-1. Air Facilities near the Study Area

7.0 Surface Water

This section describes the water resources, including surface waters, potential wetland areas, and floodplains located within the Study Area. The following resources were reviewed as part of this report: 1) National Hydrography Dataset (NHD) from United States Geological Survey (USGS, 2015b), 2) USFWS's National Wetlands Inventory (NWI) (USFWS, 2015a), and 3) Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM).

All surface waters and floodplains mapped in the Study Area are discussed in Section 7.2. The Regional Parkway PEL Study Area is within the Texas Coastal Zone Management area which is administered by the Texas General Land Office (TGLO).

7.1 Legal and Regulatory Context

Several state and federal regulations apply to water quality, including the National Pollutant Discharge Elimination System (NPDES), the Clean Water Act (CWA), and the River and Harbors Act of 1899. According to the CWA, Waters of the U.S. include intrastate rivers, streams (including intermittent streams), wetlands, and natural ponds. The CWA protects against the use, degradation, or destruction that affect interstate or foreign commerce of surface waters. Water quality consists of the physical, chemical, and biological characteristics of water.

7.1.1 Federal Requirements

The Environmental Protection Agency's (EPA) National Pollutant Discharge Elimination System (NPDES) permit program, authorized by the CWA, controls water pollution by regulation of the discharge of pollutants into waters of the U.S., including those discharges associated with construction activities. In Texas, the NPDES program is administered by the Texas Commission on Environmental Quality (TCEQ) as part of the Texas Pollutant Discharge Elimination System (TPDES).

Executive Order 11988, "Floodplain Management," requires federal agencies to avoid actions, to the extent practicable, which will result in the location of facilities in floodplains and/or affect floodplain values. FEMA requires municipalities that participate in the National Flood Insurance Program to adopt floodplain ordinances that prohibit development in the existing 100-year floodplain. The COCC, Nueces County and Kleberg County are participants.

In order to regulate continued growth in the coastal zone congress passed the Coastal Zone Management Act (CZMA) in 1972 (NOAA, 2016). Administered by National Oceanic and Atmospheric Administration (NOAA), this act provides for management of the nation's coastal resources. The goal of the CZMA is to "preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone." The U.S. Army Corps of Engineers (USACE) also regulates the discharge of dredged and fill material into wetlands and other waters of the U.S. under Section 404, subsection 330.5(a)(21) of the CWA. Sections 9 and 10 of the Rivers and Harbors Act of 1899 further authorize USACE and the U.S. Coast Guard (USCG) to regulate any work in or affecting navigable waters of the U.S. Regulated activities may be permitted through USCG bridge permits and/or via USACE Individual Permits (IP), Regional General Permits (RGP), or Nationwide Permits (NWP).

The term “waters of the United States” has broad meaning and incorporates both deep-water aquatic habitats and special aquatic sites, including wetlands, as listed below:

- The territorial seas with respect to the discharge of fill material;
- Coastal and inland waters, lakes, rivers, and streams that are navigable waters of the United States, including their adjacent wetlands;
- Tributaries to navigable waters of the United States, including adjacent wetlands; and
- Interstate waters and their tributaries, including adjacent wetlands.

The 1987 USACE Wetland Delineation Manual defines wetlands based on three criteria: hydrophytic vegetation, hydric soils, and wetland hydrology. In general, all three criteria must be present for an area to qualify as a wetland. Some exceptions can occur in disturbed areas or in newly formed wetlands, where one indicator (such as hydric soils) might be lacking.

7.1.2 State Regulations

For purposes of monitoring water quality, the TCEQ has divided each river basin into segments. These surface waters are described by water quality standards, general use, and possible source pollutants in the Texas Water Quality Inventory and Section 303(d) List. Stream segments in the Study Area that are listed as threatened or impaired are discussed in Section 7.2.2.

7.2 Existing Conditions

This section discusses potential waterways and floodplains within the Study Area. Water quality and hydrology within the Study Area is also described.

7.2.1 Existing Surface Drainage Characteristics

The Study area is located within the Nueces-Rio Grande Coastal Basin which drains approximately 10,442 square miles (TCEQ, 2015a). This basin drains the area of the Texas coastal plain which occurs between the Nueces River and the Rio Grande, which then empties into the Laguna Madre, Baffin Bay and Oso Bay. Segment A is primarily located within the North Laguna Madre Watershed however a portion of the northwest area occurs within the South Corpus Christi Bay Watershed (**Figure 7-1**) (NHD, 2015). Segment B occurs within the South Corpus Christi Bay Watershed with the exception of a small area in the southeast which is within the North Laguna Madre Watershed. The Rodd Field Rd. corridor occurs entirely within the South Corpus Christi Bay Watershed.

Table 7-1 includes information regarding the three major watersheds and other hydrological features within the Study Area. Oso Creek and two of its tributaries occur within the Study Area. Oso Creek is considered to be perennial and the two tributaries are classified as intermittent. Perennial streams flow year-round during a typical year and intermittent streams only flow during certain parts of the year, typically seasonally. In addition there are a number of ditches/canals within the Study Area which provide added drainage to primarily agricultural

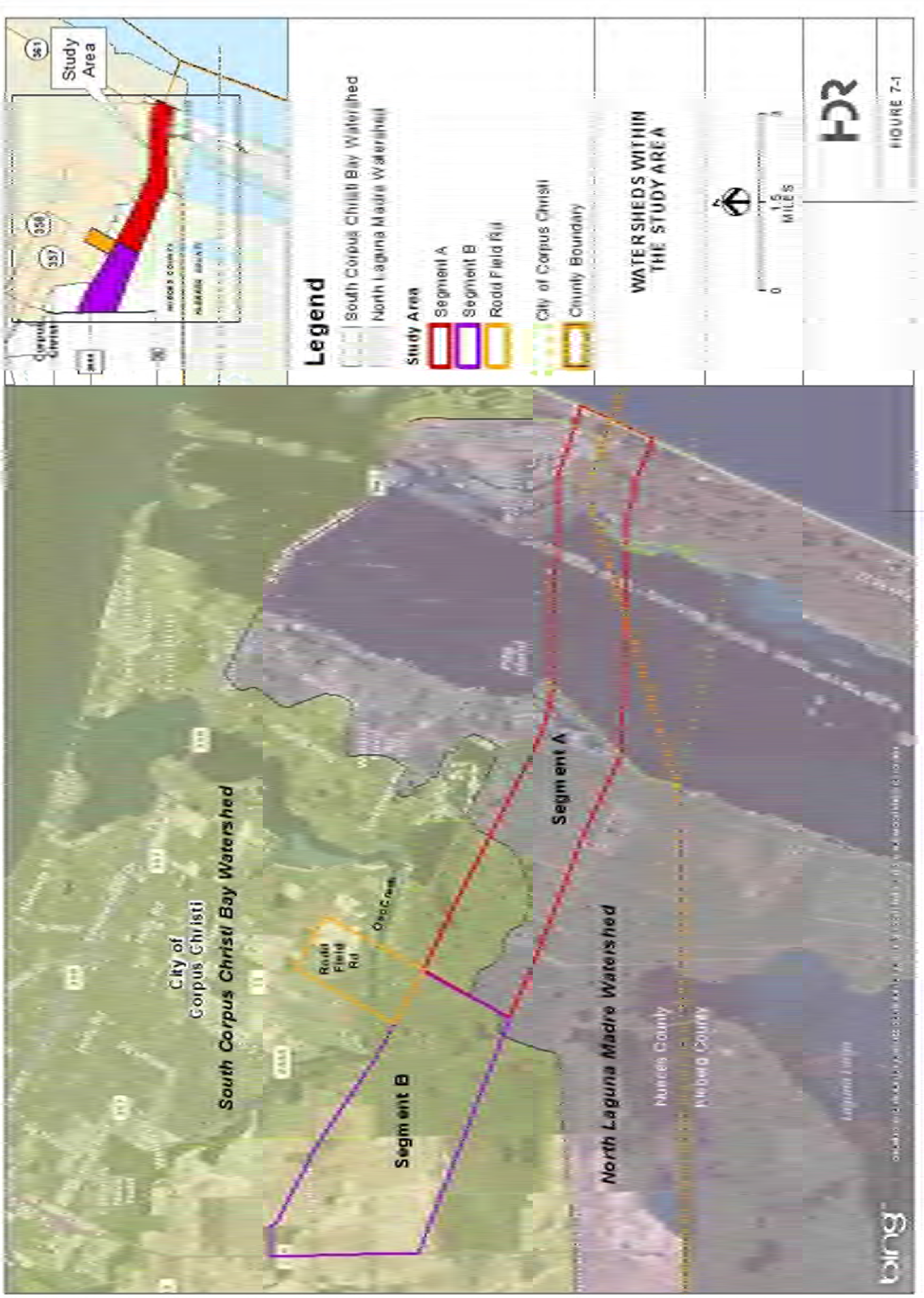

Figure 7-1. Watersheds within the Study Area

Table 7-1. Existing Surface Drainage Systems in the Study Area

Stream	Length in Study Area (mi)	Location Description	Classification
Segment A			
Ditch/Canal #1	1.5	Crosses the center of Segment A in a southwest to northeast direction terminating below the southeast corner of the Barney Davis Reservoir.	Ephemeral
Rodd Field Rd.			
Oso Creek	1.1	Crosses southwest to northeast within the lower half of the Rodd Field Rd. corridor.	Perennial
Ditch/Canal #2	1.0	Parallels northern boundary of Rodd Field Rd. corridor along Yorktown Rd.	Ephemeral
Ditch/Canal #3	0.6	From northeast residential area at Rancho Vista Blvd. south to Oso Creek.	Ephemeral
Segment B			
Tributary 1 to Oso Creek	0.9	From 0.4 mi. southeast of King Trail, flowing southwest through the center of Segment B.	Intermittent
Ditch/Canal #4	3.5	From Tributary 1 to Oso Creek traveling northwest through upper portion of Segment B.	Ephemeral
Ditch/Canal #5	2.0	From intersection with Ditch/Canal #3, traveling 2.0 miles west to western border of Segment B.	Ephemeral
Tributary 2 to Oso Creek	1.9	From Tributary 2 to Oso Creek traveling southwest in lower third of Segment B.	Intermittent
Ditch/Canal #6	0.6	From Tributary 2 running south to southern border of Segment B.	Ephemeral
Ditch/Canal #7	1.3	From Tributary 2 running west to southern border of Segment B.	Ephemeral

Source: U.S. Geological Survey, National Hydrography Dataset, 2015.

areas. These ditches/canals are considered to be ephemeral, which means that they only contain water for a short time following a rain event.

7.2.2 Existing Water Quality in Surface Streams

The *Texas Integrated Report of Surface Water Quality*, developed by the TCEQ, evaluates the quality of surface waters in Texas. This report, which satisfies the requirements of the CWA Sections 305(b) and 303(d), evaluates the quality of surface waters in Texas, describes the status of Texas' natural waters based on historical data, and identifies water bodies that are not meeting standards set for their use on the 303(d) list (TCEQ, 2015b). The study area includes two unclassified water bodies within TCEQ designated Segment 2485 (Oso Bay); Oso Creek (Segment 2485A), and an unnamed tributary of Oso Creek (Segment 2485B). The Oso Creek segment is described as occurring from the Oso Bay confluence in southern Corpus Christi to a point 3 miles upstream of SH44 west of Corpus Christi. The unnamed tributary of Oso Creek is defined as originating from its confluence with Oso Creek upstream to a point 3.2 miles west of Hwy 286. Segment A does not include either of these water bodies; however Segment B includes a portion of the unnamed tributary of Oso Creek and a small piece of Oso Creek. The Rodd Field Rd. corridor encompasses a significant section of Oso Creek.

Oso Creek is included in the 2014 303(d) list as a category 5a for Texas for high bacteria levels for Recreational use (TCEQ, 2015c). Category 5a includes water bodies where a Total Maximum Daily Load (TMDL) study is underway, scheduled or will be scheduled for one or more Unclassified streams are protected by the general water quality standards that apply to all waters of the state. A TMDL for Oso Creek was developed by TCEQ which was scheduled to begin in September of 2013 and end in August of 2015 (TCEQ, 2015d). The goal of this study was to determine the amount of a pollutant (load) that Oso Creek could receive and still support its beneficial uses. This load is then allocated among classes of sources within the watershed. The watershed stakeholders will then work with the TCEQ to develop a plan to reduce the pollutant level. The Costal Bend Bays Foundation is working with community stakeholders, the COCC and County of Nueces along with interested citizens to create the Oso Bay and Oso Creek Coordination Committee (CBBF 2015). The focus of this committee is to outline a plan to restore water quality to Oso Bay and Oso Creek.

The 2014 *Texas Integrated Report* also shows that Oso Creek also has concerns associated with the nutrient screening levels for Chlorophyll a, total phosphorus, and nitrate. The unnamed tributary of Oso Creek is not listed as impaired, but also includes a nutrient screening level concern for total phosphorus. The suggested point sources of pollution include municipal point source dischargers; non-point source pollution is attributed to urban runoff/storm sewers.

7.2.3 Existing Floodplains

Floodplain maps for the Study Area were obtained in GIS format from FEMA (FEMA, 1998). In addition to these finalized maps, a DRAFT copy of the revised Nueces County floodplain map was also obtained for this project (FEMA, 2015). This updated map was used to determine the floodplain areas within the Study Area in Nueces County. Because draft Kleberg County maps were not available for use in this analysis, current aerial photographs and elevation mapping data was used to estimate the floodplain zones within the Kleberg County portion of the Study Area. The types of floodplains in the Study Area are shown in **Figure 7-2**. Information specific to each area within the Study Area is included in **Table 7-2**.

Segment A contains approximately 47 percent Zone X areas which include areas determined to be outside the 500-year floodplain and occur in the western mainland portion of this segment. It also includes 11 percent Zone AE or areas inundated by a 1 percent annual chance of flooding for which base flood elevations have been determined, and 35 percent Zone VE which is defined as areas inundated by a 1 percent annual chance of flooding with wave action where base flood elevations have been determined. The remainder of this area, approximately 6 percent, includes areas which have a 0.2 percent annual chance of flood hazard. Zone VE within Segment A occurs over the Laguna Madre, and Zones AE and areas which have a 0.2 percent annual chance of flood hazard appear either on the perimeter of the mainland or on Padre Island.

Segment B includes approximately 47 percent Zone X areas, 26 percent Zone AE, 21 percent 0.2 percent annual chance of flood hazard, and 6 percent AO which is defined as areas inundated by a 1 percent annual chance of flooding for which average depths range from 1 to 3 feet. Segment B is almost entirely used for agricultural purposes including farming and ranching activities. In addition a limited area of residential development has been developed along the central part of the northern border.

The Rodd Field Rd. corridor is the only part of the Study Area that includes a portion of Oso Creek. This area includes approximately 43 percent Zone X, 31 percent Zone AE and 31 percent 0.2 percent annual chance of flood hazard. Some residential and commercial areas occur within the portion above Oso Creek, with agricultural areas occurring within the majority of the other areas.

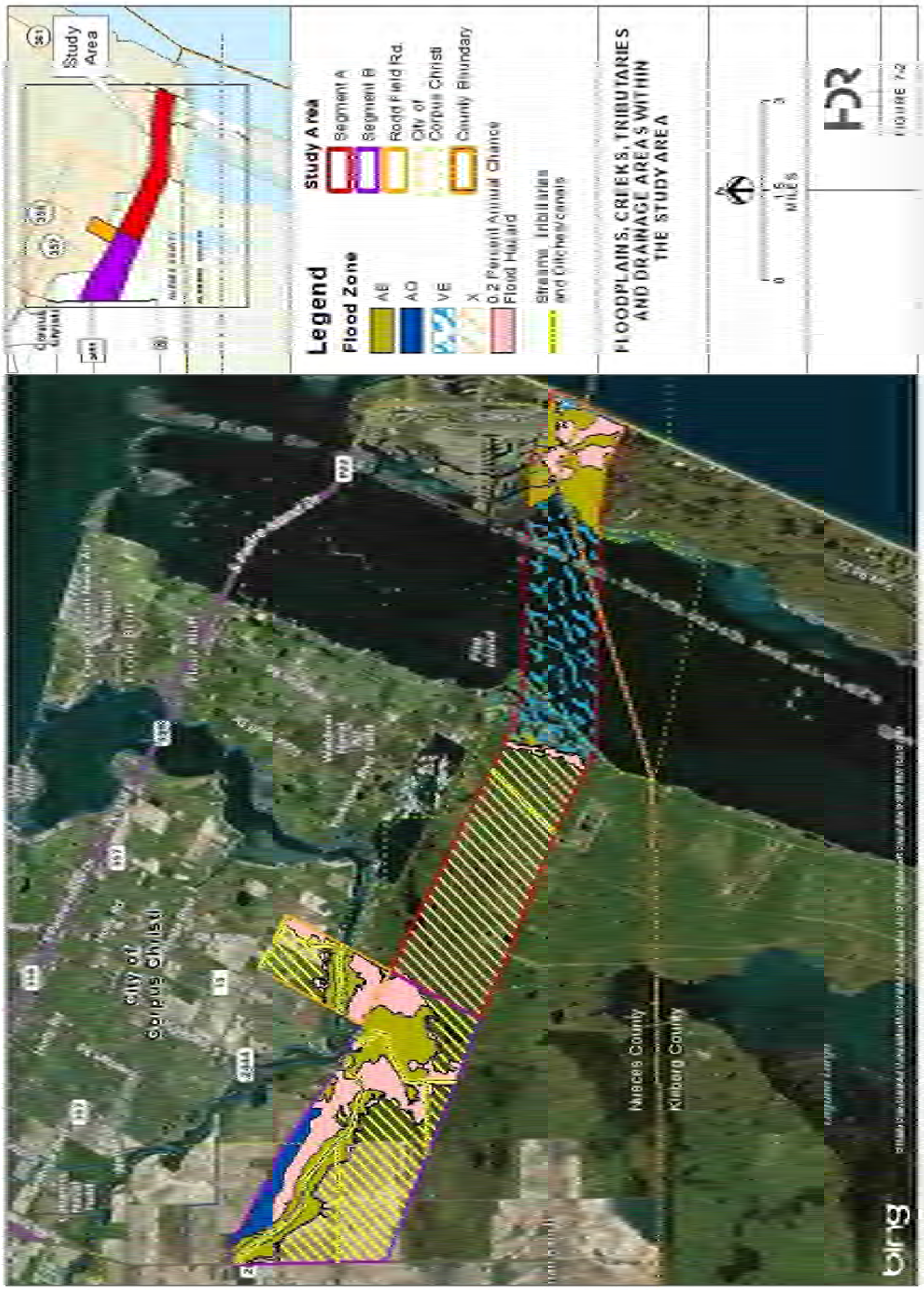

Figure 7-2. Floodplains, Creeks, Tributaries and Drainage Areas within the Study Area

Table 7-2. Floodplain Types in the Study Area

Floodplain Type	Acres in Area	% of Area
Segment A		
0.2 Percent annual chance flood hazard	558	6.2
AE--An area inundated by 1 percent annual chance of flooding, for which Base Flood Elevations have been determined.	991	11.0
VE-- An area inundated by 1 percent annual chance of flooding with wave action); Base Flood Elevations have been determined.	3,186	35.4
X-- Area determined to be outside the 500-year floodplain.	4,272	47.4
Total	9,007	
Segment B		
0.2 Percent annual chance flood hazard	1,398	21.4
AE--An area inundated by 1 percent annual chance of flooding, for which Base Flood Elevations have been determined.	1,688	25.8
AO-- An area inundated by 1 percent annual chance of flooding for which average depths range from 1 to 3 feet.	387	5.9
X-- Area determined to be outside the 500-year floodplain.	3,055	46.8
Total	6,529	
Rodd Field Rd.		
0.2 Percent annual chance flood hazard	382	30.8
AE--An area inundated by 1 percent annual chance of flooding, for which Base Flood Elevations have been determined.	322	25.9
X-- Area determined to be outside the 500-year floodplain.	537	43.3
Total	1,242	

Source: Federal Emergency Management Agency, 2015.

7.2.4 Potential Wetlands

The Study Area includes a range of potential wetland types which are shown in **Figure 7-3** and included in **Table 7.3**. When grouped into broader NWI categories, the Segment A area includes approximately 5.8 percent potential Freshwater Emergent wetlands, and 0.2 percent Freshwater Ponds which occur on the mainland and North Padre Island. Based on NWI information, Waters of the U.S. occur within the area of the Laguna Madre crossed by Segment A, including 29.6 percent Estuarine and Marine Deepwater, and 4.9 percent potential Estuarine and Marine Wetland areas.

According to NWI, Segment B includes approximately 10.9 percent potential Freshwater Emergent Wetlands and 0.2 Percent Freshwater Ponds which primarily occur within the lower half of this segment. Less than two percent of the area contains potential Estuarine and Marine

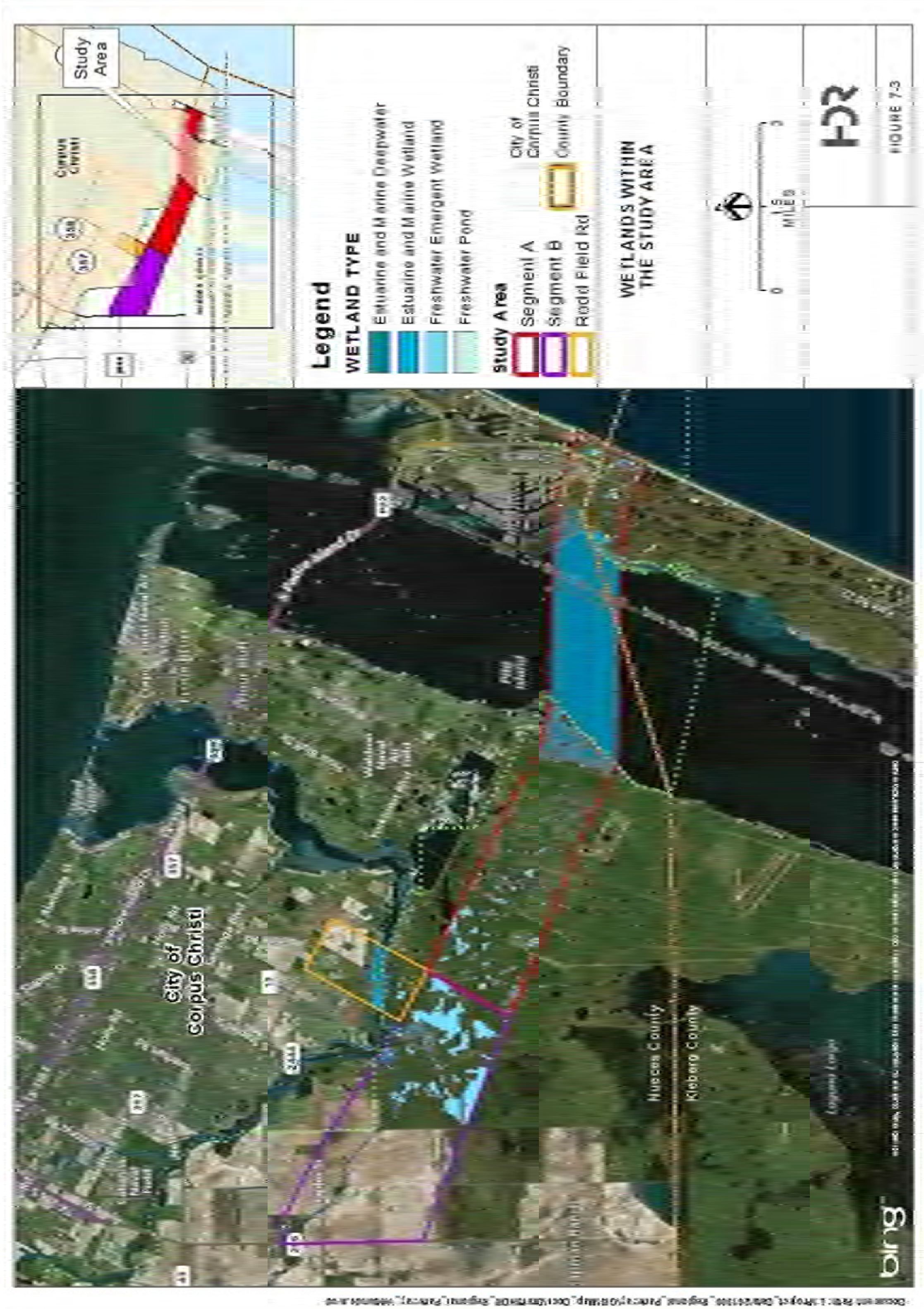

Figure 7-3. Wetlands within the Study Area

Table 7-3. Wetlands in the Study Area

NWI Type	NWI Description	Acres in Area	% of Area
Segment A			
E1AB3L	Estuarine, Subtidal Aquatic Bed, Rooted Vascular.	2526.64	69.07
PEM1A	Palustrine, Emergent, Persistent, Temporary Flooded.	228.15	6.24
PEM1C	Palustrine, Emergent, Persistent, Seasonally Flooded.	209.16	5.72
E2USN	Estuarine, Intertidal, Unconsolidated Shore, Regularly Flooded.	201.47	5.51
E1UBLx	Estuarine, Subtidal, Unconsolidated Bottom, Excavated.	140.77	3.85
PEM1F	Palustrine, Emergent, Persistent, Semi-permanently Flooded.	86.72	2.37
E2USPs	Estuarine, Intertidal, Unconsolidated Shore, Irregularly Flooded, Spoil.	70.76	1.93
E2EM1P	Estuarine, Intertidal, Emergent, Persistent, Irregularly Flooded.	53.97	1.48
E2USP	Estuarine, Intertidal, Unconsolidated Shore, Irregularly Flooded.	42.90	1.17
E2USM	Estuarine, Intertidal, Unconsolidated Shore, Irregularly Exposed.	23.08	0.63
M2USP	Marine, Intertidal, Unconsolidated Shore, Irregularly Flooded.	23.01	0.63
M2USN	Marine, Intertidal, Unconsolidated Shore, Regularly Flooded.	15.11	0.41
E2USNx	Estuarine, Intertidal, Unconsolidated Shore, Regularly Flooded.	11.45	0.31
PUBH	Palustrine, Unconsolidated Bottom, Permanently Flooded.	7.08	0.19
PUBHx	Palustrine, Unconsolidated Bottom, Permanently Flooded, Excavated.	4.98	0.14
PUBF	Palustrine, Unconsolidated Bottom, Semi-permanently Flooded.	3.57	0.10
PUSC	Palustrine, Unconsolidated Shore, Seasonally Flooded.	2.72	0.07
E2USPx	Estuarine, Intertidal, Unconsolidated Shore, Irregularly Flooded, Excavated.	1.84	0.05
PEM1J	Palustrine, Emergent, Persistent, Intermittently Flooded.	1.32	0.04
M1UBL	Marine, Subtidal, Unconsolidated Bottom.	1.24	0.03
E2EM1N	Estuarine, Intertidal, Emergent, Persistent, Regularly Flooded.	0.84	0.02
PEM1Fx	Palustrine, Emergent, Persistent, Semi-permanently Flooded, Excavated.	0.73	0.02
PEM1Cx	Palustrine, Emergent, Persistent, Seasonally flooded, Excavated.	0.16	0.00
E1UBL	Estuarine, Subtidal, Unconsolidated Bottom.	0.10	0.00
PUSCx	Palustrine, Unconsolidated Shore, Seasonally Flooded, Excavated.	0.10	0.00
PUBFx	Palustrine, Unconsolidated Bottom, Semi-permanently Flooded, Excavated.	0.09	0.00
	Totals	3657.97	100.00
Segment B			
PEM1J	Palustrine, Emergent, Persistent, Intermittently Flooded.	449.80	55.33
PEM1A	Palustrine, Emergent, Persistent, Temporary Flooded.	181.81	22.36
PEM1C	Palustrine, Emergent, Persistent, Seasonally Flooded.	74.05	9.11
E2EM1P	Estuarine, Intertidal, Emergent, Persistent, Irregularly Flooded.	28.48	3.50
E2EM1N	Estuarine, Intertidal, Emergent, Persistent, Regularly Flooded.	28.14	3.46
E2USM	Estuarine, Intertidal, Unconsolidated Shore, Irregularly Exposed.	15.40	1.89
E2USP	Estuarine, Intertidal, Unconsolidated Shore, Irregularly Flooded.	10.98	1.35

Table 7-4. Wetlands in the Study Area cont.

NWI Type	NWI Description	Acres in Area	% of Area
PUBHx	Palustrine, Unconsolidated Bottom, Permanently Flooded, Excavated.	9.48	1.17
E2USN	Estuarine, Intertidal, Unconsolidated Shore, Regularly Flooded.	6.61	0.81
PEM1/SS 1A	Palustrine, Emergent, Persistent, Palustrine, Scrub-shrub, Broad-leaved deciduous, Temporary Flooded	5.81	0.71
PEM1Ax	Palustrine, Emergent, Persistent, Temporary Flooded, Excavated.	1.20	0.15
PUBFx	Palustrine, Unconsolidated Bottom, Semi-permanently Flooded, Excavated.	0.92	0.11
PEM1Cx	Palustrine, Emergent, Persistent, Seasonally flooded, Excavated.	0.28	0.03
PEM1Fx	Palustrine, Emergent, Persistent, Semi-permanently Flooded, Excavated.	0.00	0.00
	Total	812.94	100.00
Rodd Field Rd.			
E2EM1N	Estuarine, Intertidal, Emergent, Persistent, Regularly Flooded.	86.71	44.95
E1UBL	Estuarine, Subtidal, Unconsolidated Bottom.	60.88	31.56
E2USP	Estuarine, Intertidal, Unconsolidated Shore, Irregularly Flooded.	18.97	9.83
PEM1J	Palustrine, Emergent, Persistent, Intermittently Flooded.	13.38	6.94
E2USN	Estuarine, Intertidal, Unconsolidated Shore, Regularly Flooded.	9.67	5.01
PUBHx	Palustrine, Unconsolidated Bottom, Permanently Flooded, Excavated.	1.37	0.71
PEM1Cx	Palustrine, Emergent, Persistent, Seasonally flooded, Excavated.	1.20	0.62
PEM1A	Palustrine, Emergent, Persistent, Temporary Flooded.	0.53	0.28
PEM1Ch	Palustrine, Emergent, Persistent, Seasonally Flooded, Diked/Impounded.	0.18	0.09
	Total	192.89	100.00

Source: U.S. Fish and Wildlife Service, 2015.

Wetlands which are situated along Oso Creek and its tributaries.

According to NWI information, the Rodd Field Road corridor contains approximately 9.1 percent potential Estuarine and Marine Wetlands and 4.8 percent Estuarine and Marine Deepwater areas along Oso Creek. Several smaller potential Freshwater Emergent Wetlands and Freshwater Ponds, representing less than two percent of the area, occur adjacent to the north and south boundaries of Oso Creek.

The USFWS's objective in mapping wetlands and deep-water habitats is to produce reconnaissance level information on the location, type and size of these resources. These wetland maps utilize the analysis of high altitude imagery, and wetlands are identified based on vegetation, visible hydrology and geography. However, a Field investigations including wetland delineation, would need to be completed to determine the presence of waters and wetland features likely be considered jurisdictional by the USACE under Section 404 of CWA and Section 10 of RHA. NWI maps, however, can be a valuable tool to avoid potential impacts to wetlands during early stages of project planning and development.

8.0 Groundwater

The Gulf Coast Aquifer occurs within portions of the Study Area including the western two-thirds of Segment A, the eastern one-half of Segment B, and the Rodd Field Rd. corridor. This aquifer parallels the Gulf of Mexico coastline from the border of Mexico to the Louisiana border (TWDB, 2016a). It includes several aquifers composed of silt, clay, discontinuous sand and gravel beds. Water quality within this aquifer varies greatly with the locality and depth of water. The central and northeastern portions of the aquifer provide the most useable water for municipal, industrial and irrigation purposes without requiring significant treatment.

8.1 Legal and Regulatory Context

The regulatory entities that govern groundwater resources in the Study Area are described below.

8.1.1 Texas Water Development Board

The Texas Water Development Board (TWDB) created Groundwater Management Areas to provide for the conservation, preservation, protection, recharging, and prevention of waste of groundwater (TWDB, 2016b). Chapter 36 of the Texas Water Code requires groundwater conservation districts to develop a groundwater management plan that is submitted to the TWDB for approval. The Study Area is located within Groundwater Management Area 16; however the COCC occurs within the Corpus Christi Aquifer Storage and Recovery District which regulates its ground water use.

8.1.2 Corpus Christi Water System

The COCC water system utilizes raw water diverted from the Nueces River which is then treated and distributed throughout the COCC. This water is distributed through transmission lines branching from large master meters and subsequently through service lines.

8.2 Existing Conditions

The TWDB reveals a total of five water wells within the Study Area all of which belong to the King Ranch. Segment A includes three water wells, the Pita windmill, Acuna windmill and Encina Sola windmill. Segment B also contains three water wells, the Rancho Viejo, Aguila and Portales windmills. No water wells are located within the Rodd Field Road corridor as it occurs within the boundaries of the COCC. No public water system wells occur within the Study Area. Water provided by the COCC is not sourced from the Gulf Coast Aquifer.

9.0 Air Quality/Area Emissions

This section addresses current conditions and the regulatory framework as they pertain to air quality in the Study Area.

9.1 Legal and Regulatory Context

Under the Clean Air Act of 1970 (CAA), the EPA set limits on the maximum concentration of a given pollutant allowed in the air for a set average time. These limits are represented by National Ambient Air Quality Standards (NAAQS), which have been established for the protection of public health and welfare. The CAA identified six criteria pollutants which can be harmful to human health and the environment; these include carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter (coarse and fine), and sulfur dioxide. Primary NAAQS are set at levels intended to provide public health protection, while secondary standards are set at levels intended to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation and buildings. NAAQS are periodically re-evaluated and changes are made as necessary. Current NAAQS limits for the criteria pollutants are listed in **Table 9-1.**

Table 9-1. NAAQS for Criteria Pollutants as set by the EPA

Pollutant	Primary/ Secondary	Average Time	Concentration Level	Occurrence
Carbon monoxide	Primary	8-hour	9 ppm	Not to be exceeded more than once per year
		1-hour	35 ppm	
Lead	Primary and Secondary	Rolling 3 month average	0.15 ug/m^3	Not to be exceeded
Nitrogen dioxide	Primary	1-hour	100 ppb	98th percentile, averaged over 3 years
	Primary and Secondary	Annual	53 ppb	Annual mean
Ozone	Primary and Secondary	8-hour	0.075 ppm	Annual 4th-highest daily maximum 8-hour concentration, averaged over 3 years
Particulate Pollution $PM_{2.5}$	Primary	Annual	12 ug/m^3	Annual mean, averaged over 3 years
	Secondary	Annual	15 ug/m^3	
	Primary and Secondary	24-hour	35 ug/m^3	98th percentile, averaged over 3 years
Particulate Pollution PM_{10}	Primary and Secondary	24-hour	150 ug/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur dioxide	Primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

Source: EPA, 2015.

Areas meeting the NAAQS for any given criteria pollutant are designated as “attainment areas” and areas not meeting the standards are designated as “nonattainment areas” for that pollutant.

Nonattainment areas are categorized by the severity of the exceedance. The time frames established for re-attainment and the strength of mandated pollution controls prescribed to nonattainment areas increase with the exceedance severity. A description of the six criteria pollutants is provided below (EPA, 2015):

- **Carbon Monoxide (CO)** is a colorless, odorless gas emitted to the atmosphere through combustion processes. Throughout the U.S. the majority of CO emissions come from mobile sources (vehicles). CO can cause adverse effects to organ systems by directly decreasing the blood’s ability to deliver oxygen through the body. The EPA first set CO air quality standards in 1971 for protection of both public health and welfare.

- **Lead (Pb)** is a metal that is found both naturally as well as in manufactured products. Historically, the major sources of lead emissions have been from fuels in on-road motor vehicles and industrial sources. Regulatory efforts to remove lead from gasoline have resulted in the drastic decrease of levels of lead in the air. Today, major sources of lead emissions to the air are ore and metal processing and piston-engine aircraft operating on leaded aviation fuel. Ingested, inhaled or otherwise exposed, lead accumulates in the body and can adversely affect the performance of the nervous system and other organs.

- **Nitrogen Dioxide (NO_2)** is measured as an indicator for a group of highly reactive nitrogen oxide (NO_X) gases and is a contributor to the formation of ground-level ozone and particulate matter, two other criteria pollutants. Fuel combustion, especially from mobile sources, is the largest contributor to atmospheric NO_2. This pollutant and its reaction products is linked with several respiratory and cardiovascular ailments.

- **Ozone (O_3)** is a product of reactions that occur when constituent reactants (e.g., NO_X and volatile organic compounds (VOC)) mix in the presence of sunlight. Areas with high densities of NO_X and VOC sources (e.g., automobiles, industrial facilities) are prone to ozone formation on calm, sunny days. Breathing ozone can trigger a variety of health problems, particularly for children, the elderly, and people with lung diseases such as asthma. Additionally, ozone can have harmful effects on sensitive vegetation and ecosystems.

- **Particulate Matter (PM_{10} and $PM_{2.5}$)** is divided into “fine particles” ($PM_{2.5}$) (smaller than 2.5 micrometers) and “inhalable coarse particles” (PM_{10}) (between 2.5 and 10 micrometers). Each particulate size may be a result of direct emissions (e.g., dust, soot, and vapor) or products of reactions between gases emitted and the air (e.g., NO_X, or VOCs). Particles less than 10 micrometers in diameter generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects.

- **Sulfur Dioxide (SO_2)** results from fossil fuel combustion, especially power plants and other industrial facilities. It is measured as an indicator for other sulfur oxides (SO_X) which can contribute to atmospheric particles (e.g., fine sulfate particles) which may contribute to respiratory illnesses.

The CAA stipulates that all areas of the United States be covered by State Implementation Plans (SIP) which outline pollutant emission controls and enforcement measures designed to maintain pollutant levels below NAAQS. Area-specific amendments to the SIP must be submitted for all nonattainment areas which outline the strategies that will be used to bring the area back into attainment. The TCEQ is responsible for regulatory air quality monitoring across the state and for producing and updating the state's SIP. The original Texas SIP was adopted by the EPA in 1979 and specifically addressed air quality issues related to ozone, particulate matter, and carbon monoxide. The Corpus Christi area neared nonattainment levels for ozone in the mid-1990s leading local authorities to take measures to voluntarily reduce the emissions of VOCs. As a result of the voluntary controls, the area has not exceeded the one-hour ozone standard since 1995. In 2004, the Mayor of Corpus Christi sent a letter to the EPA expressing the desire to develop an Ozone Flex program for the eight-hour ozone standard. The EPA issued national guidelines for the Eight-Hour O_3 Flex Program in 2006 to encourage attainment areas nationwide to reduce ozone emissions to continue to meet the NAAQS for ozone. In 2012 the EPA published final designations for the 2008 eight-hour ozone standard and San Patricio and Nueces Counties were designated attainment/unclassifiable under the 2008 eight-hour ozone NAAQS.

The USDOT and EPA collaborate to ensure that transportation projects will not result in reduced air quality. Urban transportation projects are directed on a local level by MPOs. As in other large urban centers, the Corpus Christi MPO produces transportation plans that set out long term (MTP) and short term Transportation Improvement Plan (TIP) project goals evaluated against projected growth and current regulatory framework. MTPs evaluate transportation projects in a 25-year window and are produced on a five-year cycle. Corpus Christi's current MTP, entitled Metropolitan Transportation Plan (MTP) 2015-2040, was approved in November 2014 and became effective December 3, 2014.

9.2 Existing Conditions

Currently, the Corpus Christi area is classified as being "Unclassifiable/Attainment" for all criteria pollutants except the O_3 (0.070 ppm [2015 standard]) for which the designation is "Pending" and the 1-hour SO^2 criteria for which the designation is "Governor's Recommendation: Attainment" (TCEQ, 2015e). Ozone (O_3) and other pollutants are being closely monitored within the area. Fifteen air quality monitoring stations are located in the Corpus Christi area. Three of these stations meet data quality assurance standards set by the EPA and therefore may be used for setting regulations. As shown in **Table 9-2**, no recent ozone values recorded by these stations exceed the NAAQS limit for ozone (75 ppb).

Table 9-2. Fourth Highest Eight-Hour Ozone Concentrations and Current Three Year Average --Corpus Christi--Victoria Area

Monitoring Site	2013 Average	2014 Average	2015 (as of 9/5/2013)	Three Year Average
Victoria C87	62	62	70	64
Corpus Christi West C4	66	65	65	65
Corpus Christi Tuloso C21	66	66	62	64

Source: TCEQ, 2015b.

10.0 Traffic Noise

Sound from highway traffic is generated primarily from a vehicle's tires, engine and exhaust. It is commonly measured in decibels and is expressed as "dB." Sound occurs over a wide range of frequencies; however, not all frequencies are detectable by the human ear. Therefore, an adjustment is made to the high and low frequencies to approximate the way an average person hears traffic sounds. This adjustment is called A-weighting and is expressed as "dBA." In addition, because traffic sound levels are never constant due to the changing number, type and speed of vehicles, a single value is used to represent the average or equivalent sound level which is expressed as "Leq."

Traffic noise analysis typically includes the following elements:

- Identification of land use activity areas that might be impacted by traffic noise;
- Determination of existing noise levels;
- Prediction of future noise levels;
- Identification of possible noise impacts; and
- Consideration and evaluation of measures to reduce noise impacts.

FHWA has established the Noise Abatement Criteria (NAC) listed in **Table 10-1** for various land use activity areas. These criteria are one of two means used to determine when a traffic noise impact would occur.

Traffic noise analyses are only required for projects that are on new location, add capacity to a roadway, substantially alter the horizontal alignment of a roadway, or substantially alter the vertical alignment of a roadway. Since these conditions apply, a traffic noise analysis would be completed during the project-level NEPA study in accordance with TxDOT's (FHWA-approved) Guidelines for Analysis and Abatement of Roadway Traffic Noise (March 2011).

Table 10-1. Noise Abatement Criteria

Activity Category	FHWA (dB(A) Leq)	TxDOT (dB(A) Leq)	Description of Land Use Activity Areas
A	57 (exterior)	56 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	67 (exterior)	66 (exterior)	Residential
C	67 (exterior)	66 (exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	52 (interior)	51 (interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E	72 (exterior)	71 (exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties, or activities not included in A-D or F
F	--	--	Agricultural, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	--	--	Undeveloped lands that are not permitted

Source: TxDOT *Guidelines for Analysis and Abatement of Roadway Traffic Noise*, March 2011.

11.0 Hazardous Materials

This section discusses sites with potential contamination from hazardous substances. The Environmental Protection Agency (EPA) defines hazardous substances as:

1. Any material that poses a threat to human health and/or the environment. Typical hazardous substances are toxic, corrosive, ignitable, explosive, or chemically reactive.

2. Any substance designated by EPA to be reported if a designated quantity of the substance is spilled in the waters of the United States or is otherwise released into the environment (EPA 2013a).

11.1 Legal and Regulatory Context

The Resource Conservation and Recovery Act (RCRA) (42 U.S.C. §6901 et seq., 1976) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. §9601 et seq., 1980) were enacted by Congress with the general purpose of protecting human health and the environment from the risks associated with hazardous materials. One result of these laws is that liability can be established for the remediation of hazardous waste sites if the responsible party is identified. CERCLA mandated that persons can be held accountable for site remediation on the basis of property ownership regardless of fault and negligence, but also provided for liability defense in some cases.

In January 2002, amendments to CERCLA initiated the move toward refining the innocent landowner defense. As a result of these amendments, the EPA published the All Appropriate Inquiries (AAI) Final Rule on November 1, 2005. This rule established that certain landowners and potential property owners could be afforded liability protection if these individuals complied with certain guidelines. In October 2014, the EPA clarified that the most current ASTM E1527-13 Phase I Environmental Site Assessment Process would be the only acceptable standard for Phase I Environmental Site Assessments. The innocent landowner, bona fide prospective purchaser, and contiguous property owner defenses provide liability protection to parties who conduct “all appropriate inquiries” before acquiring a contaminated property and meet the other requirements for those defenses.

11.2 Methodology

A Regulatory Database Report was produced for the Study Area by GeoSearch, Inc. on January 20, 2016 (GeoSearch, 2016). This report included information from state, tribal, and federal databases at the time the report was produced. The databases searched included standard environmental records as established by the ASTM E1527-13 standards, as well as additional records searched by the report producer. The search radius for each database is based on ASTM E1527-13 standards. No site reconnaissance, review of historical sources, or interviews were completed for this project, and this document does not constitute a Phase I Environmental Site Assessment. Once an alignment(s) has been selected, future hazardous materials studies would be warranted.

11.3 Existing Conditions

A total of 23 sites were identified in the database search. **Table 11-1** provides information on the type of hazardous materials sites that occur within and in the vicinity of the Study Area within the ASTM search radius.

Table 11-1. Hazardous Materials Sites

Database	Description	Facilities Listed			Total
		Sites within Study Area	Sites Outside Study Area	Un-mappable	
Federal Records					
NPL	The National Priorities List (NPL) is the U.S. EPA's database of uncontrolled or abandoned hazardous waste facilities that have been listed for priority remedial actions under the Superfund program.	0	0	0	0
Delisted NPL	The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) established the criteria that the EPA uses to delete sites from the NPL.	0	0	0	0
CERCLIS	The CERCLIS database is a compilation of facilities that the EPA has investigated or is currently investigating for a release or threatened release of hazardous substances pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980.	0	0	0	0
NFRAP	No Further Remedial Action Planned (NFRAP) refers to facilities that have been removed and archived from its inventory of CERCLA sites.	0	0	0	0
RCRAC	Includes hazardous waste sites listed with corrective action activity. A "corrective action" order is issued when there has been a release of hazardous waste or constituents into the environment from a RCRA facility.	0	0	0	0
RCRAT	The RCRAT database includes non-corrective action sites listed as treatment, storage and/or disposal facilities of hazardous waste in the RCRA Info system.	0	0	0	0
RCRAGR06	Sites listed as generators of hazardous waste (large, small and exempt) in the RCRA Info System.	0	0	0	0

Table 11 1. Hazardous Materials Sites cont.

Database	Description	Facilities Listed			Total
		Sites within Study Area	Sites Outside Study Area	Un-mappable	
NLRRCRAG	The No Longer Regulated RCRA Generator Facilities database includes RCRA generator facilities that are no longer regulated by the EPA or do not meet other RCRA reporting requirements.	0	0	0	0
EC	This database includes sites where Engineering and/or Institutional Controls have been identified as part of a selected remedy for the site as defined by US EPA remedy decision documents.	0	0	0	0
ERNSTX	Emergency Response Notification System (ERNS) records and stores information on reported releases of oil and hazardous substances.	0	0	0	0
BF	Brownfields Management System maintained by the USEPA to track activities in the various brown field grant programs including grantee assessment, site cleanup and site redevelopment. This includes tribal brownfield sites.	1	0	0	1
TRI	Toxic Chemical Release Inventory (TRI) includes data on toxic chemical releases and waste management activities from certain industries as well as federal facilities.	2	0	0	2

Table 11 1. Hazardous Materials Sites cont.

Database	Description	Facilities Listed			Total
		Sites within Study Area	Sites Outside Study Area	Un-mappable	
FRSTX	The Facility Registry System (FRSTX) is the centrally managed database that identifies facilities, sites, or places subject to environmental regulations or of environmental interest.	9	0	0	9
ICISNPDES	The Integrated Compliance Information System (ICIS) – National Pollutant Discharge Elimination System (NPDES) is an information management system maintained by the USEPA's to track permit compliance and enforcement status of facilities regulated by the NPDES under the Clean Water Act.	1	0	0	1
FUDS	Formerly Used Defense Sites inventory includes properties previously owned by or leased to the U.S. under Secretary of Defense jurisdiction, as well as Munitions Response Areas.	2	1	0	3
State Records					
SF	State Superfund Program.	0	0	0	0
APAR	An Affected Property Assessment Report (APAR) required by TCEQ documents all relevant affected property information to identify all release sources and COCs, determine the extent of all COCs, identify all transport/exposure pathways, and to determine if any response actions are necessary.	0	0	0	0
BSA	Brownfields Site Assessments (BSA) database includes relevant information on contaminated Brownfield properties that are being cleaned.	0	0	0	0

Table 11 1. Hazardous Materials Sites cont.

Database	Description	Facilities Listed			Total
		Sites within Study Area	Sites Outside Study Area	Un-mappable	
CALF	Closed and Abandoned Landfill Inventory (CALF) has located over 4,000 closed and abandoned municipal solid waste landfills throughout Texas.	0	0	0	0
IOP	Innocent Owner/Operator Database (IOP) provides a certificate to an innocent owner or operator if their property is contaminated as a result of a release or migration of contaminants from a source not located on the property and they did not cause or contribute to the contamination.	0	0	0	0
LPST	Includes aboveground and underground storage tank facilities with reported leaks.	2	0	0	2
MSWLF	Municipal Solid Waste Landfill Sites (may include active landfills and inactive landfills where solid waste is treated or stored.)	0	0	0	0
RWS	This TCEQ database contains all sites in the state that have been designated as Radioactive Waste sites.	0	0	0	0
RRCVCP	Railroad Commission Voluntary Cleanup Program and Brownfields Sites is an incentive to remediate oil & gas related pollution by participants as long as they did not cause or contribute to contamination.	0	0	0	0
VCP	Texas Voluntary Cleanup Program (VCP) provides administrative, technical, and legal incentives to encourage the cleanup of contaminated sites in Texas.	0	0	0	0
DCR	Dry Cleaner Registration (DCR) database includes dry cleaning drop stations and facilities.	0	0	0	0

Table 11 1. Hazardous Materials Sites cont.

Database	Description	Facilities Listed			Total
		Sites within Study Area	Sites Outside Study Area	Un-mappable	
IHWCA	The Industrial and Hazardous Water Corrective Action Sites is provided by the TCEQ to report the cleanup of sites contaminated from industrial and municipal hazardous waste and industrial nonhazardous waste. Sites in this program would be assessed and remediated to levels that protect human health and the environment.	1	0	0	1
PST	Aboveground and underground storage tanks registered with the TCEQ.	1	1	0	2
SPILLS	TCEQ database includes releases of hazardous or potentially hazardous materials into the environment.	1	0	0	1
TIERII	Texas Tier II Chemical Reporting Program maintains notifications from facilities that have certain hazardous chemicals in specified amounts.	1	0	0	1

Source: GeoSearch, 2016. *Some sites may be listed in more than one database.

12.0 Threatened and Endangered Species

This section provides an overview of state and federal regulations that provide protection for threatened and endangered species, including a list of threatened and endangered species of potential occurrence in Nueces and Kleberg Counties (which includes the Study Area), and information about documented occurrences of these species within the Study Area.

12.1 Legal and Regulatory Context

The Federal Endangered Species Act (ESA), the Federal Bald and Golden Eagle Protection Act (Eagle Act), the Marine Mammal Protection Act (MMPA), the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and related State regulations were enacted to protect wildlife which may occur within the Study Area.

12.1.1 Endangered Species Act

Federally-listed threatened/endangered species and their habitats are protected under the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531-1544, 87 Stat. 884). This Act authorizes the following actions:

- Determination and listing of species as endangered and threatened;
- Prohibits unauthorized taking, possession, sale, and transport of endangered species;
- Provides for land acquisition for conservation of listed species using land and water conservation funds;
- Establishment of cooperative agreements and grants-in-aid to states that establish and maintain threatened and endangered species programs;
- Assessment of civil and criminal penalties for violating the Act; and
- Payment of rewards for information leading to arrest and conviction for violations of the Act.

Subsequent amendments to the Act include provisions for the designation of critical habitat; monitoring for candidate and recovered species and recovery plans. The Act is administered by the USFWS.

An endangered species is defined under the ESA, as "any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta determined by the Secretary of the Interior to constitute a pest whose protection under the provisions of this Act would present an overwhelming and overriding risk to man." The definition of a threatened species under the Act is "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range."

The ESA also provides for the USFWS to designate critical habitat in order to aid in the conservation of listed species. Critical habitat is defined within the ESA as "the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of this Act, on which are found those physical or biological features (1) essential to the conservation of the species and (2) which may require special management considerations or protection; and (3) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of this Act, upon a determination by the Secretary that such areas are essential for the conservation of the species."

12.1.2 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act of 1940 (Eagle Act), as amended (16 U.S.C. 668-668d, 54 Stat. 250) affords protection to bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*). The law generally prohibits the taking, possession, and commerce of either species. In 1972 and 1978, amendments increased penalties for violation of the Act, authorized the Secretary of the Interior to permit taking of golden eagle nests that interfere with resource development or recovery and provided rewards for information leading to arrest and conviction for violation of the Act. The collection and distribution of eagle feathers for Native American religious purposes was included in a 1994 Executive Memorandum (EM). The USFWS administers the Bald and Golden Eagle Protection Act.

12.1.3 Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) as amended (50 C.F.R. 216), protects all marine mammals. The MMPA prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters and by U.S. citizens on high seas, and the importation of marine mammals and marine mammal products into the U.S.

12.1.4 Essential Fish Habitat (EFH)

Essential fish habitat is defined by the Magnuson-Stevens Fishery Conservation and Management Act (MSA) as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. Tidally influenced waters occur within the project area therefore coordination with the National Marine Fisheries Service (NMFS) is required.

12.1.5 State of Texas Endangered Species Regulations

Texas Parks and Wildlife Department (TPWD) Code Chapters 67-68 and Texas Administrative Code (T.A.C.) Title 31, Sections 65.171-65.176 regulations prohibit the taking, possession, transport, or sale of individuals of any state-designated endangered or threatened animal species without issuance of a permit. The collection of listed plant species from public land without a permit, and commerce of state-designated endangered or threatened plant species is prohibited by TPW Code Chapter 88 and T.A.C. Title 31, Sections 69.01-69.9.

12.2 Existing Conditions

County lists of sensitive species maintained by the USFWS and the TPWD were reviewed in August 2016 to determine if any state and/or federally listed threatened or endangered species may be present or have historically been present in the Study Area. In addition the USFWS Critical Habitat Portal (USFWS, 2015b) was utilized to determine if any of these species have designated critical habitat within this area. Table 12-1 lists the federally and state-listed threatened, endangered and species of concern with the potential to occur in Kleberg or Nueces counties.

As listed in Table **12-1**, three birds, one fish, five mammals, three reptiles, and three plants are federally listed as endangered and may be present within the Study Area counties. In addition two birds and two reptiles are federally listed as threatened within this area. The State list for the two counties lists an additional three amphibians, nine birds, one fish, two mammals, and five reptiles as threatened.

On May 19, 2009, the USFWS issued a final critical habitat designation for the Piping Plover (*Charadrius melodus*) a federal and state listed threatened avian species (USFWS, 2009). This designation included several critical habitat units in Nueces and Kleberg counties, two of which are located on North Padre Island within the Study Area. Consultation with the USFWS would be required if any work is planned within or adjacent to any designated critical habitat.

On November 8, 2015 TPWD provided information from the Texas Natural Diversity Database (NDD) which included reported occurrences of listed species within and surrounding the Study Area (TPWD, 2015d). A review of this data revealed that two listed species had occurrences within the Study Area, the piping plover, a federal and state threatened species, and south Texas ambrosia (*Ambrosia cheiranthifolia*), a federally and state listed endangered plant species.

Table 12-1. Threatened, Endangered and Species of Concern with the Potential to Occur in Kleberg or Nueces Counties

Species	Federal Status	State Status	Species/Habitat Description	Designated Critical Habitat in Counties
		AMPHIBIANS		
Black-spotted newt *Notophthalmus meridionalis*	—	T	Found in wet or sometimes wet areas on the Gulf Coastal Plain.	No
Sheep frog *Hypopachus variolosus*	—	T	Found predominantly in grassland and savanna in moist sites of arid areas.	No
South Texas siren (large form) *Siren* sp. 1	—	T	Found in wet or sometimes wet areas, such as canals, ditches or shallow depression. Southern Texas South of Balcones Escarpment.	No
		BIRDS		
American peregrine falcon *Falco peregrinus anatum*	DL	T	Year-round resident in west Texas, nests in tall cliff eyries; also, migrant across state from northern breeding areas in U.S. and Canada, winters along coast and farther south; occupies wide range of habitats during migration, including urban, with stopovers at leading landscape edges	No
Arctic peregrine falcon *Falco peregrinus tundrius*	DL	—	Potential migrant; the Texas Gulf Coast is the only spring staging area for this bird's migration in the Western Hemisphere. Prefers cliffs and bluffs, usually near rivers or lakes in Arctic tundra (nesting); coastlines and mountains (winter)	No
Audubon's oriole *Icterus graduacauda audubonii*	—	—	Found in scrub, mesquite nesting in dense trees or thickets, usually along water courses.	No

Table 12 1. Threatened, Endangered and Species of Concern with the Potential to Occur in Kleberg or Nueces Counties cont.

Species	Federal Status	State Status	Species/Habitat Description	Designated Critical Habitat in Counties
Brown pelican *Pelecanus occidentalis*	DL	—	Largely coastal and near shore areas, where it roosts and nests on islands and spoil banks	No
Eskimo curlew *Numenius borealis*	LE	E	Historic; nonbreeding: grasslands, pastures, plowed fields, and less frequently, marshes and mudflats	No
Mountain plover *Charadrius montanus*	—	—	Breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous	No
Northern aplomado falcon *Falco femoralis septentrionalis*	LE	E	Open country, especially savanna and open woodland, and sometimes in very barren areas; grassy plains and valleys with scattered mesquite, yucca, and cactus; nests in old stick nests of other bird species	No
Northern beardless-tyrannulet *Camptostoma imberbe*	—	T	Found in mesquite woodlands near the Rio Grande River. Frequents cottonwood, willow, elm, and great leadtree. Breeds April to July.	No
Peregrine falcon *Falco peregrinus*	DL	T	Subspecies migrate across the state to winter along the coast and farther south. F.P. anatum a resident breeder in west Texas but F.P. tundrius no longer listed in Texas.	No
Piping Plover *Charadrius melodus*	LT	T	Wintering migrant along the Texas Gulf Coast; beaches and bayside mud or salt flats	Yes
Red knot *Calidris canutus rufa*	LT	--	Migrant, nesting in the arctic and flying to South America during winter.	No
Reddish egret *Egretta rufescens*	—	T	Resident of the Texas Gulf Coast; brackish marshes and shallow salt ponds and tidal flats; nests on ground or in trees or bushes, on dry coastal islands in brushy thickets of yucca and prickly pear	No

Table 12 1. Threatened, Endangered and Species of Concern with the Potential to Occur in Kleberg or Nueces Counties cont.

Species	Federal Status	State Status	Species/Habitat Description	Designated Critical Habitat in Counties
Sennett's hooded oriole *Icterus cucullatus sennetti*	—	—	Often builds nests in and of Spanish moss, feeding on invertebrates, fruit and nectar.	No
Snowy plover *Charadrius alexandrinus*	—	—	Potential migrant, wintering along the coast	No
Sooty tern *Sterna fuscata*	—	T	Catches small fish as it hovers or flies over water	No
Texas Botteri's sparrow *Aimophila botterii texana*	—	T	Grassland and short-grass plains with scattered bushes or shrubs, sagebrush, mesquite, or yucca; nests on ground of low clump of grasses	No
Western burrowing owl *Athene cunicularia hypugaea*	—	—	Open grasslands, especially prairie.	No
Western snowy plover *Charadrius alexandrinus nivosus*	—	—	Uncommon breeder in Panhandle. Potential migrant that winters along the coast.	No
White-faced ibis *Plegadis chihi*	—	T	Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats	No
White-tailed hawk *Buteo albicaudatus*	—	T	Near coast on prairies, cordgrass flats, and scrub live oak; further inland on prairies, mesquite and oak savannas, and mixed savanna-chaparral; breeding March-May	No

Table 12 1. Threatened, Endangered and Species of Concern with the Potential to Occur in Kleberg or Nueces Counties cont.

Species	Federal Status	State Status	Species/Habitat Description	Designated Critical Habitat in Counties
Whooping crane *Grus Americana*	LE	E	Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties	No
Wood stork *Mycteria americana*	—	T	Forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960	No
FISHES				
American eel *Anguilla rostrate*	—	—	Found in coastal waterways below reservoirs to the gulf, spawning in January to February in the ocean.	No
Opossum pipefish *Microphis brachyurus*	—	T	Brooding adults found in fresh or low salinity waters and young move or are carried into more saline waters after birth; southern coastal areas	No
Smalltooth sawfish *Pristis pectinata*	LE	E	Young found very close to shore in muddy or sandy bottoms; in sheltered bays, on shallow banks, and in estuaries or river mouths	No
Texas pipefish *Syngnathus affinis*	—	—	Found in Corpus Christi Bay in seagrass beds.	No
INSECTS				
Tibial scarab *Anomala tibialis*	—	—	Found in sandy soils.	No

Table 12 1. Threatened, Endangered and Species of Concern with the Potential to Occur in Kleberg or Nueces Counties cont.

Species	Federal Status	State Status	Species/Habitat Description	Designated Critical Habitat in Counties
Manfreda giant-skipper *Stallingsia maculosus*	—	—	Small stout-bodied butterflies. Larvae usually feed inside a leaf shelter and pupate in a cocoon made of leaves fastened together with silk.	No
MAMMALS				
Jaguar *Panthera onca*	LE	E	Extirpated species, formerly found in dense chaparral. No reliable sightings in Texas since 1952.	No
Gulf Coast Jaguarundi *Herpailurus yaguarondi cacomitli*	LE	E	Thick brushlands near water favored.	No
Maritime pocket gopher *Geomys personatus maritimus*	—	—	Fossorial species found in deep sandy soils. Feeds mostly from within its burrow on roots and other plant parts especially grasses. Important prey species.	No
Ocelot *Leopardus pardalis*	LE	E	Dense chaparral thickets; mesquite-thorn scrub and live oak mottes; avoids open areas	No
Plains spotted skunk *Spilogale putorius interrupta*	—	—	Catholic species found in open fields, croplands, and prairies.	No
Red wolf *Canis rufus*	LE	E	Extirpated; formerly known throughout the eastern half of Texas in brushy and forested areas, as well as coastal prairies	No
Southern yellow bat *Lasiurus ega*	—	T	Associated with trees, such as palm trees (*Sabal mexicana*) in Brownsville, which provide them with daytime roosts; insectivorous; breeding in late winter	No
West Indian manatee *Trichechus manatus*	LE	E	Gulf and bay system habitats, an opportunistic aquatic herbivore.	No

Table 12 1. Threatened, Endangered and Species of Concern with the Potential to Occur in Kleberg or Nueces Counties cont.

Species	Federal Status	State Status	Species/Habitat Description	Designated Critical Habitat in Counties
White-nosed coati *Nasua narica*	—	T	Woodlands, riparian corridors and canyons; most individuals in Texas probably transients from Mexico; diurnal and crepuscular; very sociable; forages on ground and in trees	No
MUSSELS				
Golden orb *Quadrula aurea*	C	--	Larger rivers and streams.	No
REPTILES				
Atlantic hawksbill sea turtle *Eretmochelys imbricata*	LE	E	Gulf and bay system, warm shallow waters especially in rocky marine environments, such as coral reefs and jetties	No
Green sea turtle *Chelonia mydas*	LT	T	Gulf and bay system; shallow water sea grass beds, open water between feeding and nesting areas, barrier island beaches; adults are herbivorous feeding on sea grass and seaweed; juveniles are omnivorous feeding initially on marine invertebrates, then increasingly on sea grasses and seaweeds; nesting behavior extends from March to October, with peak activity in May and June	No
Keeled earless lizard *Holbrookia propinqua*	—	—	Found on coastal dunes, barrier islands, and other sandy areas. Eats insects and other small invertebrates.	No
Kemp's Ridley sea turtle *Lepidochelys kempii*	LE	E	Gulf and bay system, adults stay within the shallow waters of the Gulf of Mexico; feed primarily on crabs, but also snails, clams, other crustaceans and plants, juveniles feed on sargassum and its associated fauna; nests April through August	No
Leatherback sea turtle *Dermochelys coriacea*	LE	E	Gulf and bay systems, and widest ranging open water reptile; omnivorous, shows a preference for jellyfish; in the US portion of their western Atlantic nesting territories, nesting season ranges from March to August	No
Loggerhead sea turtle *Caretta caretta*	LT	T	Gulf and bay system primarily for juveniles, adults are most pelagic of the sea turtles; omnivorous, shows a preference for mollusks, crustaceans, and coral; nests from April through November	No

Table 12 1. Threatened, Endangered and Species of Concern with the Potential to Occur in Kleberg or Nueces Counties cont.

Species	Federal Status	State Status	Species/Habitat Description	Designated Critical Habitat in Counties
Mexican blackhead snake *Tantilla atriceps*	—	—	Found in southern Texas and northeastern Mexico in shrubland savanna. A nocturnal species.	No
Northern cat-eyed snake *Leptodeira septentrionalis*	—	T	Found in the Gulf Coastal Plain south of the Nueces river in thornbrush woodland and dense thickets bordering ponds and streams. A semi-arboreal and nocturnal species.	No
Spot-tailed earless lizard *Holbrookia lacerata*	—	—	Found in central and southern Texas and adjacent Mexico in moderately open prairie-brushland.	No
Texas diamondback terrapin *Malaclemys terrapin littoralis*	—	—	Found in coastal mashes, tidal flats, estuaries and lagoons. May venture into lowlands at high tide.	No
Texas horned lizard *Phrynosoma cornutum*	—	T	Open, arid, and semi-arid regions with sparse vegetation; soil varies in texture from sandy-rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March-September; eats red/harvester ants	No
Texas indigo snake *Drymarchon melanurus erebennus*	—	T	Found in Texas south of the Guadalupe river and Balcones Escarpment in thornbush-chaparral woodlands of south Texas; dense riparian corridors; suburban and irrigated croplands; requires moist microhabitats for shelter	No
Texas scarlet snake *Cemophora coccinea lineri*	—	T	Mixed hardwood scrub on sandy soils; feeds on reptile eggs; semi-fossorial; active April-September	No
Texas tortoise *Gopherus berlandieri*	—	T	Open brush with grass understory preferred; open grass and bare ground avoided; burrows; breeds April-November	No
PLANTS				
Amelia’s abronia *Abronia ameliae*	—	—	Occurs in deep, well-drained sandy soils of the South Texas Sand Sheet in grassy and/or herbaceous dominated openings within coastal live oak woodlands or mesquite-coastal live oak woodlands.	No

Table 12 1. Threatened, Endangered and Species of Concern with the Potential to Occur in Kleberg or Nueces Counties cont.

Species	Federal Status	State Status	Species/Habitat Description	Designated Critical Habitat in Counties
Bailey's ballmoss *Tillandsia baileyi*	—	—	Epiphytic on various trees and tall shrubs. Most common on mottes of live oak on vegetated dues and flats in the coast portions of the South Texas Sand Sheet, but also on evergreen sub-tropical woodlands along resacas in the Lower Rio Grande Valley.	No
Black lace cactus *Echinocereus retchenbachii* var *albertii*	LE	E	Texas endemic found in grasslands, thorn shrublands, mesquite woodlands on sandy somewhat saline soils on the coastal prairie. Frequently found in natural open areas sparsely cover with low brush or in areas dominated by halophytic grasses and forbs.	No
Bristle nailwort *Paronychia setacea*	—	—	Flowering endemic plant found in eastern south central Texas on sandy soils.	No
Buckley's spiderwort *Tradescantia buckleyi*	—	—	Occurs on sandy loam or clay soils in grasslands or shrublands underlain by the Beaumont Formation.	No
Elmendorf's onion *Allium elmendorfii*	—	—	Texas endemic found in grassland openings in oak woodlands o deep, loose, well-drained sands.	No
Kleberg saltbush *Atriplex klebergorum*	—	—	Texas endemic which usually occurs in sparsely vegetated saline areas in light sandy or clayey loam soils.	No
Lila de los llanos *Echeandia chandleri*	—	—	Most commonly encountered among shrubs or in grassy openings in subtropical thorn shrublands on somewhat saline clays of lomas along the Gulf Coast near the Rio Grande.	No
Mexican mud-plantain *Heteranthera Mexicana*	—	—	Found in wet clayey soils of resacas and ephemeral wetlands in South Texas and along margins of playas in the Panhandle.	No
Plains gumweed *Grindelia oolepis*	—	—	Found in coastal prairies on heavy clay soils often in depressional areas, flowering April-December.	No

Table 12 1. Threatened, Endangered and Species of Concern with the Potential to Occur in Kleberg or Nueces Counties cont.

Species	Federal Status	State Status	Species/Habitat Description	Designated Critical Habitat in Counties
Slender rushpea *Hoffmannseggia tenella*	LE	E	Texas endemic; coastal prairie grasslands on level uplands and on gentle slopes along drainages, usually in areas of shorter or sparse vegetation; soils often described as Blackland clay, but at some of these sites soils are coarser textured and lighter in color than the typical heavy clay of the coastal prairies; flowering April-November	No
South Texas ambrosia *Ambrosia cheiranthifolia*	LE	E	Grasslands and mesquite-dominated shrublands on various soils ranging from heavy clays to lighter textured sandy loams, mostly over the Beaumont Formation on the Coastal Plain; in modified unplowed sites such as railroad and highway right-of-ways, cemeteries, mowed fields, erosional areas along small creeks; flowering July-November	No
Texas windmill-grass *Chloris texensis*	—	—	Texas endemic found in sandy to sandy loam soils in relatively bare areas in coastal prairie grassland remnants.	No
Welder machaeranthera *Psilactis heterocarpa*	—	—	Texas endemic found in grasslands varying from midgrass coastal prairies, and open mesquite-huisache woodlands on nearly level, gray to dark gray clayey to silty soils.	No

Status Codes:
LE = Federal Endangered LT = Federal Threatened
C = Candidate for listing DL = Delisted
E = State Endangered T = State Threatened -- = No Designated Listing

Sources: US Fish & Wildlife Service (USFWS, 2016c; USFWS, 2016d); Texas Parks and Wildlife Department, Wildlife Division (TPWD, 2016a; TPWD, 2016b).

The piping plover is a small shorebird found in open sandy beaches and alkali flats (CLO, 2015). This species is found along the Atlantic and Gulf coasts and inland in the northern Great Plains. Disturbance by humans is the primary reason this species is considered threatened.

The South Texas Ambrosia is a perennial herbaceous plant about 4 to 12 inches high with silvery to grayish-green leaves (TPWD, 2015c). Loss of habitat including conversion to agricultural fields and urban areas has led to the decline of this species. It occurs in open grasslands or savannas on soils which vary from sandy loams to clay loams. Habitat suitable for both of these species may occur within the Study Area. The Texas NDD is a potential presence database and lack of data does not constitute evidence of absence. Habitat surveys and assessments for the species listed in **Table 12-1** would need to be conducted during the NEPA stage of project development.

12.3 Seagrass Areas

The Study Area includes the crossing of the Upper Laguna Madre with a bridge. Although there are approximately 216,000 acres of seagrass on the Texas coast about 79% occurs in the Laguna Madre (TPWD, 2016c). Seagrass meadows play critical roles in the coastal environment, including nursery habitat, stabilization of coastal erosion and sedimentation, and major biological agents in nutrient cycling and water quality processes. These seagrass meadows are threatened by high nutrient loading from non-point source pollution, dredging and dredge disposal and subsidence issues (USFWS, 2016a). Seagrass coverage within the Upper Laguna Madre was reported to be high in March 2016, particularly from JFK Causeway south to Baffin Bay (Congdon et al., 2016). Coordination with the USFWS and TPWD concerning potential disturbance of these aquatic areas would need to take place during the NEPA state of project development.

13.0 Natural Areas and Preserves

Under Section 4(f) of the 1966 Transportation Act, federally-funded transportation projects which impact or use public parks, recreation areas, wildlife or waterfowl refuges or historic sites, must perform a 4(f) evaluation if use of the property cannot be avoided. Texas Parks and Wildlife Code Chapter 26 protects public parks and recreational lands unless it is determined that 1) there is no feasible and prudent alternative to the use or taking of such land, and 2) the project includes all reasonable planning to minimize harm to the park resulting from the use or taking. Section 6(f)(3) of the Land and Water Conservation Fund Act (LWCF Act) (16 USC Section 4601-4) protects federal investments in public outdoor recreation areas as well as federal land acquisition and conservation strategies. Although no preserves occur within the Study area, the areas found along Oso Creek include natural areas that are a focus for the Corpus Christi area.

The Oso Parkway Plan which was adopted by the COCC in 1993 included a number of plan goals and objectives. These included the integration of buildings and infrastructure with the natural environment, improvement of water quality in Oso Creek and Cayo Del Oso, creation of active and passive recreational areas close to residential neighborhoods, protection of archeological resources, reduction of the impacts of storm water runoff from adjacent urban development, and development of a continuous scenic parkway along the creek for automobile, bicycle and pedestrian traffic (COCC 1993). Oso Parkway currently occurs west of the Study Area, ending at its intersection with Cimarron Blvd. As initially proposed, this roadway would continue in an easterly direction along Oso Creek, crossing the Rodd Field Rd. corridor of the Study Area.

Plans for the Oso Creek-Oso Bay Green Belt, Parks, and Trails System (COCC, 2016b) is an updated plan for the Oso Creek area which includes additional park areas on the southern side of Oso Creek and numerous proposed hike and bike trails which would occur within Segment B (**Figure 13-1**).

Figure 13-1. Oso Creek-Oso Bay Green Belt, Parks, and Trails System

14.0 Parklands and Recreational Resources

This section addresses the existing parks and recreational areas in the Study Area and the regulations enacted to protect them.

14.1 Legal and Regulatory Context

Parks and recreational facilities are protected under Texas Parks and Wildlife Code Chapter 26, Section 4(f) of the USDOT Act of 1966, and Section 6(f)(3) of the Land and Water Conservation Fund Act (LWCF Act) (16 USC Section 4601-4).

14.2 Existing Conditions

A database and map search was conducted in November 2015 to identify parks and recreational resources in the Study Area. This search utilized city, county, state and federal database sources and revealed that three parks occur within the Study Area (COCC, 2016c). The Padre Balli Park, a Nueces County Coastal Park is located within Segment A. This park is located at the eastern end of the Study Area on Park Road 22 and includes 374.5 acres (NCCP, 2015). Padre Balli Park includes 54 paved campsites with water and electric hookups, areas for tent camping, a camper's bathhouse and washateria, picnic areas, a pavilion, fishing pier and other recreational amenities. Padre Balli Park comprises approximately 1.6 percent of Segment A. No parks or recreational resources occur within Segment B of the Study Area.

In addition, portions of two COCC parks occur within the Rodd Field Rd. corridor, Bill Witt Park and Oso Creek Park. Bill Witt Park occurs in the northwest portion of the Rodd Field Road corridor. This park includes 136 acres of land donated to the COCC in 1980 by the General Services Administration and is located at the site of the closed Rodd Field Naval Airfield (Freeman, 2016). Bill Witt Park includes a number of soccer, baseball and kickball fields along with picnic and playground areas, and shelters. Oso Creek Park runs west to east to the approximate center of this area in a band along the banks of Oso Creek. Oso Creek Park is currently undeveloped. These two parks make up approximately 14.6 percent of the Rodd Field Rd. corridor.

The two parks within the Rodd Field Rd. corridor were designated as Major Investment Parks within the Corpus Christi Strategic Parks and Recreation Master Plan (COCC, 2012). Bill Witt Park and 80 acres of Oso Creek Park would be combined to produce a Regional Park. Regional Parks are recommended to include community buildings with meeting rooms, restrooms, dog parks, trails, pavilions, picnic areas, playscapes, and several different types of recreational facilities.

15.0 Coastal Barrier Resources Act

This section addresses the areas within the Study Area subject to the regulations of the Coastal Barrier Resources Act (CBRA, 2015).

15.1 Legal and Regulatory Context

Congress recognized in the 1970s and 1980s that certain actions and programs of the Federal Government had historically subsidized and encouraged development on coastal barrier areas. This development consequently resulted in the loss of natural resources; threats to human life, health, and property; and the expenditure of large sums of tax dollars each year. The Coastal Barrier Resources Act and its amendments were subsequently developed in order to minimize the loss of human life, wasteful expenditure of Federal revenues, and the damage to fish, wildlife, and other natural resources associated with development by prohibiting most new federal expenditures that tend to encourage development or modification of designated coastal barrier areas. This act only applies to areas that are within the defined John H. Chafee Coastal Barrier Resource System (CBRS) and does not restrict activities carried out with private or other non-federal funds.

The CBRS contains two types of units, System units and Otherwise Protected Areas (OPAs). System units are generally comprised of private lands that were relatively undeveloped at the time of their designation within the CBRS. The boundaries of these units are generally intended to follow geomorphic, development, or cultural features. Most new federal expenditures and financial assistance, including federal flood insurance, are prohibited within System units.

OPAs are generally comprised of lands held by a qualified organization primarily for wildlife refuge, sanctuary, recreational, or natural resource conservation purposes. The boundaries of these units are generally intended to coincide with the boundaries of conservation or recreation areas such as state parks and national wildlife refuges. The only Federal spending prohibition within OPAs is the prohibition on federal flood insurance. With three minor exceptions, only Congress has the authority to add or delete land from the CBRS and create new units.

15.2 CBRA Areas

USFWS database shapefile reveal that both System units and OPAs occur within the area of Segment A located on Padre Island. The OPA located at the northeastern terminus of Segment A includes Nueces County Coastal Parks and Padre Balli Park. The southern portion of this segment includes a System unit and an OPA area associated with the Padre Island National Seashore.

16.0 Historic and Cultural

This section includes a summary of available information regarding previous cultural resource surveys undertaken, previously-recorded archaeological sites, Official Texas Historical Markers (OTHMs), Recorded Texas Historic Landmarks (RTHLs), cemeteries, inventoried historic structures, and National Register of Historic Places (NRHP) listed or eligible properties within the Study Area.

16.1 Section 106 of the National Historic Preservation Act

NEPA and Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, have established generally complementary requirements for the consideration of important historic, cultural, and natural aspects of our national heritage during federal undertakings. Under 36 CFR 800 and its subsections, federal agencies are required to identify and evaluate historic-age resources for NRHP eligibility and assess the effects that the undertaking would have on these historic properties. A historic resource review would also be required under the terms of the December 2005 Programmatic Agreement for Transportation Undertaking (PA-TU) (or the current agreement in effect at that time). This review would include the Federal Highway Administration (FHWA), the Texas Historical Commission (THC) in its capacity as State Historic Preservation Office (SHPO), the Advisory Council on Historic Preservation (ACHP), and TxDOT.

16.2 Section 4(f) of the U.S. Department of Transportation Act of 1966

In addition, Section 4(f) of the U.S. Department of Transportation (DOT) Act of 1966 (currently in effect as 23 USC 138) discourages the transportation use of historic properties, if the transportation project receives federal funding or federal permits, "unless (1) there is no feasible and prudent alternative to the use of such land, and (2) such program includes all possible planning to minimize harm to such…historic sites resulting from such use" (23 USC 138).

16.3 Antiquities Code of Texas

Any project that is proposed as a result of the Regional Parkway PEL would also fall under the purview of the Antiquities Code of Texas (ACT) due to the involvement of political subdivisions of the state of Texas (9 TNRC 191). Properties studied under the ACT are evaluated for their eligibility to be designated as State Antiquities Landmarks (SALs) and for possible significance (13 TAC 26). These standards were developed using the U.S. Secretary of the Interior's Standards and Guidelines. As a political subdivision of the State of Texas, the COCC is subject to the ACT.

In addition, the COCC is a Certified Local Government Community (CLG), which means that the THC (THC, 2016) and the National Park Service (NPS) (NPS 2016) have confirmed the COCC has made a commitment to historic preservation and will preserve, protect, and increase the awareness of its unique cultural heritage.

Cemeteries are protected from disturbance by the Texas Health and Safety Code (8 THSC 711). Under some circumstances, cemeteries of historic age (50 years or older) may also be protected as historic properties under the NHPA. Because the potential disturbance of cemeteries is in most cases an archeological matter, cemetery issues other than basic location data will not be addressed further in this document. These issues will instead be examined on a project-by-project basis along with other aspects of the archeological record for each specific area.

16.4 Methodology

Research for the Study Area included a review of online desktop resources available from the

Texas Historical Commission (THC) as well as information requested from the Texas Archeological Research Laboratory (TARL). Online resources examined included the online

Texas Historical Commission Historic Sites Atlas (Atlas) and publically available GIS information from the THC which identifies National Register of Historic Places NRHP-listed properties and districts, recorded historic-age cemeteries, National Historic Landmarks (NHLs), Recorded Texas Historic Landmarks (RTHLs), State Antiquities Landmarks (SALs), and Official Texas Historic Markers (OTHMs) within the state. Although cemetery information obtained from the THC was utilized, additional geographic databases which included cemeteries were also used. No RTHLs, cemeteries, or inventoried historic structures are recorded within the study area.

As part of this desktop review process, the Atlas was consulted with the purpose of identifying resources that are listed in, or eligible for listing in, the NRHP, the official list of the Nation's historic places worthy of preservation. Any cultural resource that is listed in or eligible for inclusion in the NRHP is known as a "historic property," and the term "eligible for inclusion in the NRHP" includes both properties formally determined as such by the Secretary of the Interior and all other properties that meet NRHP-listing criteria (36 Code of Federal Regulations [CFR] 800.2).

16.5 Historic Context

The area where Corpus Christi now sits was originally inhabited by various tribes of the Karankawa Indian group, which migrated up and down the Coastal Bend region. According to the COCC (COCC, 2016d), Spanish explorer Alonzo Alvarez de Pineda discovered the area in 1519 on the Roman Catholic Feast Day of Corpus Christi; however, according to the Texas State Historical Association (Long, 2016), it is unknown but likely that the first Europeans to visit the area was Alvar Nunez Cabeza de Vaca and his group. After that time, the area was largely unknown and unexplored until Joaquin de Orobio y Basterra led an expedition down the Nueces River in 1747. Following Orobio's expedition, the Spanish sent fifty families accompanied by a squadron of soldiers and two priests to colonize the area in the summer of 1749. This group was unable to reach the area due to prolonged drought and a lack of adequate provisions (Long, 2016). Several other failed attempts were made to colonize the area by the Spanish and Germans and the site remained uninhabited until 1839 when Colonel Henry Lawrence Kinney founded a frontier trading post called Kinney's Trading Post or Kinney's Ranch (COCC, 2016d). The post was abandoned in 1842 due to attacks by Mexican bands, but was reestablished a few years later when the area was bolstered by the presence of U.S. troops from July 1845 until March 1846, in preparation for war with Mexico. The following year, the city changed its name to Corpus Christi. Corpus Christi was incorporated and became the county seat of Nueces County in 1846, however because no public officials were elected, the corporation was repealed, and Corpus Christi was not reincorporated until 1852 (Long, 2016; COCC, 2016d).

Numerous events kept the population of Corpus Christi from growing rapidly. In the late 1840s, many fortune-seekers passed through the area headed for California, but few permanent settlers remained. In 1854, an outbreak of yellow fever decimated the population of the town and difficulty in obtaining fresh water proved to be an obstacle to growth through the 1850s. A major impediment to growth was the lack of a deep-water port which left large ships unable to enter Corpus Christi Bay. However, towards the end of the 1850s trade through the COCC increased and schools, churches and several fraternal lodges were established. Corpus Christi was an important port for Confederate commerce during the early years of the Civil War, but Union forces occupied the town in 1863 and remained there until the early 1870s. Through the late 1860s and 1870s cattle and sheep ranching were important economic drivers in the region and commerce via ship and railway was extended. The population and economy of Corpus Christi continued to steadily grow through the late 1800s and into the 1900s, however, the COCC was hit by a devastating hurricane in 1919 that destroyed much of the North Beach area and the central business district and killed approximately 350 to 400 people. In order to recover from this enormous economic loss, civic and business leaders were convinced that the COCC needed to build a deep-water port to accommodate large ships. In 1926, the deep-water port of Corpus Christi was completed and as a result the COCC prospered. While growth of the area slowed during the Great Depression, the discovery of oil in the county in 1930 and the continued development of the port of Corpus Christi helped to buffer the area from the Depression's worst effects. The population of Corpus Christi doubled between 1931 and 1941, and the COCC continued to rapidly grow after World War II (Long, 2016).

Today, Corpus Christi is the largest city on the Texas Coast and is the sixth largest port in the nation. The region is the center of a major petroleum and petrochemical industry with other key industries including agriculture, education, shipping and the military (COCC, 2016a). The area offers recreational opportunities; that coupled with historic attractions, festivals; museums and other activities make Corpus Christi and the surrounding area a major tourist destination (Long, 2016).

16.6 Results

The results of this desktop review of historic and cultural resources will include information regarding the locations of previously identified historic sites or properties within or close to the Study Area.

16.6.1 National Register of Historic Places Districts and Sites Located in and Near the Study Area

Within the Study Area, there is one NRHP-listed District, which includes the King Ranch. In addition there are two NRHP-listed archaeological sites (41NU37 and 41NU46) which are located adjacent to Segment B along Oso Creek (**Table 16-1**).

Table 16-1. National Register of Historic Places Listed Districts and Sites Within or Near the Study Area

Resource	Type	Location	Year	NRHP Eligibility	Comments
King Ranch	District	Kingsville and its environs	Mid 19th c.	Listed (1966)	Located within study area; National Historic Landmark
Oso Dune Site (41NU37)	Archaeologic al site	Address restricted	Archaic—Late Prehistoric	Listed (1985)	Located adjacent to study area; occupation and cemetery
Tucker Site (41NU46)	Archaeologic al site	Address restricted	Archaic—Late Prehistoric	Listed (1985)	Located adjacent to study area; large prehistoric campsite

The King Ranch was founded after 1852 by Richard King and "Legs" Lewis. The two set up a cow camp near the Santa Gertrudis Creek and continued to purchase large tracts of land throughout the mid-19th century. King began a cattle operation on the ranch and, after the murder of Lewis, founded R. King and Company in 1860. King then brought longhorn cattle from Mexico and used them to breed cows to build a profitable ranch (THC, 2016). The King Ranch was used during the Civil War as a way-station for Confederate cotton sent to Mexico. King used the economic hardship brought on by the war to purchase more land. Following the war, the King Ranch was subject to numerous raids by Mexican bandits.

These raids continued until 1874 when local rule was reinstated and the Texas Rangers re-formed. Beginning in the 1870s, cattle from the ranch were herded to more northern markets. Richard King died in 1884, and his son-in-law, Robert Kleberg continued to expand the ranch. By 1905, the King Ranch was the largest supplier of horse and mules in the world. After the ranch became less isolated in the early 1900s, improvement of the existing herds by King descendants produced a new breed of cattle, the Santa Gertrudis, in addition to fine quarter horses and thoroughbreds. Petroleum was discovered on ranch property in the 1930s further enhancing its value and diversity. The King Ranch flourished into the mid-20th century and began operations in Kentucky, Pennsylvania, Australia, Cuba, Brazil, Argentina, and Venezuela. The King ranch currently includes almost one million acres in south Texas. The Ranch was listed in the NRHP in 1966 making it subject to Section 4(f) regulations.

In addition, two archaeological sites, the Oso Dune Site (41NU37) and the Tucker Site (41NU46), have been listed in the NRHP. Site 41NU37 is an Archaic to Late Prehistoric site listed in 1985. It includes evidence of human occupation including a cemetery. The Tucker Site includes a large prehistoric campsite of the same period. The actual location of these sites is information restricted to professional archeologists due to the potential for disturbance if the site location was identified.

16.6.2 Individual Archaeological Sites

In addition to the districts discussed above, thirteen previously-recorded archaeological sites were identified within the Study Area (**Table 16-2**). These archaeological sites range in age from the Paleo-Indian Period to the Late Archaic Period. A total of 5 of the previously-recorded sites are Prehistoric sites, one is Late Prehistoric, three are Late Archaic, one is Paleo-Indian, and three sites have an unknown temporal affiliation. None of these previously-recorded sites are listed in the NRHP although four of these archaeological sites are eligible for inclusion in the NRHP. Two of the sites are considered not eligible for inclusion in the NRHP, and the eligibly of the remaining seven sites for inclusion in the NRHP is unknown. More detailed descriptions of the four sites eligible for NRHP inclusion are included below.

All four of the archeological sites eligible for listing in the NRHP are situated within the Rodd Field Rd. corridor. These include 41NU108, a prehistoric open campsite which was recorded in 1973. The site consisted of a projectile point, debitage, burned clay nodules, a core, a possible mano, and oyster shell. As of 2003, site 41NU108 was considered eligible for inclusion in the NRHP.

Table 16-2. Previously Recorded Archeological Sites within the Study Area

Identifier	Affiliation	Features/ Function	NRHP Eligibility	Comments/Recommendations
Segment A				
41KL59	Prehistoric	Lithic scatter	Unknown	Located within study area
41NU152	Prehistoric	Lithic scatter	Unknown	Located within study area
Segment B				
41NU245	Late Archaic	Campsite	Not eligible	Located within study area; within King Ranch
41NU38	—	—	Unknown	Located within study area; no data available
41NU39	Late Prehistoric	Open campsite	Not eligible	Located within study area; within King Ranch
Rodd Field Rd.				
41NU108	Prehistoric	Open campsite	Eligible	Located within study area
41NU109	Prehistoric	Open campsite (possible burial)	Eligible	Located within study area

Table 16-2. Previously Recorded Archeological Sites within the Study Area cont.

Identifier	Affiliation	Features/ Function	NRHP Eligibility	Comments/Recommendations
41NU188—Bauman Site #11	Prehistoric	Small campsite	Unknown	Located within study area
41NU247	Late Archaic	Open campsite	Eligible	Located within study area
41NU248	Late Archaic	Open campsite	Eligible	Located within study area; test for significance if proposed park development will affect the site recommended
41NU28	—	—	Unknown	Located within study area; no data available
41NU47—Bauman Site 10	Paleoindian	Small scatter of projectile points, debitage, scrapers, potsherds, shell debris	Unknown	Located within study area; site recordation recommended
41NU75	—	—	Unknown	Located within study area; no data available

Site 41NU109 was recorded in 1973 as a prehistoric large campsite which contained a possible burial. The site consisted of projectile points, worked shell, debitage, burned clay nodules, sandstone, shell, several cores, and human skull fragments. The site measures approximately one to two acres in size on a high rise within a field. Site 41NU109 is eligible for inclusion in the NRHP.

Site 41NU247 is recorded as a Late Archaic open campsite. The site contains burned clay nodules, worked chert, marine shell, and rabdotus shell. The depth of the deposit was not tested when the site was assessed in 1987. In 2003, site 41NU247 was considered eligible for inclusion in the NRHP.

Site 41NU248 is a Late Archaic open campsite which was recorded in 1987. The site contained burned clay nodules, a chert hammerstone, a chert core, and marine shell. The depth of this deposit was not tested during the initial site assessment. Site 41NU248 is considered eligible for inclusion in the NRHP.

Previous Surveys

The Atlas review also revealed that 14 previously performed cultural resources surveys intersect the Study Area.

16.7 Conclusion

Information provided by the Texas Archeological Research Laboratory (TARL) included thirteen recorded archeological sites within the Study Area (TARL, 2015). Segment A includes two sites which occur on North Padre Island, Segment B contains three sites and the Rodd Field Rd. corridor encompasses eight recorded archeological sites. Two sites adjacent to Segment B (41NU37 and 41NU46) are listed on the NRHP and four located within the Rodd Field Rd. corridor are eligible for listing. The sites located within Segment B and the Rodd Field Rd. corridor all occur near Oso Creek or its tributaries. Cultural resources sites are frequently found near water features where human occupation has previously occurred. Further, King Ranch, an NRHP-listed district, encompasses a large portion of the study area and would be subject to Section 4(f) of the U.S. Department of Transportation (DOT) Act of 1966.

Additional cultural resource surveys were also shown by THC shapefile data within the Study Area along Oso Creek and Park Rd. 22 on Padre Island (THC, 2015). However, a majority of the Study Area is unsurveyed and has a high potential to yield intact buried cultural resources. Therefore, a full intensive THC Antiquities Permitted archaeological survey of any project area should be conducted prior to any ground disturbing activities.

17.0 Utilities

This section summarizes the existing public utility infrastructure, gas, water and wastewater within the Study Area. Utilities available to the portion of the Study Area that occurs within the COCC are relatively inclusive; however the undeveloped areas within Segments A and B include limited utility infrastructure.

Because of the multitude of providers available within the Study Area, specific information obtained for utility providers is limited. Project-specific information for potential alternatives identified by this study will need to be obtained to help evaluate costs related to the relocation or protection-in-place of major utilities.

17.1 Summary List of Utility Information

Table 17-1 includes contacts for utility companies that have facilities located within the Study Area. Although this list includes most major utilities, it is not comprehensive. Larger 138 kv transmission lines occur within the central portion of Segment A and the Rodd Field Rd. study area, and adjacent to the northeastern boundary of Segments A and B.

Table 17-1. Utility Companies within the Study Area

Utility Owner	Type of Facility	Point of Contact	
		Name	Phone No.
AT&T	Telephone, Internet, Cable television	--	--
City of Corpus Christi Water Utility	Water and Wastewater	Mark Van Vleck, P.E., Executive Director of Utilities	361-826-1874
City of Corpus Christi Water Utility	Stormwater	Mark Van Vleck, P.E., Executive Director of Utilities	361-826-1874
City of Corpus Christi Gas Dept.	Natural Gas	Deborah A. Marroquin, P.E., Director of Gas Operations	(361) 885-6924
Electricity for Corpus Christi / Ambit Energy	Electricity	--	--
Time Warner Cable	Telephone, Internet, Cable television	--	--
TXU Energy	Electricity	--	--
Verizon Wireless	Telephone, Internet	--	--

17.2 Oil and Gas Wells, Pipelines and associated Facilities

Figure 17-1 shows the general areas of potential concern relating to oil and gas wells, pipelines and any associated facilities such as directional well lines provided by the Texas Railroad Commission (RRC) (RRC, 2013). The RRC Public Gas Viewer was used to check for any additional recent wells or pipelines within the Study Area (RRC, 2016). More detailed information related to the Study Area pipelines is included in **Table 17-2**. Pipelines occur within all portions of the Study Area. Segment A includes sections of eleven pipelines, nine which carry natural gas and two that transport crude oil. Four of these pipelines, two natural gas and two crude oil, are considered to be abandoned. Segment B contains portions of six natural gas pipelines, five in-service and one abandoned. The Rodd Field Rd. corridor includes three natural gas pipelines, two in-service and one abandoned. The diameter of these pipelines ranges from 3.5 inches to 24 inches. In addition to the pipelines listed above, Segment A includes eight directional well lines, and Segment B one of these lines.

Figure 17-1. Oil and Gas Facilities within the Study Area

Table 17-2. Pipelines Located within the Study Area

Study Area	Operator Name	System Name	Subsystem Name	Commodity	Pipe Diameter	Status	# of Segments *
Corridor A	Enterprise Products Operating LLC	South Texas-Tx150	Shoup To Barney Davis	Natural Gas	16 inches	In-Service	1
Corridor A	Exxon Mobil Corporation	E Lateral - Pita Lateral To Krgp	--	Natural Gas	6.63 inches	Abandoned	1
Corridor A	Exxonmobil Pipeline Company	Borregas - Viola Crude	65a Laguna Larga-Jct Flour Bluff-Viola	Crude Oil	4.5	Abandoned	2
Corridor A	Kinder Morgan Tejas Pipeline LLC	Tgpl Mustang	520-102	Natural Gas	12.75 and 10.75	In-Service	2
Corridor A	Exxon Pipeline Co.	--	--	Crude Oil	4.5	Abandoned	1
Corridor A	Milagro Exploration, LLC	Kleberg County Gathering Line	--	Natural Gas	3.5	In-Service	2
Corridor A	Onyx Pipeline Company	Barney Davis	--	Natural Gas	24	In-Service	1
Corridor A	Southcross Ccng Transmission Ltd	Ccng System	Transco To Barney Davis 16"	Natural Gas	16.0	In-Service	6
Corridor A	Southcross Ccng Transmission Ltd	Ccng System	Tet To Barney Davis 12" (Leased To Onyx)	Natural Gas	12.75	In-Service	1
Corridor A	Southcross Ccng Transmission Ltd	Ccng System	Tet To B Davis (Bird Island Lateral)	Natural Gas	12.75	In-Service	1
Corridor A	Wfs-Pipeline Company	Offshore Lateral	--	Natural Gas	20	Abandoned	3
Corridor B	Enterprise Products Operating LLC	South Texas-Tx150	Shoup To Barney Davis	Natural Gas	16 inches	In-Service	4

Table 17-2. Pipelines Located within the Study Area cont.

Study Area	Operator Name	System Name	Subsystem Name	Commodity	Pipe Diameter	Status	# of Segments*
Corridor B	Enterprise Products Operating LLC	South Texas-Tx150	King Resources - Mobil David	Natural Gas	6.63 inches	In-Service	2
Corridor B	South Shore Pipeline L.P.	South Shore	Duke	Natural Gas	8.63	In-Service	1
Corridor B	South Shore Pipeline L.P.	South Shore	Main Line	Natural Gas	8.63	In-Service	5
Corridor B	Southcross Ccng Transmission Ltd	Ccng System	Transco To Barney Davis 16"	Natural Gas	16.0	In-Service	1
Corridor B	South Shore Pipeline L.P.	Dt-1-3-2, E Cc Bay Lateral	Donated To City Of Corpus Christi	Natural Gas	8.63	Abandoned	1
Rodd Field Rd.	South Shore Pipeline L.P.	Dt-1-3-2, E Cc Bay Lateral	Donated To City Of Corpus Christi	Natural Gas	8.63	Abandoned	3
Rodd Field Rd.	South Shore Pipeline L.P.	South Shore	Main Line	Natural Gas	8.63	In-Service	1
Rodd Field Rd.	Southcross Ccng Transmission Ltd	Ccng System	Pantex 8"	Natural Gas	8.63	In-Service	2

*GIS layers include shapefile segments that are part of the same pipeline; therefore the number of pipelines and number of segments may differ.

Both oil and gas wells occur within the Study Area. Segment A contains a total of 23 well sites. These include one cancelled location, nine dry holes, three gas wells, four plugged gas wells, one plugged oil well, one plugged oil/gas well and four sidetrack wells. Segment B includes a total of 20 well sites consisting of 17 dry holes, two plugged gas wells, and one sidetrack well. The Rodd Field Rd. corridor does not include any well sites.

17.1 Water, Wastewater and Natural Gas Systems

The COCC water system provides water to the portions of the Study Area which occur within the COCC limits which includes the Rodd Field Rd. corridor, North Padre Island and a portion of Segment B located west of Oso Creek near FM 2444 (COCC 2016d). The COCC also provides wastewater service lines within the COCC limits with the exception of the area west of Oso Creek near FM 2444. Residences within this limited area utilize septic systems for their wastewater needs. No information was acquired concerning any water or wastewater systems located within the mainland sections of Segments A or B with the exception of the area of Segment B as described above. Consequently it is probable that water wells and septic tanks are utilized as water and wastewater resources within the remaining mainland areas of the Study Area. Stormwater lines also occur within the COCC limits including the area west of Oso Creek near FM 2444.

The COCC also provides natural gas services within the COCC limits of the Study Area. Smaller distribution lines are located within residential and commercial areas, and a high pressure main is situated along Yorktown Blvd. adjacent to the Rodd Field Rd. corridor. A high pressure gas main is also located between FM 2444 and SH 286 adjacent to Segment B. No information concerning natural gas services for the mainland areas of Segments A and B outside of the COCC was found.

18.0 Mines and Quarries

No mines or quarries occur within seven miles of the Study Area according to the U.S. Geological Survey, National Minerals Information Center (USGS, 2015c). However a sand and gravel pit appears in use near the northwest border of Segment B.

19.0 Soils and Prime Farmland

This section summarizes the existing prime farmland resources within the Study Area and applicable federal and state regulations for prime farmland.

19.1 Legal and Regulatory Context

The Farmland Protection Policy Act (FPPA), as detailed in Subtitle I of Title XV of the Agricultural and Food Act of 1981, provides protection to prime farmland, unique farmland; and farmland of local or statewide importance. Prime farmland is defined by the FPPA as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses (not urban built-up land or water). Prime farmland must also have the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when proper management including irrigation and acceptable farming methods are applied. Unique farmland is defined as land other than prime farmland that is used for the production of specific high value food, feed, and fiber crops. Farmland of local or statewide importance is determined by the appropriate state agencies and includes land that does not meet the criteria for prime or unique farmland but is used for the production of food, feed, fiber, forage and oilseed crops.

Segment A contains approximately 24.3 acres or 0.3 percent prime farmland soils, Segment B includes 3967.4 or 60.8 percent prime farmland soils, and the Rodd Field Rd. corridor encompasses 442.3 acres or 34.9 percent prime farmland soils. These areas would be subject to the FPPA.

19.2 Existing Conditions

Table 19-1 lists all soil map units and their acreages found within Segment A, Segment B and Rodd Field Rd. **Figure 19-1** shows the Study Area soil map units designated by the Natural Resource Conservation Service (NRCS) including prime farmland or prime farmland if irrigated. Prime farmland soils that are within existing roadway ROW or dedicated to urban development are not subject to the requirements of the FPPA. A minor portion of the Study Area is within roadway ROW or areas dedicated to urban development.

Table 19-1. Soils within the Study Area

Soil Map Unit Description	Map Unit Code	Prime Farmland (Y/N)	Acres
Segment A			
Baffin soils, submerged	BA	N	136.9
Edroy clay	BA	N	6.8
Beaches, sandy, very frequently flooded	BE1	N	16.8
Raymondville complex, 0 to 1 percent slopes	CcA	Y	24.2
Coastal beach	Co	N	0.3
Coastal dunes	Cs	N	324.5
Greenhill fine sand, 2 to 12 percent slopes, rarely flooded	GhE	N	25.7
Galveston and Mustang fine sands	Gm	N	4,168.7
Greenhill-Mustang complex, 0 to 12 percent slopes, occasionally flooded	GmE	N	100.5
Ijam clay loam	Ma	N	177.1
Madre-Malaquite complex, 0 to 1 percent slopes, occasionally flooded	MaA	N	19.0
Mustang fine sand, 0 to 1 percent slopes, occasionally flooded	MsA	N	74.5
Mustang-Padre complex, 0 to 2 percent slopes, occasionally flooded	MtB	N	482.5
Mustang fine sand	Mu	N	37.8
Novillo peat, 0 to 1 percent slopes	NeA	N	30.9
Nueces fine sand	Nu	N	213.1
Orelia-Willamar complex	Os	N	15.0
Spoil banks	Sb	N	141.9
Tidal flats	Ta	N	448.9
Tatton fine sand, 0 to 1 percent slopes, very frequently flooded	TaA	N	11.0
Twin palms-Yarborough complex, 0 to 3 percent slopes, frequently flooded	TwA	N	24.2

Table 19-1. Soils within the Study Area cont.

Soil Map Unit Description	Map Unit Code	Prime Farmland (Y/N)	Acres
Urban land	Ua	N	126.4
Water	W	--	2,356.3
Yarborough fine sandy loam, 0 to 1 percent slopes, very frequently flooded	YaA	N	6.3
Total of Segment A			8,969.5
Segment B			
Edroy clay	BA	N	509.4
Edroy clay, 0 to 1 percent slopes, ponded	BN	N	222.3
Galveston and Mustang fine sands	GM	N	132.8
Gullied land, saline	Gv	N	277.9
Miguel fine sandy loam, 0 to 1 percent slopes	MgA	Y-if irrigated	21.9
Miguel fine sandy loam, 1 to 3 percent slopes	MgB	Y-if irrigated	20.7
Nueces fine sand	Nu	N	204.6
Orelia fine sandy loam	Of	N	830.2
Orelia-Willamar complex	Os	N	111.3
Raymondville complex, 0 to 1 percent slopes	CcA	Y	418.4
Tidal flats	Ta	N	8.1
Victoria clay, 0 to 1 percent slopes	VcA	Y	3,506.4
Victoria clay, low	Vt	N	223.3
Water	W	--	36.5
Total of Segment B			6,523.6
Rodd Field Rd.			
Edroy clay	BA	N	101.62
Edroy clay, 0 to 1 percent slopes, ponded	BN	N	0.02
Gullied land, saline	Gv	N	117.62
Orelia fine sandy loam	Of	N	274.00
Orelia-Willamar complex	Os	N	200.91
Raymondville complex, 0 to 1 percent slopes	CcA	Y	10.94
Tidal flats	Ta	N	128.86
Victoria clay, 0 to 1 percent slopes	VcA	Y	431.33
Water	W	--	0.83
Total of Rodd Field Rd.			1266.13

Source: NRCS, 2015.

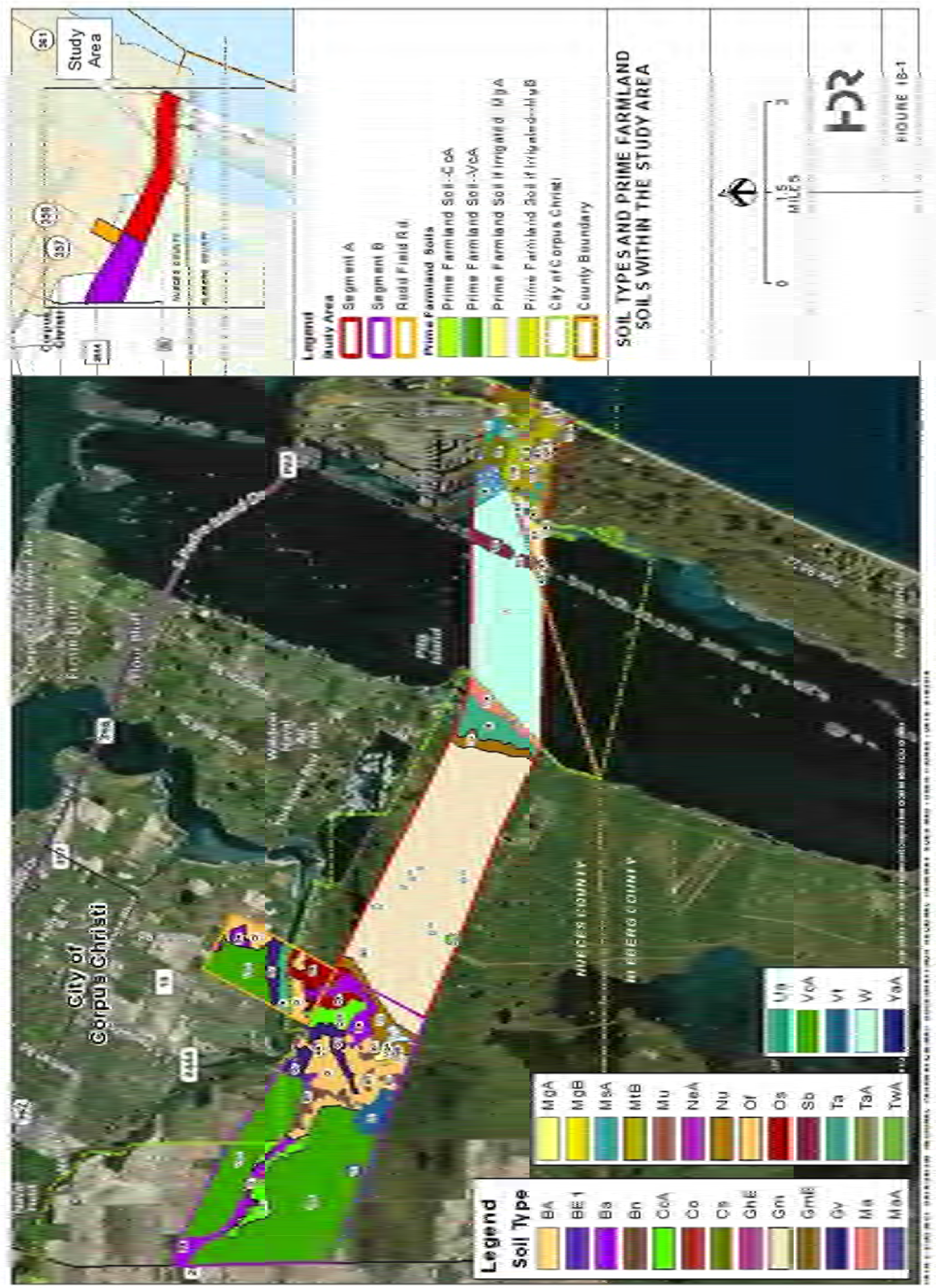

Figure 19-1. Soil types and Prime Farmland Soils within the Study Area

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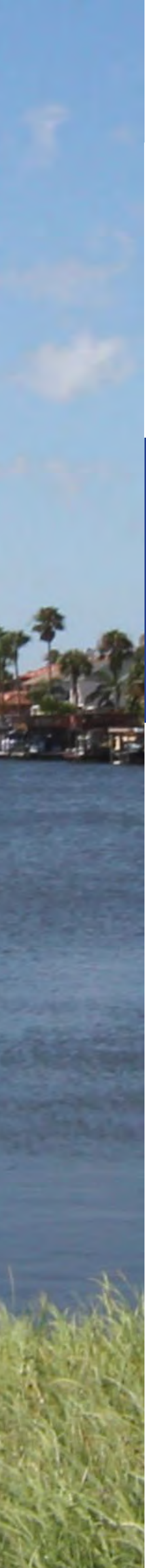
APPENDIX A

Acronyms and Abbreviations

ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey
ACT	Antiquities Code of Texas
ADT	Average Daily Traffic
APAR	Affected Property Assessment Report
ASTM	American Society of Testing and Materials
Atlas	Historic Sites Atlas
Authority	The Port of Corpus Christi Authority
BNSF	Burlington Northern Santa Fe
BSA	Brownfields Site Assessment
CAA	Clean Air Act
CALF	Closed and Abandoned Landfill
CCMPO	Corpus Christi Metropolitan Planning Organization
CBRA	Coastal Barrier Resources Act
CCRTA	Corpus Christi Regional Transportation Authority
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLG	Certified Local Government
CO	Carbon Monoxide
COC	Contaminant of Concern
COCC	City of Corpus Christi
CR	County Road
CSS	Context Sensitive Solutions
CWA	Clean Water Act
DCR	Dry Cleaner Registration
EM	Executive Memorandum
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ETJ	Extra-Territorial Jurisdiction
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FM	Farm-to-Market Road
FPPA	Farmland Protection Policy Act
FUDS	Formerly Used Defense Sites
GIS	Geographic Information Systems
GNIS	USGS Names Information System

HDR	HDR, Engineering Inc.
IH	Interstate Highway
IHWCA	Industrial Hazardous Waste Corrective Action
IOP	Innocent Owner/Operator database
IP	Individual Permit
ITS	Intelligent Transportation System
KCS	Kansas City Southern
LEP	Limited English Proficiency
LPST	Leaking Petroleum Storage Tank
LWCF	Land and Water Conservation Fund
MMPA	Marine Mammal Protection Act
MOA	Memorandum of Agreement
MPO	Metropolitan Planning Organization
MSWLF	Municipal Solid Waste Landfill
MTP	Metropolitan Transportation Plan
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
NCCP	Nueces County Coastal Parks
NDD	Natural Diversity Database
NEPA	National Environmental Policy Act
NFRAP	No Further Remedial Action Planned
NHD	National Hydrography Dataset
NHL	National Historic Landmarks
NHPA	National Historic Preservation Act
NO_2	Nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priority List
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
NWP	Nationwide Permit
O_3	Ozone
OHWM	Ordinary High Water Mark
OTHM	Official Texas Historic Landmarks
PA-TU	Programmatic Agreement for Transportation Undertaking
Pb	Lead
PEL	Planning and Environmental Linkage
PM_{10} & $PM_{2.5}$	Particulate Matter
Port	Port of Corpus Christi
PR	Park Road
PST	Petroleum Storage Tank

RCRA	Resource Conservation and Recovery Act
RGP	Regional General Permit
RRC	Railroad Commission of Texas
RRCVCP	Railroad Commission Voluntary Cleanup Program
RTHL	Recorded Texas Historical Landmark
RWS	Radioactive Waste Sites
SAL	State Antiquities Landmark
SF	State Superfund Sites
SH	State Highway
SIP	State Implementation Plan
SO_2	Sulfur dioxide
TAC	Texas Administrative Code
TARL	Texas Archeological Research Laboratory
TCEQ	Texas Commission on Environmental Quality
TDM	Traffic Demand Management
TGLO	Texas General Land Office
THC	Texas Historical Commission
“The B”	Corpus Christi Regional Transportation Authority
THSC	Texas Health and Safety Code
TIP	Transportation Improvement Plan
TMDL	Total Maximum Daily Load
TNRIS	Texas Natural Resources Information System
TPWD	Texas Parks and Wildlife Department
TSDC	Texas State Data Center
TSM	Transportation System Management
TWDB	Texas Water Development Board
TxDOT	Texas Department of Transportation
U.S.C	United States Code
UPRR	Union Pacific Railroad
UPWP	Unified Planning Work Program
US	U.S. Highway
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USDOT	United States Department of Transportation
USFWS	United States Fish and Wildlife Services
USGS	United States Geological Survey
UTP	Unified Transportation Plan
VCP	Voluntary Cleanup Program
VTC	Valley Transit Company



Appendix E

Alternatives Development and Evaluation Technical Memorandum

ALTERNATIVES DEVELOPMENT AND EVALUATION TECHNICAL MEMORANDUM

Regional Parkway - Planning and Environment Linkages (PEL) Study

Corpus Christi Metropolitan Planning Organization
City of Corpus Christi

October, 2016

CSJ: 0916-00-066

1.0 Introduction

The Corpus Christi Metropolitan Planning Organization (CCMPO), in cooperation with the City of Corpus Christi (CoCC), initiated the Regional Parkway Planning and Environmental Linkages (PEL) Study to further refine transportation needs and potential route alternatives for Regional Parkway from within two of the seven segments of independent utility identified in the Regional Parkway Mobility Corridor (RPMC) Study (2013). The RPMC yielded Segments A-G, and the PEL is focused on Segments A and B, as well as, the future extension of Rodd Field Road. Segment A extends from the intersection of Park Road 22 (PR 22), on Padre Island to the intersection of Rodd Field Road. Segment B extends from the intersection with Rodd Field Road to the intersection of State Highway 286 (SH 286) (Crosstown Expressway).

There has been discussion going back to the mid-eighties among the CCMPO, COCC, Nueces and San Patricio Counties and other interested parties concerning the need for an alternate major transportation route within Nueces County, particularly on the south side of Corpus Christi. This alternate route would be designed to address the expanding housing, industrial and commercial developments in Nueces County and the resulting traffic congestion and safety issues, such as providing for an alternate hurricane evacuation route off Padre Island. As envisioned, Regional Parkway would be an at-grade facility with access restricted to intersections and delineated crossings (i.e., signalized pedestrian crossings). It could accommodate vehicles and other transportation modes including mass transit, bicycles, and/or pedestrians. As practical, it might incorporate existing roadways as well as include construction of new roadways and bridges as needed.

The PEL Study is a collaborative and integrated approach to identifying mobility solutions. The PEL affords great opportunity for the CCMPO and CoCC to review and consider community, environmental, and economic issues early in the transportation planning process. In turn, the CCMPO and CoCC will use the information, analysis, and products developed during the PEL to inform future environmental reviews and decisions.

2.0 Regional Parkway PEL Study Purpose

The Regional Parkway PEL Study builds upon the results of previous planning studies, e.g., the 1999 *South Loop Transportation Study*, and the 2013 *Regional Parkway Mobility Corridor Study,* and other planning documents such as the CCMPO *Metropolitan Transportation Plan* (MTP) and the City of Corpus Christi Plan CC Comprehensive Plan 2035 (Plan CC). These plans have identified a need for transportation improvements within the Study Area, but have not proceeded to the National Environmental Policy Act (NEPA) process for further development.

The PEL Study establishes a foundation for agencies and stakeholders to develop improvements within the Regional Parkway Study Area, thereby minimizing duplication of effort. Additionally, this PEL Study can reduce the time required to develop and implement projects by bringing the planning-level recommendations into subsequent, detailed environmental studies. Ultimately, the goal of this PEL Study is to create a fully functional transportation planning product that effectively addresses the transportation needs identified within the Study Area. A

PEL can specify the purpose and need of a project through the use of the goals and objectives identified in the planning activities. The *Regional Parkway PEL Purpose and Need Technical Memorandum* presents this study's goals and objectives and establish a pre-NEPA foundation for the purpose and need. A summary of this information is shown in **Table 1**. The purpose and need will guide the evaluation and comparison of mobility solutions within Segments A & B based upon language and processes commonly used for National Environmental Policy Act (NEPA) studies.

Table 1: Purpose and Need Summary

Purpose of Regional Parkway PEL Study	Need for Regional Parkway PEL Study
• **Reduce Congestion and Facilitate Regional Mobility, Connectivity and System Linkages** • **Accommodate Potential Growth and Address Operational Safety Issues** • **Address Safety Issues and Provide Alternate Hurricane Evacuation Routes**	• Frequent congestion in the SH 358 corridor and other major east-west routes • Lack of redundancy in the transportation network • Provide alternate routes for traffic to/from the south side of Corpus Christi and the Islands

3.0 Regional Parkway PEL Study Area

The Regional Parkway PEL Study Area is generally comprised of a buffer that is generally one mile wide bounded on the east by PR 22 and on the west by SH 286. The PEL Study Area defines Segments A and B and is inclusive of the proposed extension of Rodd Field Rd., which is bounded on the north with the intersection of Yorktown Blvd. The Study Area limits are graphically depicted in **Figure 1**.

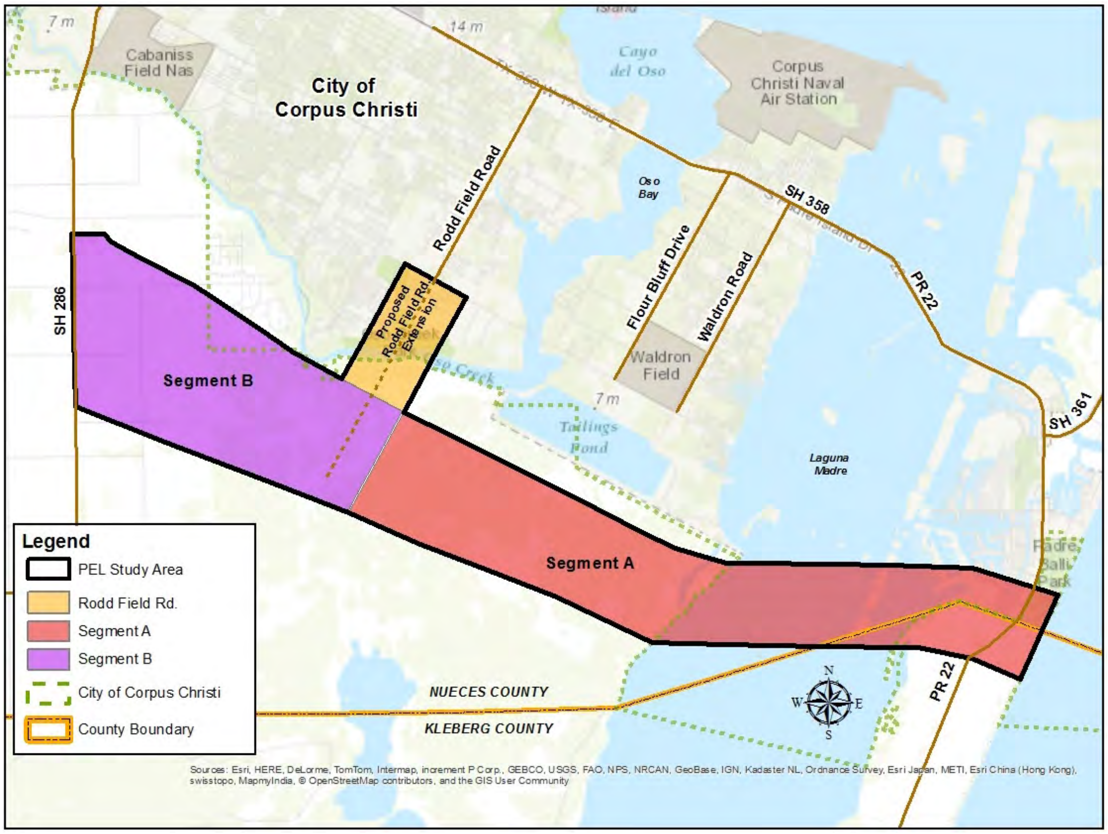


Figure 1: Regional Parkway PEL Study Area

4.0 Conceptual Alternatives Development

This section describes the conceptual alternatives development process for the Regional Parkway PEL Study, including descriptions of preliminary conceptual alternatives considered. Evaluation methodologies are described in **Section 5**.

4.1 Conceptual Alternatives Development Process

The Regional Parkway PEL Study utilized information from previous planning studies, current technical analyses, and input from the Technical Working Group (TWG workshop conducted April 6, 2016 consisted of representatives of CCMPO, COCC, and Nueces County), general public and other key stakeholders to develop the “universe of alternatives” or conceptual alternatives to be evaluated and eliminate those alternatives that did not meet the purpose and need of the study. The universe of conceptual alternatives was established for the PEL through identification of key characteristics and feedback from the TWG workshop and targeted stakeholder interviews. Each conceptual alternative was tested in terms of whether or not it met the purpose and need of the study.

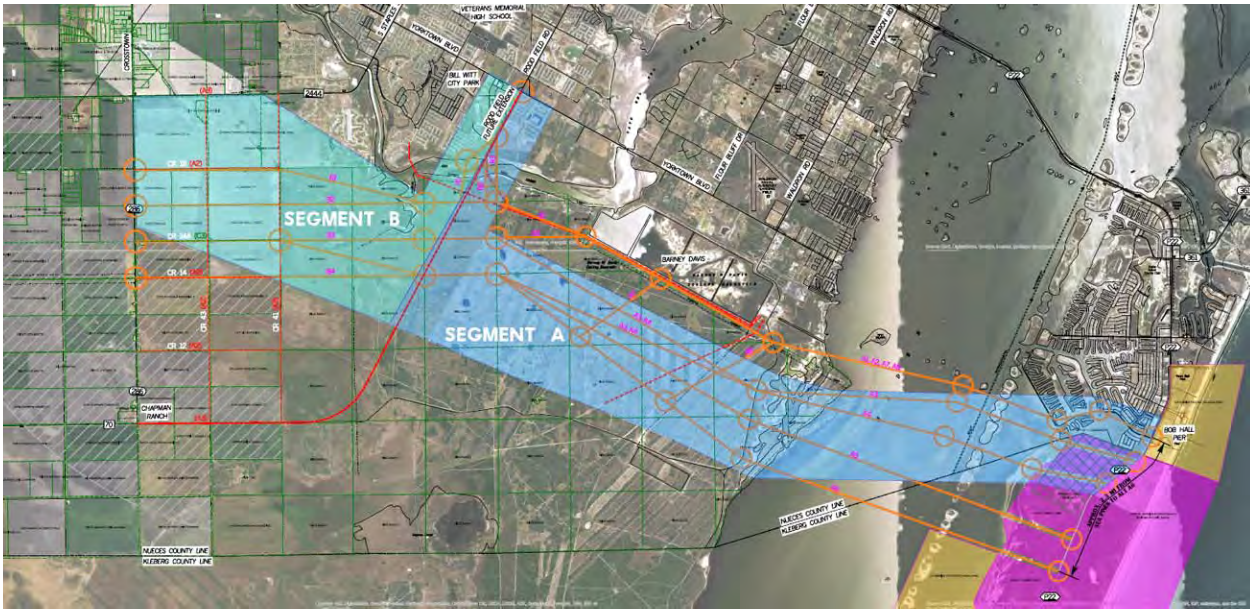


Figure 2: Universe of Alignment Alternatives for Regional Parkway

4.2 Description of Conceptual Alternatives

The following is a brief description of the conceptual alternatives under consideration in the Regional Parkway PEL Study. In total, eight (8) alternatives were considered in Segment A, four (4) alternatives were considered in Segment B, and three (3) alternatives were considered for the proposed future extension of Rodd Field Rd. These fifteen alternatives comprised our “universe” of alternatives and were subject to the screening process.

- *No Build Alternative*

No improvements beyond what may already be identified and funded in local planning documents are made in this alternative. The No Build Alternative provides a baseline to gauge the effectiveness of other alternatives to accomplish the purpose and need of the study. This alternative is a required element of consideration in PEL and future NEPA analyses.

Segment A Alternatives

- *Alternative A-1*

Beginning at a point where the proposed future extension of Rodd Field Rd., as represented by the City of Corpus Christi Urban Transportation Plan (UTP) (March 2013), is 1.75 miles south of Yorktown Blvd., then heading east for 0.5 miles until nearing an electrical transmission line utility easement (UE), then along the UE for 1.3 miles towards the southwest corner of the Barney Davis Power Plant (BDPP), then turning parallel to the BDPP and continuing east along the UE for 3.0 miles to the intersection of a the BDPP service road, a King Ranch road, and King Ranch clearings, then continues east and across the Laguna Madre until intersecting Sea Pines Dr., then continuing along Sea Pines Dr. until intersecting PR 22.

- *Alternative A-2*

Beginning at a point where the proposed future extension of Rodd Field Rd., as represented by the UTP, is 2.3 miles south of Yorktown Blvd., then heading east for 2.0 miles towards the southwest corner of the BDPP and nearing an electrical transmission utility easement (UE), then turning parallel to the BDPP and continuing east along the UE for 3.0 miles to the intersection of a BDPP service road, a King Ranch road, and King Ranch clearings, then continues east and across the Laguna Madre until intersecting Sea Pines Dr., then continuing along Sea Pines Dr. until intersecting PR 22.

- *Alternative A-3*

Beginning at a point where the proposed future extension of Rodd Field Rd., as represented by the UTP, is 2.3 miles south of Yorktown Blvd., then heading east for 0.77 miles, then turning southeast for 4.15 miles until intersecting a point on a King Ranch road which is 0.85 miles south of the Barney Davis property, then continues east and across the Laguna Madre until it intersects PR 22, 0.41 miles south of Sea Pines Dr.

- *Alternative A-4*

Beginning at a point where the proposed future extension of Rodd Field Rd., as represented by the UTP, is 2.3 miles south of Yorktown Blvd., then heading east for 0.77 miles, then turning southeast for 4.15 miles until intersecting a point on a King Ranch road which is 0.85 miles south of the BDPP, then continues east and across the Laguna Madre until it intersects PR 22 0.90 miles south of Sea Pines Dr.

- *Alternative A-5*

Beginning at a point where the proposed future extension of Rodd Field Rd., as represented by the UTP, is 2.86 miles south of Yorktown Blvd., then heading east for 1.0 miles, then turning southeast for 4.0 miles until intersecting a point on a King Ranch road which is 1.23 miles south of the BDPP, then continues east and across the Laguna Madre until it intersects PR 22, 1.83 miles south of Sea Pines Dr.

- *Alternative A-6*

Beginning at a point where the proposed future extension of Rodd Field Rd., as represented by the UTP, is 2.86 miles south of Yorktown Blvd., then heading east for 1.0 miles, then turning southeast for 4.22 miles until intersecting a point on a King Ranch road which is 1.8 miles south of the BDPP, then continues east and across the Laguna Madre until it intersects PR 22, 2.3 miles south of Sea Pines Dr.

- *Alternative A-7*

Beginning at a point where the proposed future extension of Rodd Field Rd., as represented by the UTP, is 2.86 miles south of Yorktown Blvd., then heading east for 1.0 miles, then turning southeast for 1.2 miles, then turning northeast towards the BDPP for 1.4 miles until nearing an electrical transmission line UE, then turning southeast and running parallel to said easement for 1.63 miles to the intersection of a BDPP service road, a King Ranch road, and King Ranch clearings, then continues east and across the Laguna Madre until intersecting Sea Pines Dr., then continuing along Sea Pines Dr. until intersecting PR 22.

- *Alternative A-8*

Beginning at a point where the proposed future extension of Rodd Field Rd., as represented by the UTP, is 2.86 miles south of Yorktown Blvd., then heading east for 1.0 miles, then turning southeast for 3.1 miles until intersecting a King Ranch road which is 1.36 miles south of the BDPP, then turning northeast towards the BDPP for 1.54 miles to the intersection of a BDPP service road, a King Ranch road, and King Ranch clearings, then continues east and across the Laguna Madre until intersecting Sea Pines Dr., then continuing along Sea Pines Dr. until intersecting PR 22.

Segment B Alternatives

- *Alternative B-1*

Beginning at the intersection of Crosstown (SH 286) / County Road 18 (CR 18) and extending east along CR 18 to County Road 41 (CR 41). Alt. B-1 then heads in a southeastern direction for 2 miles until intersecting a line which parallels CR 18 and is approximately 0.5 miles to the south of CR 18, and continues east for 0.5 miles until intersecting the proposed future extension of Rodd Field Rd., as represented by the UTP.

- *Alternative B-2*

Alt. B-2 begins at the intersection of Crosstown (SH 286) approximately 0.5 miles south of CR 18 and extending east and parallel to CR 18 to a point approximately 2.5 miles east of CR 41. Alt. B-2 then intersects the proposed future extension of Rodd Field Rd., as represented by the UTP.

- *Alternative B-3*

Beginning at the intersection of Crosstown (SH 286) / County Road 14A (CR 14A) and extending east along CR 14A for 4.25 miles until intersecting the proposed future extension of Rodd Field Rd., as shown in the UTP.

- *Alternative B-4*

Alt. B-4 begins at the intersection of Crosstown (SH 286) / County Road 14 (CR 14) and extending east along CR 14 for 4.0 miles until intersecting the proposed future extension of Rodd Field Rd., as shown in the UTP.

Alternatives for the Proposed Future Extension of Rodd Field Rd.

- *Alternative R-1*

Alt. R-1 extends from the intersection of Yorktown Blvd. / proposed extension of Rodd Field Rd. and heads south for 0.78 miles, then turning southwest for 0.46 miles to a point which is 0.14 miles south of the Royal Creek Estates subdivision, then turning south for 0.32 miles crossing Oso Creek, then turning southwest to parallel the Rodd Field future extension as represented by the City of Corpus Christi Urban Transportation Plan, March 2013.

- *Alternative R-2*

Alt. R-2 extends from the intersection of Yorktown Blvd. / proposed extension of Rodd Field Rd. and heads south for 1.0 mile, then turning south for 0.27 miles crossing Oso Creek, then turning southwest to parallel the Rodd Field future extension as represented by the City of Corpus Christi Urban Transportation Plan March 2013.

- *Alternative R-3*

Alt. R-3 extends from the intersection of Yorktown Blvd. / proposed extension of Rodd Field Rd. and heads south for 0.7 miles, then continues south for 1.9 miles crossing Oso Creek, terminating at the intersection of the Segment A alternatives.

5.0 Initial Screening Method and Results

5.1 Initial Screening Methodology

This section describes the initial screening method used to evaluate conceptual alternatives. The purpose of the initial screening process was to identify those alternatives which have potential to meet the purpose and need of the study. To promote a transparent evaluation process, the screening methodology and criteria were mutually agreed upon between the CCMPO, CoCC, and stakeholders. It should be noted that the level of screening analysis performed during the initial phase is a high-level, pass/fail type analysis intended to eliminate conceptual alternatives that do not meet purpose and need of the study.

5.2 Initial Screening Criteria

The screening criteria utilized in the initial pass/fail analysis focused on broad evaluation factors directly related to the purpose and need of the study. The initial evaluation criteria are shown in **Table 2**. These factors seek to provide a rough characterization and differentiation between: (1) those alternative concepts with a high probability of improving safety, improving mobility, and mitigating environmental impacts and (2) those alternative concepts which will not meet the purpose and need and thus should be eliminated from further study at this point.

Table 2: Initial Evaluation Criteria	
CATEGORY	**CRITERIA**
Safety	Does the alternative have the potential to reduce crashes on existing facilities, such as SH 358 (South Padre Island Drive (SPID)), SH 357 (Saratoga Blvd.), and major north-south arterials (Ayers, Weber, Everhart, Staples, Airline, Rodd Field)? Based on traffic volumes, an alternative that could reduce volumes on existing facilities would conceivably reduce crashes as well. One that could increase crashes should be evaluated unfavorably. Does the alternative provide for redundancy in the network and serve as an alternate hurricane evacuation route?
Mobility	Does the alternative have the potential to reduce congestion on existing facilities in the study area? An alternative that could reduce congestion should be evaluated favorably. One that could increase congestion should be evaluated unfavorably.
Environmental Impacts	Does the alternative have a potentially significant environmental impact(s)? An alternative that has environmental impacts that cannot be mitigated should be eliminated from consideration.

5.3 Initial Screening Results

The results of the initial conceptual alternative screening processes are presented in this section. The results are summarized in **Table 3**. The conceptual alternatives, described in **Section 4.2**, were screened and the evaluation rationale is described in this section.

Table 3: Initial Screening Matrix

	Evaluation Criteria			Meets	Comments
Conceptual Alternatives	Safety	Mobility	Environmental Impacts		
No Build	Fail	Fail	Fail	No	Required Baseline
A-1	Pass	Pass	Pass	Yes	
A-2	Pass	Pass	Pass	Yes	
A-3	Pass	Pass	Pass	Yes	
A-4	Pass	Pass	Pass	Yes	
A-5	Pass	Pass	Pass	Yes	
A-6	Pass	Pass	Pass	Yes	
A-7	Pass	Pass	Pass	Yes	
A-8	Pass	Pass	Pass	Yes	
B-1	Pass	Pass	Pass	Yes	
B-2	Pass	Pass	Pass	Yes	
B-3	Pass	Pass	Pass	Yes	
B-4	Pass	Pas	Pass	Yes	
R-1	Pass	Pass	Pass	Yes	
R-2	Pass	Pass	Pass	Yes	
R-3	Pass	Pass	Pass	Yes	

It should be noted the purpose of the initial screening process is to identify alternatives which have the potential to meet purpose and need of the project. Additionally, the level of screening analysis performed during the initial phase is a high-level, pass/fail type analysis intended to assess whether an alternative meets purpose and need. Each of the alternatives initially screened meet purpose and need. This outcome is not at all unexpected since Regional Parkway is planned primarily as a new-location route and the alternatives are specifically generated to address project purpose and need.

- *No Build Alternative*

The No Build Alternative was selected to advance to secondary evaluation. Though this alternative does not meet the purpose and need, it is a PEL and NEPA requirement to advance the alternative as an environmental baseline against which other alternatives are measured. The initial screening results are presented in **Table 4**.

Table 4: Initial Screening - No Build Alternative

Screening Criteria	Pass/Fail	Reasoning
Safety: Does the alternative have the potential to reduce crashes on existing facilities?	**Fail**	**The No-Build alternative does not make improvements to address crashes.**
Mobility: Does the alternative have the potential to reduce congestion on existing facilities in the study area?	**Fail**	**The No-Build alternative does not make improvements to address congestion.**
Environmental: Does the alternative have a potentially significant environmental impact(s)?	**Fail**	**The No-Build alternative does not address existing mobility, air quality, or noise issues.**

- *Alternatives A-1 through A-8*

Alternatives A-1 through A-8 were selected to advance to secondary evaluation. The initial screening results are presented in **Table 5**.

*Table 5: Initial Screening **- Alternatives A-1 through A-8***		
Screening Criteria	**Pass/Fail**	**Reasoning**
Safety: Does the alternative have the potential to reduce crashes on existing facilities?	**Pass**	**These alternatives have the potential to reduce crashes on existing facilities.**
Mobility: Does the alternative have the potential to reduce congestion on existing facilities in the study area?	**Pass**	**These alternatives have the potential to reduce congestion on existing facilities.**
Environmental: Does the alternative have a potentially significant environmental impact(s)?	**Pass**	**These alternatives do not create potential unmitigated environmental impacts.**

- *Alternatives B-1 through B-4*

Alternatives B-1 through B-4 were selected to advance to secondary evaluation. The initial screening results are presented in **Table 6**.

Table 6: Initial Screening - Alternatives B-1 through B-4		
Screening Criteria	**Pass/Fail**	**Reasoning**
Safety: Does the alternative have the potential to reduce crashes on existing facilities?	**Pass**	**These alternatives have the potential to reduce crashes on existing facilities.**
Mobility: Does the alternative have the potential to reduce congestion on existing facilities in the study area?	**Pass**	**These alternatives have the potential to reduce congestion on existing facilities.**
Environmental: Does the alternative have a potentially significant environmental impact(s)?	**Pass**	**These alternatives do not create potential unmitigated environmental impacts.**

- *Alternatives R-1 through R-3*

Alternatives R-1 through R-3 were selected to advance to secondary evaluation. The initial screening results are presented in **Table 7**.

Table 7: Initial Screening - Alternatives R-1 through R-3		
Screening Criteria	Pass/Fail	Reasoning
Safety: Does the alternative have the potential to reduce crashes on existing facilities?	**Pass**	**These alternatives have the potential to reduce crashes on existing facilities.**
Mobility: Does the alternative have the potential to reduce congestion on existing facilities in the study area?	**Pass**	**These alternatives have the potential to reduce congestion on existing facilities.**
Environmental: Does the alternative have a potentially significant environmental impact(s)?	**Pass**	**These alternatives do not create potential unmitigated environmental impacts.**

5.4 Conceptual Alternatives Eliminated from Further Study

Each of the conceptual alternatives, other than the No Build, meets the PEL Study purpose and need. Therefore, none of the conceptual alternatives identified in the "Universe of Alternatives" has been eliminated from further study.

5.5 Conceptual Alternatives Carried Forward for Further Study

Those conceptual alternatives which passed the initial screening were evaluated as having potential to meet the purpose and need of the study. Altogether there were fifteen (15), as well as the No Build, conceptual alternatives recommended for further development and consideration in the secondary evaluation. Each of the fifteen alternatives was refined to meet the established engineering design criteria for the Regional Parkway PEL Study. These criteria are summarized in the Design Summary Report prepared for the PEL and included in **Appendix A** to this tech memo. The refinements are necessary to create an alignment about which a 500 foot buffer is produced by offsetting 250 feet left and right of the refined alignment centerline. Subsequently, each 500 foot buffer is mapped in a geospatial database (GIS) and analyzed with respect to the evaluation criteria discussed in **Section 6** below. The "refined" alternatives are depicted in **Figure 3**.

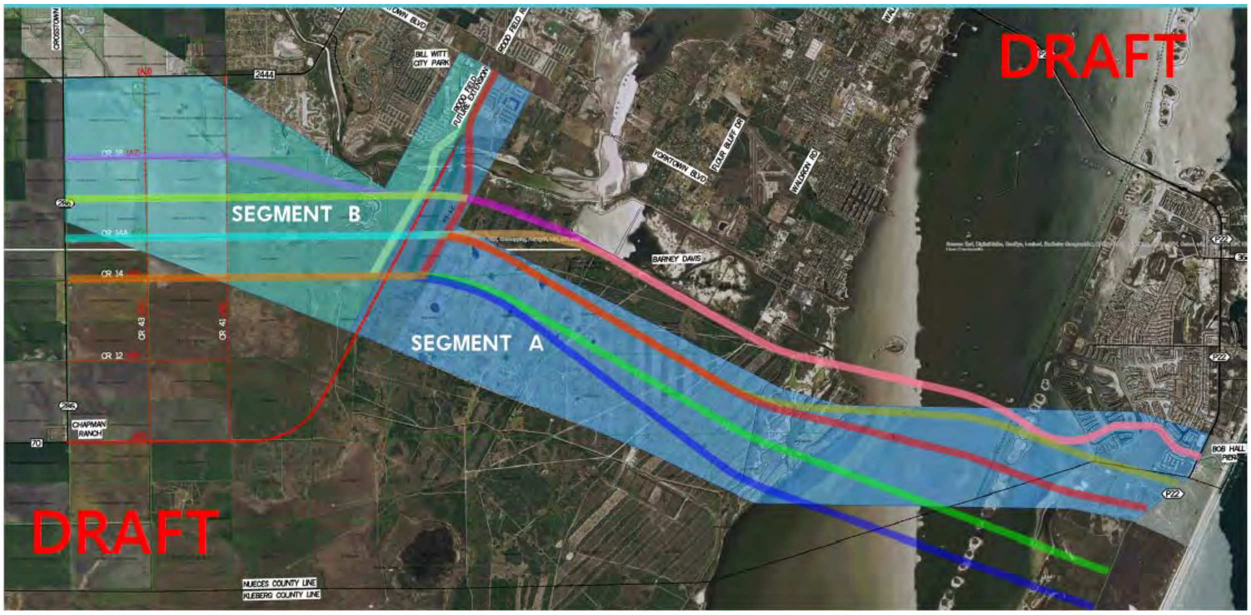


Figure 3: Refined Alignment Alternatives for Regional Parkway

6.0 Secondary Screening Methods

The following sections describe the methods used for analyzing and differentiating between the alternatives in Segment A, Segment B and Segment R (proposed extension of Rodd Field Road. Results of the detailed evaluation are shown in the secondary screening decision matrix in **Appendix A**.

6.1 Evaluation Methodology

In the secondary screening phase, each of the fifteen (15) conceptual alternatives was evaluated based on engineering and environmental considerations and stakeholder input. Scoring alternatives is potentially controversial, particularly if the scoring system is too fine (i.e., what is the difference between a 7 and an 8, let alone the difference between a 72 and a 78?).

Broader scoring categories at this level of analysis are easier to complete and to gather support for an individual rating. If ratings are low, medium, or high, there is generally less chance for the performance measure to be contested due to scoring issues or weighting of the components. A challenge of a low/medium/high scoring system is to effectively present the scoring criteria so that a low score indicates good performance across all performance measures. For example, a low score on utility impacts indicates good performance while a low score on system reliability indicates poor performance. The effort to consistently align performance measures across all criteria can produce awkward or counterintuitive results. To correlate a low score with good performance is an inherently peculiar notion - unless you are an avid golfer!

An alternative rating scheme, more easily visualized, is a “traffic light” scorecard using green, yellow, and red scores. It is widely understood that green is indicative of good, yellow indicates fair, and red indicates poor or bad performance. The “traffic light” scoring was used on the Regional Parkway PEL Study.

The method of criteria scoring could be either qualitative (based on professional judgment) or quantitative (based on direct quantity comparisons) and is most often determined on a case by case basis. Environmental scores were based on quantitative GIS data collected for numerous resource categories. Green, yellow, and red ratings were used to distinguish alternatives from each other. Red does not necessarily mean a fatal flaw, but may be indicative of a challenging regulatory hurdle.

Using these evaluation criteria, a separation of conceptual alternatives is normally expected at some threshold. Conceptual alternatives that score above the threshold may be carried forward to the next step in the project development process. The environmental analysis recognized that avoidance, minimization, and mitigation could take place in a subsequent NEPA phase, helping to reduce impacts. In addition, the No-Build alternative is carried through each evaluation step regardless of rank to keep a consistent baseline for comparison and since it must be retained for comparison in any NEPA document.

6.2 Secondary Evaluation Criteria and Measures

Each area of consideration was evaluated using multiple criteria, each criterion was defined, and ranges were established for the purpose of scoring. The criteria, definitions, and scoring ranges are presented in **Table 8** through **Table 10**, one table for each evaluation category (Engineering, Environmental and Stakeholder Input). The evaluation results are presented, for each alternative, in in **Section 7**. The complete scoring matrix, with back-up data, is presented in **Appendix A**.

Table 8: Secondary Evaluation Categories, Criteria, and Scoring

Engineering Considerations		
Category	**Evaluation Criteria**	**Scoring Measures**
Bridge Length	**Bridge Length (BL) vs. Average Bridge Length (ABL) in linear feet (lf) for each segment**	**Segment A ABL = 22k lf Segment B ABL = 6.1k lf Segment R ABL = 3k lf G = BL less than ABL Y = BL equal to ABL R = BL greater than ABL**
ROW Required	**ROW Required (RR) vs Average ROW (AR) measured by acre (ac)**	**Segment A AR = 400 ac Segment B AR = 200 ac Segment R AR = 40 ac G = RR less than AR Y = RR equal to AR R = RR greater than AR**

Table 9: Secondary Evaluation Categories, Criteria, and Scoring

Environmental Considerations		
Category	**Evaluation Criteria**	**Scoring Measures**
Critical Habitat	**Area of critical habitat impacted**	**G = no designated critical habitat** **Y = not used** **R = one or more occurrences of designated critical habitat**
Threatened and Endangered Potential Occurrences	**Number of documented occurrences of federal or state listed endangered or threatened species listed on TPWDs Natural Diversity Database (NDD)**	**G = no documented occurrences of federal or state listed species in the NDD** **Y = one or more documented occurrences of state listed endangered or threatened species in the NDD** **R = one or more documented occurrences of federally listed endangered or threatened species in the NDD**
FEMA Floodplains	**Percentage of floodplain area impacted**	**G = area is less than 20% (sum of zones A, AE, AH, AO, AR, A1-A30, & VE)** **Y =area is between 20% and 40% (sum of zones A, AE, AH, AO, AR, A1-A30, & VE)** **R = area is greater than 40% (sum of zones A, AE, AH, AO, AR, A1-A30, & VE)**
Hydrography	**Potential crossings of waters of the US**	**G = less than 5 crossings (no perennial)** **Y = between 5 and 8 crossings (no perennial)** **R = greater than 8 crossings or includes perennial crossings**
Water Wells	**Number of existing water wells impacted**	**G = less than 5 existing water wells** **Y = between 5 and 15 existing water wells** **R = greater than 15 existing water wells**
Wetlands	**Number of NWI areas impacted**	**G = less than 5 wetland areas** **Y = between 5 and 20 wetland areas** **R = greater than 20 wetland areas**
National Registry Districts	**Number of National Registry Historic Districts impacted**	**G = no National Registry Historic Districts** **Y = NA** **R = one or more National Registry Historic Districts**
TARL Archaeological Data (Linear features)	**Number of TARL linear features recorded**	**G = no recorded linear features** **Y = NA** **R = one or more recorded linear features**
TARL Archaeological Data (Recorded Arch Site Points)	**Number of Texas Archaeological Research Laboratory recorded sites**	**G = no recorded sites** **Y = NA** **R = one or more recorded sites**
Wet Utilities	**Number of potential impacts to existing gas, water, sewer, and storm sewer**	**G = less than 5** **Y = between 5 and 15** **R = greater than 15**
Residential Subdivisions	**Number of impacts to platted subdivisions as a percentage of area**	**G = less than 5%** **Y = between 5 and 25%** **R = greater than 25%**
Public Facilities	**Number of potential impacts to public facilities (i.e., hospitals, libraries, museums, churches, schools, etc.)**	**G = less than 5** **Y = between 5 and 25** **R = greater than 25**

Planned Developments	**Potential impacts to planned developments**	**G = Otherwise** **Y = greater than 20% residential developments** **R = greater than 2% of any conservation/restoration area present or park, commercial, recreational, or other entertainment development**
Public Parks	**Number of impacts to publicly owned parks**	**G = no parklands impacted** **Y = NA** **R = one or more parklands impacted**
Prime Farmland Soils	**Percentage of prime farmland soils**	**G = less than 10% prime farmlands impacted** **Y = between 10% and 30% prime farmlands impacted** **R = greater than 30% prime farmlands impacted**
Hazardous Materials - Points	**Number of recorded hazardous material sites**	**G = no recorded sites** **Y = less than 3 sites** **R = greater than 3 sites**
Hazardous Materials - Former Defense Sites	**Number of recorded hazardous material defense sites**	**G = no recorded sites** **Y = NA** **R = one or more sites**
Oil and Gas Pipelines	**Number of potential impacts to oil and gas lines**	**G = less than 3** **Y = between 3 and 10** **R = greater than 10**
Oil and Gas Wells	**Number of potential impacts to oil and gas wells**	**G = less than 3** **Y = between 3 and 10** **R = greater than 10**
Current Land Use	**Percent change to current land use**	**G = otherwise** **Y = residential greater than 2%** **R = public greater than 10%**
Unpaved pathways	**linear feet of existing ranch road, easement, etc.**	**G = greater than 2500 ft.** **Y = between 500 ft. and 2500 ft.** **R = less than 500 ft.**
Coastal Barrier Resources System (CBRS) Implications	**Encroachments onto CBRS designated unit**	**G = no encroachments** **Y = encroaches onto publicly owned lands within CBRS unit** **R = encroaches onto privately owned lands within CBRS unit**

Table 10: Secondary Evaluation Categories, Criteria, and Scoring

Stakeholder Input		
Category	**Evaluation Criteria**	**Scoring Measures**
Property Owner Interviews	**input from property owners were collected**	**G = Positive Comment** **Y = No expressed opinion or comment** **R = Negative Comment**
Entities	**Inputs from entities were collected**	**G = Positive Comment** **Y = No expressed opinion or comment** **R = Negative Comment**

7.0 Secondary Evaluation Results

Conceptual alternatives that passed initial screening were developed further and refined in response to technical work group reviews and initiatives. The secondary evaluation of each alternative was then compared against the No-Build and with the other alternatives.

The results of the secondary evaluation for each Segment are presented in this section, in **Table 11** through **Table 26**. The evaluation categories, criteria, and scoring are defined earlier in this report in **Section 6.0**. For ease of reporting, the Environmental Considerations have been aggregated and rolled up into five (5) categories. The complete evaluation matrix, with backup data, is presented in **Appendix A**.

- *No-Build Alternative*

The No-Build alternative was forwarded as the baseline against which each of the other alternatives is measured. The No-Build alternative was evaluated using the same measures used for all alternatives in Segment A, Segment B and the proposed extension of Rodd Field Road. The evaluation results are displayed in **Table 11**.

Table 11: Secondary Evaluation Results - No-Build Alternative

Engineering Considerations	**Bridge Length**	**ROW Required**			
Environmental Considerations	**Biological**	**Water Resources**	**Cultural Resources**	**Community Resources**	**Other Resources**
Stakeholder Input	**Property Owners**	**Entities**			

7.1 Segment A Alternatives

The secondary evaluation results of the Segment A alternatives, previously described in **Section 4.2**, are displayed in **Table 12** through **Table 19**.

Table 12: Secondary Evaluation Results - Alternative A-1

Engineering Considerations	**Bridge Length**	**ROW Required**			
Environmental Considerations	**Biological**	**Water Resources**	**Cultural Resources**	**Community Resources**	**Other Resources**
Stakeholder Input	**Property Owners**	**Entities**			

Table 13: Secondary Evaluation Results - Alternative A-2

Engineering Considerations	**Bridge Length**	**ROW Required**			
Environmental Considerations	**Biological**	**Water Resources**	**Cultural Resources**	**Community Resources**	**Other Resources**
Stakeholder Input	**Property Owners**	**Entities**			

Table 14: Secondary Evaluation Results - Alternative A-3

Engineering Considerations	**Bridge Length**	**ROW Required**			
Environmental Considerations	**Biological**	**Water Resources**	**Cultural Resources**	**Community Resources**	**Other Resources**
Stakeholder Input	**Property Owners**	**Entities**			

Table 15: Secondary Evaluation Results - Alternative A-4

Engineering Considerations	**Bridge Length**	**ROW Required**			
Environmental Considerations	**Biological**	**Water Resources**	**Cultural Resources**	**Community Resources**	**Other Resources**
Stakeholder Input	**Property Owners**	**Entities**			

Table 16: Secondary Evaluation Results - Alternative A-5

Engineering Considerations	**Bridge Length**	**ROW Required**			
Environmental Considerations	**Biological**	**Water Resources**	**Cultural Resources**	**Community Resources**	**Other Resources**
Stakeholder Input	**Property Owners**	**Entities**			

Table 17: Secondary Evaluation Results - Alternative A-6					
Engineering Considerations	Bridge Length	ROW Required			
Environmental Considerations	Biological	Water Resources	Cultural Resources	Community Resources	Other Resources
Stakeholder Input	Property Owners	Entities			

Table 18: Secondary Evaluation Results - Alternative A-7					
Engineering Considerations	Bridge Length	ROW Required			
Environmental Considerations	Biological	Water Resources	Cultural Resources	Community Resources	Other Resources
Stakeholder Input	Property Owners	Entities			

Table 19: Secondary Evaluation Results - Alternative A-8					
Engineering Considerations	Bridge Length	ROW Required			
Environmental Considerations	Biological	Water Resources	Cultural Resources	Community Resources	Other Resources
Stakeholder Input	Property Owners	Entities			

7.2 Segment B Alternatives

The secondary evaluation results of the Segment B alternatives, previously described in **Section 4.2**, are displayed in **Table 20** through **Table 23**.

Table 20: Secondary Evaluation Results - Alternative B-1					
Engineering Considerations	Bridge Length	ROW Required			
Environmental Considerations	Biological	Water Resources	Cultural Resources	Community Resources	Other Resources
Stakeholder Input	Property Owners	Entities			

Table 21: Secondary Evaluation Results - Alternative B-2					
Engineering Considerations	**Bridge Length**	**ROW Required**			
Environmental Considerations	**Biological**	**Water Resources**	**Cultural Resources**	**Community Resources**	**Other Resources**
Stakeholder Input	**Property Owners**	**Entities**			

Table 22: Secondary Evaluation Results - Alternative B-3					
Engineering Considerations	**Bridge Length**	**ROW Required**			
Environmental Considerations	**Biological**	**Water Resources**	**Cultural Resources**	**Community Resources**	**Other Resources**
Stakeholder Input	**Property Owners**	**Entities**			

Table 23: Secondary Evaluation Results - Alternative B-4					
Engineering Considerations	**Bridge Length**	**ROW Required**			
Environmental Considerations	**Biological**	**Water Resources**	**Cultural Resources**	**Community Resources**	**Other Resources**
Stakeholder Input	**Property Owners**	**Entities**			

7.3 Alternatives for Segment R (Proposed Extension of Rodd Field Road)

The secondary evaluation results of the alternatives considered for the proposed extension of Rodd Field Road, previously described in **Section 4.2**, are displayed in **Table 24** through **Table 26**.

Table 24: Secondary Evaluation Results - Alternative R-1					
Engineering Considerations	**Bridge Length**	**ROW Required**			
Environmental Considerations	**Biological**	**Water Resources**	**Cultural Resources**	**Community Resources**	**Other Resources**
Stakeholder Input	**Property Owners**	**Entities**			

Table 25: Secondary Evaluation Results - Alternative R-2					
Engineering Considerations	**Bridge Length**	**ROW Required**			
Environmental Considerations	**Biological**	**Water Resources**	**Cultural Resources**	**Community Resources**	**Other Resources**
Stakeholder Input	**Property Owners**	**Entities**			

Table 26: Secondary Evaluation Results - Alternative R-3					
Engineering Considerations	**Bridge Length**	**ROW Required**			
Environmental Considerations	**Biological**	**Water Resources**	**Cultural Resources**	**Community Resources**	**Other Resources**
Stakeholder Input	**Property Owners**	**Entities**			

8.0 Conclusion and Recommendations

The Regional Parkway PEL Study developed fifteen conceptual alternatives that met the purpose and need of the PEL Study. These alternatives were subjected to a two-step evaluation process to determine the alternatives with the highest potential to meet the purpose and need of the study. The initial screening of the evaluation process was a high level pass/fail type analysis designed to eliminate alternatives that did not meet the purpose and need. No alternatives (other than the No-Build) were found to not meet the purpose and need of the study. Therefore, eight (8) alternatives in Segment A, four (4) alternatives in Segment B and three (3) alternatives for the proposed future extension of Rodd Field Road were moved forward from the initial evaluation into the secondary screening process.

In the secondary evaluation, each of the alternatives was evaluated more specifically with respect to engineering, direct environmental impacts, and stakeholder input/support. The secondary evaluation revealed that Segments A-5, A-6, B-3, B-4, and R-3 are the highest ranked alternatives in terms of the screening criteria evaluated and reported in the decision matrix.

The result lends itself to implementing a plan utilizing a phased approach to future development. Project implementation can be phased over time to provide incremental benefit. Moving forward into a NEPA process alternatives A-5, B-4, and R-3 represent the highest ranked in each of the segments and are recommended to be studied in greater detail in an effort to avoid, minimize, and mitigate environmental impacts. A more detailed future field survey will build upon the initial data collection and analysis presented in this technical memorandum.

REGIONAL PARKWAY PEL STUDY

ALTERNATIVES DEVELOPMENT AND EVALUATION TECHNICAL MEMORANDUM

APPENDIX A

Regional Parkway

CONNECTIVITY FOR NUECES AND SAN PATRICIO COUNTIES

DESIGN SUMMARY REPORT

TECHNICAL MEMORANDUM

Regional Parkway - Planning and Environmental Linkages (PEL) Study

Corpus Christi Metropolitan Planning Organization

February, 2016

CSJ: 0916-00-066

Introduction

This technical memorandum will serve as a guide for planning and design of the Regional Parkway within the Corpus Christi MSA. Two segments of the Parkway are undergoing continued refinement in order to more clearly define right-of-way needs and to build community awareness and support. Segment A extends from Park Road (PR) 22 to the future Rodd Field Road extension and Segment B extends from the Rodd Field Road extension to SH 286 (Crosstown Expressway). The basic design criteria recommended for use in planning and design is referenced from the Texas Department of Transportation (TxDOT) Roadway Design Manual, dated October, 2014. The following outlines the major design elements to be considered and evaluated. The design summary report attached as *Exhibit A* outlines the proposed design parameters.

Functional Classification

The first step in the design process is to define the function that the Regional Parkway is to serve. The two major considerations in functionally classifying a roadway are mobility and access. Mobility and access are inversely related - that is, as access is increased, mobility is decreased. Roadways are functionally classified first as either urban, suburban, or rural. The current land uses in the area are rural. In the case of Regional Parkway - Segments A and B functionally should be classified as suburban due to the proximity of the project to urban growth and development on the south side of Corpus Christi and Padre Island. Suburban roadways have both urban and rural characteristics and serve as transitions between low speed urban streets and high speed rural highways. The hierarchy of the functional highway system within either the urban, suburban, or rural area consists of the following:

- *Principal arterial* - main movement (high mobility, limited access)
- *Minor arterial* - interconnects principal arterials (moderate mobility, limited access)
- *Collectors* - connects local roads to arterials (moderate mobility, moderate access)
- *Local roads and streets* - permits access to abutting land (high access, limited mobility)

Traffic Characteristics

Information on traffic characteristics is vital in selecting the appropriate geometric features of a roadway. Necessary traffic data includes traffic volume, traffic speed, and percentage of trucks or other large vehicles.

Traffic volume is an important basis for determining such elements as number and width of travel lanes, shoulder width, bike and pedestrian accommodations, traffic control, right-of-way (ROW) width, etc. Traffic volumes may be expressed in terms of average daily traffic (ADT) or design hourly volumes (DHV). These volumes may be used to calculate the service flow rate, which is typically used for evaluations of geometric design alternatives.

Traffic speed is influenced by traffic volume, roadway capacity, roadway geometry, weather, traffic control devices, posted speed limit, and individual driver preference. The influence, roadway geometry, is impacted by “design speed”. Design speed is a selected speed used to determine the various geometric design features of the roadway. Design elements for Regional

Parkway such as sight distance, vertical and horizontal alignment, lane and shoulder widths, roadside clearances, superelevation, etc., will be influenced by design speed.

Sight Distance

Sight distance is one of several principal elements of design common to all types of highways and streets. Consideration of sight distance is critical as CCMPO, City, and HDR plan for the Regional Parkway. This criterion will be instrumental as the selection of geometric elements is made to provide adequate sight distance. For this DSR, the following four types of sight distance are considered:

- *Stopping Sight Distance*
- *Decision Sight Distance*
- *Passing Sight Distance*
- *Intersection Sight Distance*

Horizontal Alignment

Horizontal alignment is they layout of a roadway path by utilizing straight lines and curves. In the design of horizontal alignment, it is necessary to establish the proper relation between design speed and horizontal curvature. The two basic elements of horizontal curves are “curve radius” and “superelevation”.

Vertical Alignment

Vertical alignment of a roadway is used to either deviate from or follow the existing terrain upon which it will be constructed. The two basic elements of vertical alignment are “grades” and “vertical curves”. Grades of a roadway have an impact on traffic speed. Travelling up a roadway grade (hill) may decrease a vehicles speed relative to the length of the grade. Travelling down a grade may have the opposite effect with an increase in vehicle speed. Vertical curves are utilized to provide a gradual change between traveling up and down roadway grades or vice-versa. Vertical curve design is based on meeting criteria for sight distance.

Cross Sectional Elements

In addition to horizontal and vertical alignment, there are cross sectional elements which impact the safety of a roadway. Some elements are within the footprint of the roadway, and other elements are considered part of the roadside. Roadside safety is influenced by the cross-sectional elements designed for the area between a roadway’s outside shoulder and the right-of-way limits. The following are common cross sectional elements considered during roadway design:

- *Pavement Cross Slope*
- *Side Slopes and Ditch Slopes*
- *Median Design*
- *Lane Widths*

- *Shoulder Widths*
- *Sidewalks and Pedestrian Elements*
- *Curb and Curb & Gutters*
- *Roadside Recovery Area*
- *Horizontal Clearance to Obstructions*
- *Transit Elements*
- *Bicycle Elements*
- *Driveway Placement*

Hydrology (Drainage)

Hydrology deals with estimating runoff magnitudes as the result of precipitation. Runoff can be considered in terms of peak discharge. Roadway drainage structures are designed to convey predetermined discharges in order to avoid significant flood hazards. Some examples of traditional drainage structures are:

- *Storm Drain Systems*
- *Culverts*
- *Bridges*

The magnitude of a peak discharge is a function of their expected frequency of occurrence, which in turn relates to the magnitude of the potential flood damage and hazard. The occurrence of a flood event is governed by chance. The chance of flooding is described by a statistical analysis of flooding history in the subject watershed or in similar watersheds. Because it is not economically feasible, nor necessarily desirable in terms of project footprint, to design a structure for the maximum possible magnitude of peak discharge, the designer must choose a design frequency appropriate for the roadway structures. The expected frequency for a given flood is the reciprocal of the probability or chance that the flood will be equaled or exceeded in a given year, thus yielding the following chart:

Frequency versus Probability	
Frequency (Years)	Probability (%)
2	50
5	20
10	10
25	4
50	2
100	1

In addition to traditional drainage structures, context sensitive solutions will be considered for the Regional Parkway corridor. The goal of context sensitive solutions is to leverage the natural drainage features within the corridor to minimize the quantity of drainage structures thereby achieving a balanced resilient design.

EXHIBIT A

Regional Parkway Segment A and B

Project Description

Limits From:	SH 286
To:	PR 22
Description:	Proposed new location transportation corridor from SH 286 to PR 22 including a connection to the future Rodd Field Road extension.

Existing Project Elements

Existing Facility?	N/A
Existing ROW	N/A
Predominant Land Use	Refer to environmental constraints mapping
Estimated No. of Landowners	Refer to environmental constraints mapping
Soil Types	Refer to environmental constraints mapping
Stream Crossings?	Refer to environmental constraints mapping
Eligible Historical Structures	Refer to environmental constraints mapping
Schools	Refer to environmental constraints mapping
Parks	Refer to environmental constraints mapping
Archeological sites	Refer to environmental constraints mapping
Potential hazardous material sites	Refer to environmental constraints mapping
Ecological (wetlands, habitats, etc.)	Refer to environmental constraints mapping
Airport (notify FAA, FAA Form 7460-1)	No
Railroad Crossings	No
Major Utilities?	AEP Transmission, others TBD

Proposed Project Elements

National Highway System (on/off)	OFF
Sidewalk	YES
Curb and Gutter	YES
Storm Drain	YES
Illumination (safety or continuous)	ANSI / IES Rp-8-14
Is Planimetric Needed	YES
Status of Aerial	Complete
Status of Field Survey	N/A
Vertical & Horizontal Control Established?	NO
Additional Elements to be Surveyed	Laguna Madre, Rodd Field/Yorktown Intersection,
Proposed Right of Way Width	500 ft
How many parcels will be involved in ROW acquisition?	Unknown
Are easements required for drainage?	Unknown
Major Utilities?	Unknown
Functional Classification	Principal Arterial
Highway Type	Suburban
Proposed Work	4R
Terrain	Level
Traffic ADT (Design Value)	8000
LOS (Design)	D
Bicycle Design Parameters	CCMPO Active Mobility
Bus Standards	CCRTA

Geometric Design Criteria

Design Parameter	Mainlanes	Ramps	Frontage Roads	Reference
Design Speed (Min/Max)(mph)	50 / 70	45 / 60	30 / 50	Table 3-17, Page 3-66, Table 3-20
Desirable Stopping Sight Distance(ft)	425 / 730	360 / 570	200 / 425	Table 2-1
Usual Minimum Radius of Curvature(ft)	1050 / 3390	810 / 2195	333 / 1050	Table 2-3, Table 2-5
Absolute Minimum Radius of Curvature(ft)	833 / 2040	643 / 1330	250 / 833	Table 2-3, Table 2-5
Minimum Radius of Curve w/o Super(ft)	14,100	11,100	7,870	Table 2-4, Table 2-5
Maximum Deflection Angle w/o a curve(min)	15	15	15	Page 2-12
Maximum Superelevation(%)	6.00%	6.00%	4.00%	Table 2-5, Table 2-6
Maximum Gradient(%)	3.00%	4.00%	5.00%	Table 2-11
Minimum Gradient (w/ unlined ditches)(%	0.50%	0.50%	0.50%	Page 2-25
Minimum Gradient (w/ lined ditches)(%)	0.25%	0.25%	0.25%	Page 2-25
Minimum Gradient w/ Curbs(%)	0.35%	0.35%	0.35%	Page 2-25
Max. Grade Break w/o Vertical Curve(%)	0.50%	1% / 0.5%	1% / 0.5%	Page 2-30
Design Control K-Value (Crest)	84 / 247	61 / 151	19 / 84	Figure 2-5
Design Control K-Value (Sag)	96 / 181	79 / 136	37 / 96	Figure 2-6
Cross-slope(%)	2%	2%	2%	Page 2-31
Maximum Side-Slope	4H:1V	4H:1V	4H:1V	Page 2-41, Page 2-42
Lane Width (ft)	12	14 (UC)/ 22 (C)	12	Table 3-18, Table 3-1
Outside Shoulder Width (ft)	10	6-8	4	Table 3-1, Table 3-18, Table 3-19, Page 3-62
Inside Shoulder Width (ft)	10	2-4	4	Table 3-1, Table 3-18, Table 3-19, Page 3-62
Horizontal Clearance to Obstructions	30	16	6(C)/ 10(UC)	Table 2-12
Min. Horizontal Clearance to Obstructions	N/A	N/A	4 ft from face of curb	Table 2-12
Desirable Curb Offset	N/A	N/A	2 ft	Table 3-1
Minimum Curb Offset	N/A	N/A	1 ft	Table 3-1
Vertical Clearance (Roadway Overpass)	16.5 ft	16.5 ft	16.5 ft	Table 3-1
Vertical Clearance (Railroad Overpass)	23 ft	23 ft	23 ft	Figure 3-16
Sidewalk Width (min)(ft)	-	-	8	Figure 3-1

References:
1. TxDOT Roadway Design Manual, October 2014
2. Corpus Christi UTP, March 2010

Abbreviations:
ft = feet, mph - miles per hour, min = minimum, max = maximum, C = curbed, UC = uncurbed

Proposed Bridge Design Data

Location	Type	Clear Roadway Width	Vertical Clearance
SH 286	Overpass		16.5 ft
Rodd Field Road	Overpass		16.5 ft
Intercoastal Canal at Laguna Madre	Overpass		USCG Regulated

Hydraulic Design Criteria		
Evacuation Route?	Yes	
Entity with most stringent design criteria	City of CC	
Special Hydraulic Considerations?	none at this time	
List Outfall Channels along with owner	Outfall XYZ	County XYZ
Are flood insurance study streams in project limits?	Yes	Oso Creek
Is there a potential LOMR required for project?	Unknown	
Any existing structures in floodplain that will be impacted by the project?	No	
Mainlane (arterial)		
- inlets and storm drain[2]	25 yr	with a 100 yr check[4]
- Culvert Crossings[1]	50 yr	with a 100 yr check
- Bridges[1]	50 yr	with a 100 yr check
Frontage Road (collector)		
- inlets and storm drain[1,2]	5 yr[3]	with a 100 yr check[4]
- Culvert Crossings[1]	10 yr	with a 100 yr check
- Small Bridges[1]	25 yr	with a 100 yr check
- Major River Crossings[1]	50 yr	with a 100 yr check
Local Road		
- inlets and storm drain[1,2]	5 yr[3]	with a 100 yr check[4]
- Culvert Crossings & Small Bridges[2]	10 yr	with a 100 yr check

References:
1. TxDOT Hydraulic Design Manual, October 2014
2. Corpus Christi UTP, March 2010

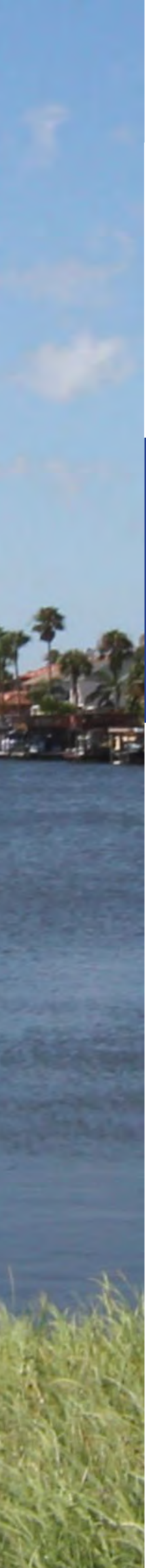
Notes:
3. If contributing drainage area is greater than or equal to 200 acres, design level of protection shall be for 25-year event
4. Measures shall be taken to ensure that street ponding remains below habitable living space

Regional Parkway PEL
Alternatives Evaluation Decision Matrix - October, 2016

Category	No Build	R1	R2	R3	B1	B2	B3	B4	A1	A2	A3	A4	A5	A6	A7	A8
Engineering Considerations																
Bridge Length																
Required ROW																
Total Engineering Considerations	G = 2 Y = 0 R = 0	G = 0 Y = 0 R = 2	G = 0 Y = 1 R = 1	G = 1 Y = 1 R = 0	G = 0 Y = 1 R = 1	G = 0 Y = 0 R = 2	G = 1 Y = 0 R = 1	G = 1 Y = 1 R = 0	G = 0 Y = 0 R = 2	G = 0 Y = 1 R = 1	G = 0 Y = 1 R = 1	G = 2 Y = 0 R = 0	G = 2 Y = 0 R = 0	G = 2 Y = 0 R = 0	G = 0 Y = 0 R = 2	G = 0 Y = 0 R = 2
Stakeholder Considerations																
Property Owner																
Property Owner 1																
Property Owner 2																
Property Owner 3																
Property Owner 4																
Entities																
Agency 1 (FW)																
Agency 2 (BE)																
Entity - NGO																
Agency 3 - NS																
Total Public Involvement Considerations	G = 8 Y = 0 R = 0	G = 0 Y = 8 R =0	G = 0 Y = 8 R =0	G = 0 Y = 8 R =0	G = 0 Y = 7 R =1	G = 0 Y = 7 R =1	G = 1 Y = 6 R =1	G = 2 Y = 6 R =0	G = 0 Y = 7 R =1	G = 0 Y = 7 R =1	G = 1 Y = 4 R =3	G = 1 Y = 4 R =3	G = 1 Y = 4 R =3	G = 1 Y = 4 R =3	G = 3 Y = 5 R =0	G = 3 Y = 5 R =0
Environmental Considerations																
Biological																
Critical Habitat																
T&E Potential Occurences																
Water Resources																
FEMA Floodplains																
Hydrography																

Regional Parkway PEL
Alternatives Evaluation Decision Matrix - October, 2016

Category	No Build	R1	R2	R3	B1	B2	B3	B4	A1	A2	A3	A4	A5	A6	A7	A8
Water Wells																
Wetlands																
Cultural Resources																
National Registry District																
Texas Archeological Research Laboratory (TARL) Data (Linear features)																
TARL Archaelogical Data (Recorded Archeological Site Points)																
Community Resources																
Wet Utilities																
Platted Subdivisions																
Community Facilities																
Planned Development																
Parks																
Prime Farmland (PF) Soils																
Other Resources																
Hazardous Materials-Points																
Hazardous Materials Areas, Formerly Used Defense Sites (FUDS)																
Oil and Gas Pipelines																
Oil and Gas Wells																
Current Landuse																
Unpaved pathways																
Coastal Barrier Resources System (CBRS) Implications																
Total Environmental Considerations	G = 20 Y = 0 R = 1	G = 7 Y = 6 R = 9	G = 7 Y = 7 R = 8	G = 10 Y = 7 R = 5	G = 14 Y = 4 R = 4	G = 17 Y = 2 R = 3	G = 16 Y = 3 R = 3	G = 15 Y = 4 R = 3	G = 9 Y = 2 R = 11	G = 9 Y = 2 R = 11	G = 11 Y = 2 R = 9	G = 12 Y = 1 R = 9	G = 13 Y = 3 R = 6	G = 12 Y = 4 R = 6	G = 9 Y = 3 R = 10	G = 10 Y = 2 R = 10
Overall Considerations	G = 20 Y = 0 R = 1	G = 7 Y = 14 R = 11	G = 7 Y = 16 R = 9	G = 11 Y = 16 R = 5	G = 14 Y = 12 R = 6	G = 17 Y = 9 R = 6	G = 18 Y = 9 R = 5	G = 18 Y = 11 R = 3	G = 9 Y = 10 R = 13	G = 9 Y = 10 R = 13	G = 12 Y = 7 R = 13	G = 15 Y = 5 R = 12	G = 16 Y = 7 R = 9	G = 15 Y = 8 R = 9	G = 12 Y = 8 R = 12	G = 13 Y = 7 R = 12



Appendix F

Traffic Analysis Technical Memorandum

TRAFFIC ANALYSIS

TECHNICAL MEMORANDUM

Regional Parkway - Planning and Environmental Linkages (PEL) Study

Corpus Christi Metropolitan Planning Organization
City of Corpus Christi

February 2016

CSJ: 0916-00-066

Study Background

The Corpus Christi Metropolitan Planning Organization (CCMPO), City of Corpus Christi (City), Nueces County, and San Patricio County sponsored and completed a study (Regional Parkway Mobility Corridor Feasibility Study, January 2013) (1) to determine whether a new roadway is needed to alleviate congestion, (2) to provide an alternate route in portions of Nueces and San Patricio Counties, and (3) to plan for forecasted growth in the region. The study focused on the feasibility of what has become known as the Regional Parkway Mobility Corridor (RPMC).

The Regional Parkway Planning and Environmental Linkages (PEL) Study is the next step in the planning process. It is intended to define a preferred alignment for Segments A and B of the Regional Parkway within the previously identified RPMC study area. The purpose of this PEL study is to conduct analyses and planning activities with resource agencies and the public in order to produce a transportation planning product that can be incorporated into the City of Corpus Christi's Urban Transportation Plan of Mobility CC.

The study area, depicted in **Figure 1**, is bounded on the east by Park Road 22 (PR 22) on North Padre Island and on the west by SH 286 (Crosstown Expressway). The boundary between Segment A and Segment B is a proposed extension of Rodd Field Road. The study area is contained in Nueces County, with the exception of a small portion of Segment A which crosses into Kleberg County on North Padre Island. The Regional Parkway PEL study area is within the limits for which the CCMPO is required to perform transportation planning activities.

The RPMC facility is proposed as a limited access, four-lane roadway consisting of a raised center median, shoulders, bicycle, pedestrian, and multimodal accommodations, as shown in **Figure 2**. This memo provides a summary of the data collection, traffic forecasting, operational, and safety analysis results.

Study area

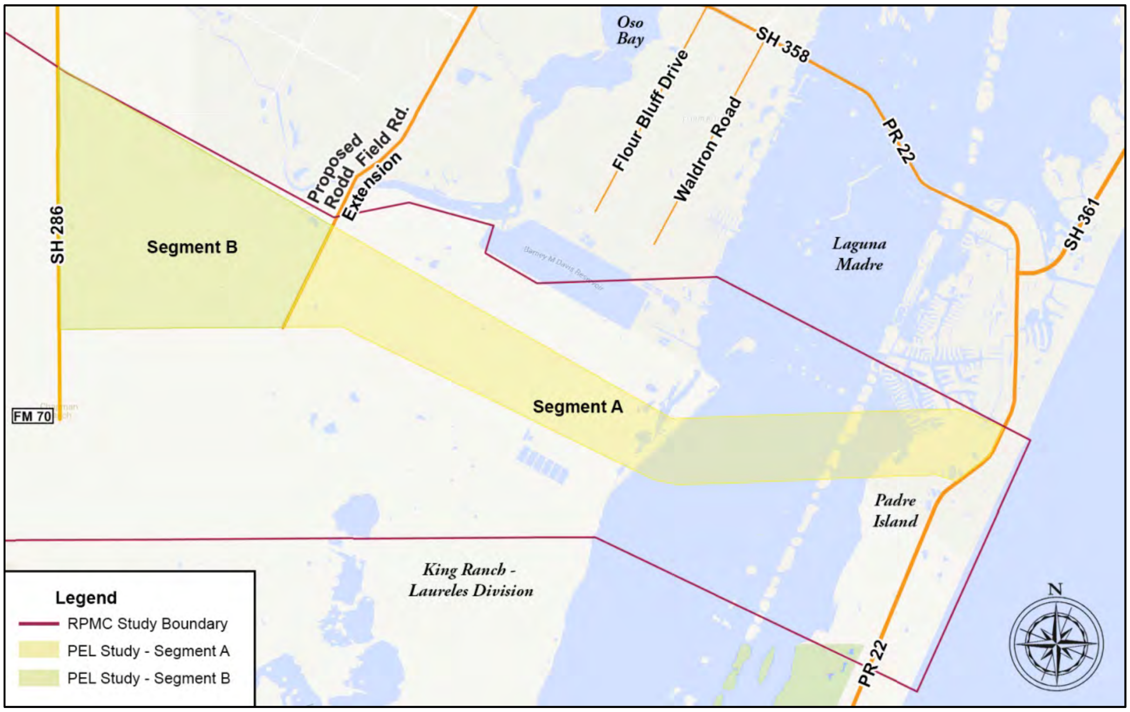


Figure 1: Study Area

Figure 2: Rendering of Regional Parkway

Methodology and Assumptions

Historical and existing traffic counts were collected for the study area to better understand traffic patterns, truck percentages, directional distribution and intersection turning percentages. In addition to the historical traffic counts obtained from TxDOT (Ref. 1) and the CCMPO, existing traffic counts were collected in November 2015 for a wider variety of geographic locations within the study area. A summary of all data is provided in the Appendix.

A review of the TxDOT historical traffic counts (2010-2014) along the SH 358/PR 22 corridor indicated a four percent annual growth rate. This factor was then applied to the most recent traffic data sources from previous years to obtain 2015 traffic volumes.

Time of Day Traffic Distribution

The 24-hour tube counters record the total vehicular volume every 15 minutes for one day. **Figure 3** depicts the average 15-minute volume plotted against the time of day for the fourteen traffic count locations within the study area. Since these are just one-day counts, they are only considered a sample representation of the traffic characteristics within the study area. Multiple days of data are typically needed to identify the time of day distributions. 24-hour count data was also used to determine the K Factors (the proportion of average annual daily traffic (AADT) occurring in an hour) and D-Factors (directional distribution factor) along eastbound (EB) and westbound (WB) directions during the peak hours.

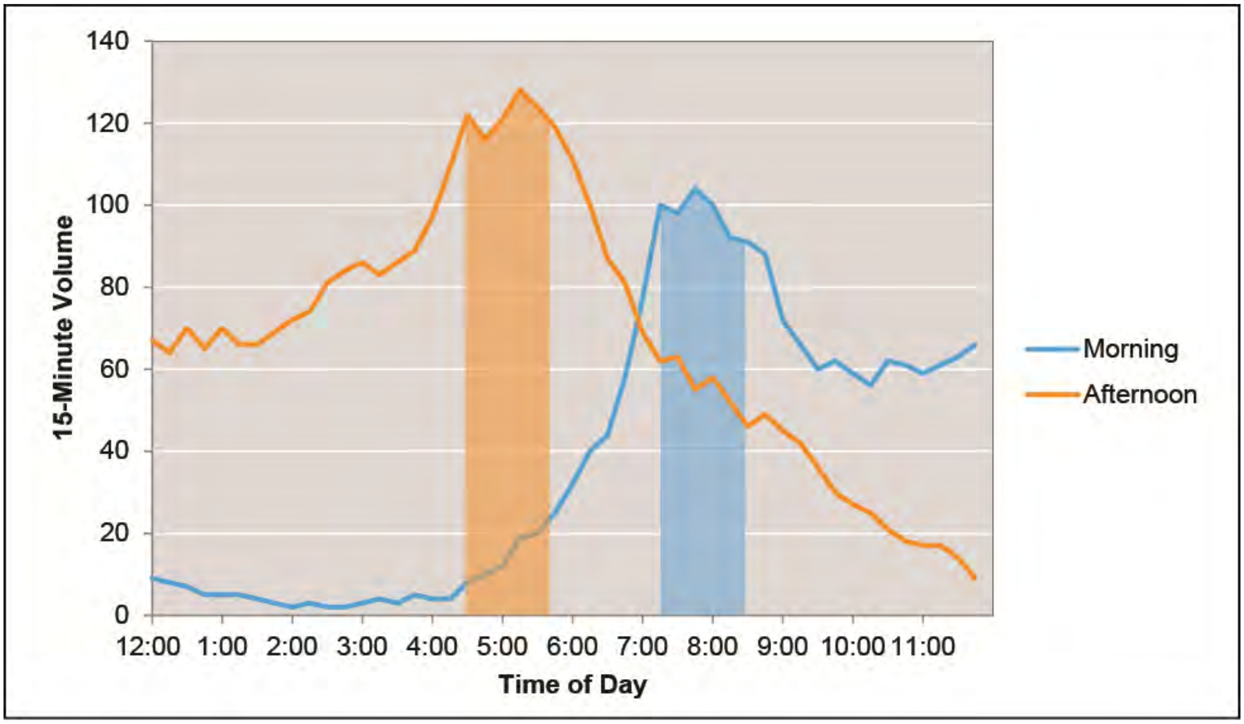


Figure 3: Average Time of Day Distribution

Vehicle Classification

Truck percentages and mixtures (heavy duty, medium duty, light duty, and buses) within the project area were based on TxDOT vehicle classification count data, which resulted in a truck percentage of 0.9 percent during the AM peak period and two percent during the PM peak period.

Analysis

The purpose of this portion of the analysis is to determine the Level of Service (LOS) of the mainlanes and intersections for existing conditions. Segments of the SH 358 mainlanes were analyzed in Highway Capacity Software (HCS) to provide an overview of operations along the corridor. Existing and forecasted year (2035) peak hour intersection turning movement volumes and segment volumes are provided in the Appendix.

Signalized and unsignalized intersections along SH 358, Yorktown Blvd, and PR 22 were analyzed in Synchro to evaluate the intersection operations along the study corridor. The following section summarizes the LOS results of the HCS and Synchro analyses. Detailed analysis output can be found in the Appendix.

Freeway Segments

A freeway segment is defined as portions of the mainlanes that are connected between two ramp junctions but is outside the area influence of the ramps. **Table 1** presents LOS and the ranges of density per vehicle for freeway segments as per the 2010 Highway Capacity Manual (HCM).

Table 1: Freeway LOS Thresholds and Definitions

LOS	Density (veh/mi/ln)	Description
A	≤ 11	Free-flow operations.
B	>11 and ≤18	Reasonably free-flow, the ability to maneuver is only slightly restricted.
C	>18 and ≤26	Speeds are at or near free-flow, although freedom to maneuver is noticeably restricted. Queues may form behind any significant blockage.
D	>26 and ≤35	Speeds decline slightly with increase in flow and freedom to maneuver is more noticeably limited. Queuing occurs with minor incidents.
E	>35 and ≤45	Operation is at or near capacity with no usable gaps in the traffic stream. Any disruption causes queuing.
F	> 45	Demand is greater than capacity, which causes breakdown in flow. These conditions generally exist within queues behind breakdown points.

Source: HCM 2010, Transportation Research Board

Intersection Level of Service

Utilizing procedures in the Highway Capacity Manual (HCM) (Ref. 2) and the MOEs (measures of effectiveness) reported by Synchro, LOS was determined for intersections within the study area network. Intersection Level of service (LOS) is a qualitative measure of operating conditions at a location and is directly related to vehicle delay at intersections. LOS is reported using the letter designations from A to F, as shown in **Table 2** as per the 2010 Highway Capacity Manual (HCM).

Table 2: Intersection LOS Thresholds and Definitions

LOS	Control Delay (sec/veh)		Description
	Signalized Intersections	Unsignalized Intersections	
A	≤ 10.0	≤ 10.0	Very low vehicle delays, short cycle length/exceptionally favorable signal progression.
B	10.1 to 20.0	10.1 to 15.0	Low vehicle delays, short cycle length/highly favorable signal progression, more vehicular stops than LOS A.
C	20.1 to 35.0	15.1 to 25.0	Favorable signal progression/moderate cycle length, potential cycle failures, significant number of vehicular stops.
D	35.1 to 55.0	25.1 to 35.0	Ineffective signal progression/long cycle length, many vehicular stops, noticeable cycle failures.
E	55.1 to 80.0	35.1 to 50.0	Ineffective signal progression, long cycle length, frequent cycle failures.
F	> 80.0	> 50.0	Poor signal progression, long cycle length, cycle failures during most cycles.

Source: HCM 2010, Transportation Research Board

Existing Conditions Analysis

The existing conditions traffic results for the SH 358/PR 22 corridor are summarized in **Table 3** and output files are presented in the Appendix. Per the HCS analysis, SH 358 operates at LOS A and B east of Staples St. and LOS D west of Staples St. for the peak direction during the AM and PM peak hours.

Table 3: SH 358/PR 22 HCS Segment Level of Service – Existing 2015

Segment	Number of Lanes	Volume (veh/hr)		Density (veh/mi/ln)		LOS	
		EB PM	WB AM	EB PM	WB AM	EB PM	WB AM
West of Staples St	3	5,074	5,647	26.9	32.3	D	D
West of Rodd Field Rd	3	3,174	3,533	15.9	18.0	B	B
East of Rodd Field Rd	3	2,454	2,731	12.3	13.9	B	B
East of Flour Bluff Dr	3	2,110	2,348	10.6	12.0	A	B
At JFK Bridge	2	1,310	1,458	9.8	11.1	A	B

The results for the intersection analysis are summarized in **Table 4**. In this study, only the PM peak is considered for the future year intersection analysis, as it represents the worst case. The analyzed intersections operate at LOS D or better in existing conditions, with the exception of Staples St and SH 286, which operates at LOS E during the PM peak hours.

Table 4: Intersection Level of Service – Existing 2015

Intersection	PM	
	Delay/Veh (sec)	LOS
Staples St and SH 286[1]	37.8	E
Staples St and Yorktown Blvd	29.1	C
Rodd Field Rd and Yorktown Blvd[2]	27.5	D
Flour Bluff Dr and Yorktown Blvd[2]	17.8	C
Commodores Dr and PR 22	23.3	C
Whitecap Blvd and PR 22	23.2	C

[1] All-way stop controlled intersection.
[2] Two-way stop controlled intersection. Highest approach delay reported.

Crash Analysis

To analyze the current safety impacts, crash data for the years between January 2010 and October 2015 was provided from the MPO and reviewed for crash patterns, trends, and type. **Table 5** provides a summary of the crashes by roadway segment and severity. Crash data from January 2015 to October 2015 is presented in **Table 6** for comparison but was excluded from the analysis as it is considered preliminary and has not been finalized or certified.

Table 5: Crash Type and Severity Summary (2010-2014)

Facility	Number of Crashes	Crash Severity		
		Fatality	Injury[1]	Non-injury
SH 358	5,167	19	1,617	3,531
SH 357 (north of Saratoga Blvd)	336	1	90	245
Yorktown Blvd	262	0	90	172
Rodd Field Rd	92	0	19	73
Flour Bluff Dr	123	0	44	79
Staples St (north of Oso Pkwy)	1460	0	387	1073
Staples St (south of Oso Pkwy)	37	0	11	26
PR 22 (S of SH 361)	113	0	34	79

[1] Includes incapacitating crashes, non-incapacitating crashes, and possible injury crashes.

The crash rate on the selected roadways was compared with the statewide average from the Texas Strategic Safety Highway Plan (Ref. 3) to obtain safety ratios and crash and fatality rates per 100 million vehicle miles traveled for the years 2010 – 2014. The results are summarized in **Table 6**.

The total number of crashes for 2014 and partial year 2015 are lower than those of previous years. The study team reviewed the crash data and there does not appear to be any significant missing data (i.e. missing months or large portion of missing days). Hence, the year 2014 data set was considered to be complete. Year 2015 data was included for comparison purposes, as sufficient data is not available to calculate crash rates.

The study segments had a five year average safety ratio ranging from 0.8 to 3.4, meaning the segments ranged from 20 percent less to 240 percent higher crash occurrences than similar facilities. The safety ratio for most of the facilities in year 2014 is less than one. Safety ratios greater than one indicates that crashes pose a problem throughout the study segment.

Staples St. between SH 358 and Oso Pkwy had crash rates ranging from 3.2 to 3.6 from 2010-2012 and then dropped in 2013. This correlates with the median improvements south of Saratoga Blvd. Flour Bluff Dr. between SH 358 and Yorktown Blvd is another segment with high crash rates ranging from 2.2 to 3.1. This can be attributed to the rural design of the two-lane road with no shoulders located in an urbanizing area.

Table 6: Crash Rate Analysis Summary (2010-2014)

	5-Year Total	Year					
		2010	2011	2012	2013	2014	2015[7]
SH 358/PR 22 (between SH 286 and SH 361)							
Yearly Total	5,167	1,238	1,159	1,190	1,035	545	298
ADT[1]	N/A	69,000	67,000	69,000	72,000	76,000	-
Corridor Crash Rate	258.5	313.3	302.1	301.1	251.0	125.2	-
Statewide Average Crash Rate[2,3]	202.7	188.9	191.6	206.6	210.1	216.4	-
Corridor Safety Ratio	1.3	1.7	1.6	1.5	1.2	0.6	-
Five-Year Annual Average	1.3 or 30 percent more crashes than other similar facilities						
SH 357 (between SH 358 and Saratoga Blvd)							
Yearly Total	336	58	57	93	94	34	15
ADT[1]	N/A	26,000	28,000	24,000	25,000	25,000	-
Corridor Crash Rate	416.1	349.2	318.7	606.7	588.6	212.9	-
Statewide Average Crash Rate[2,4]	284.8	270.9	271.2	293.1	296.0	293.0	-
Corridor Safety Ratio	1.5	1.3	1.2	2.1	2.0	0.7	-
Five-Year Annual Average	1.5 or 50 percent more crashes than other similar facilities						
Yorktown Blvd (between Weber Rd and Rodd Field Road)							
Yearly Total	262	55	70	70	52	15	17
ADT[1]	N/A	18,000	19,000	19,000	19,000	20,000	-
Corridor Crash Rate	167.9	184.4	222.3	222.3	165.2	45.3	-
Statewide Average Crash Rate[2,5]	122.1	102.2	115.6	132.2	137.5	133.3	-
Corridor Safety Ratio	1.4	1.8	1.9	1.7	1.2	0.3	-
Five-Year Annual Average	1.4 or 40 percent more crashes than other similar facilities						
Rodd Field Rd (between Saratoga Blvd and Yorktown Blvd)							
Yearly Total	92	23	11	28	21	9	8
ADT[1]	N/A	10,000	10,000	11,000	11,000	11,000	-
Corridor Crash Rate	327.7	434.6	207.8	481.0	360.7	154.6	-
Statewide Average Crash Rate[2,6]	198.5	187.8	192.7	206.8	214.4	190.6	-
Corridor Safety Ratio	1.6	2.3	1.1	2.3	1.7	0.8	-
Five-Year Annual Average	1.6 or 60 percent more crashes than other similar facilities						
Flour Bluff Dr (between SH 358 and Yorktown Blvd)							
Yearly Total	123	24	30	24	24	21	9
ADT[1]	N/A	4,000	4,000	4,000	4,000	4,000	-
Corridor Crash Rate	488.4	476.5	595.6	476.5	476.5	416.9	-
Statewide Average Crash Rate[2,6]	198.5	187.8	192.7	206.8	214.4	190.6	-
Corridor Safety Ratio	2.5	2.5	3.1	2.3	2.2	2.2	-
Five-Year Annual Average	2.5 or 150 percent more crashes than other similar facilities						
Staples St (between SH 358 and Oso Pkwy)							
Yearly Total	1073	373	393	318	270	106	60
ADT[1]	N/A	31,000	29,000	23,000	24,000	25,000	-
Corridor Crash Rate	785.4	860.7	969.4	804.7	303.3	785.4	-
Statewide Average Crash Rate[2,4]	284.8	270.9	271.2	293.1	296.0	293.0	-
Corridor Safety Ratio	2.8	3.2	3.6	3.4	2.7	1.0	-
Five-Year Annual Average	2.8 or 180 percent more crashes than other similar facilities						
Staples St (between Oso Pkwy and SH 286)							
Yearly Total	37	10	8	5	10	4	2
ADT[1]	N/A	8,000	8,000	7,000	8,000	8,000	-
Corridor Crash Rate	164.5	218.1	174.5	124.6	218.1	87.3	-
Statewide Average Crash Rate[2,6]	198.5	187.8	192.7	206.8	214.4	190.6	-
Corridor Safety Ratio	0.8	1.2	0.9	0.6	1.0	0.5	-
Five-Year Annual Average	0.8 or 20 percent less crashes than other similar facilities						
PR 22 (south of SH 361)							
Yearly Total	113	22	27	28	22	14	1
ADT[1]	N/A	23,000	21,000	21,000	22,000	14,000	-
Corridor Crash Rate	111.1	95.3	128.1	132.8	99.6	99.6	-
Statewide Average Crash Rate[2,5]	122.1	102.2	115.6	132.2	137.5	133.3	-
Corridor Safety Ratio	0.9	0.9	1.1	1.0	0.7	0.7	-
Five-Year Annual Average	0.9 or 10 percent less crashes than other similar facilities						

[1] Source: TxDOT Data Management System
[2] Source: TxDOT Annual Crash Summary Report (Ref.4)
[3] Urban State Highway
[4] Urban 4 or more lanes, undivided
[5] Urban 4 or more lanes, divided
[6] Urban 2 Lanes, 2 way
[7] January – October 2015, sufficient data not available for safety ratio calculation.

Traffic Forecasting

To forecast traffic on the existing and proposed roads, the 2006 and 2040 CCMPO TransCAD travel demand models (TDM) were used as the base models for the study area. The HDR study team used linear interpolation of the 2006 base model and 2040 TDM Origin-Destination (OD) travel time matrices data to obtain the OD travel time matrix for year 2035. The roadway networks for year 2040 and 2035 were assumed to be the same for the analysis. The resulting 24-hour link volume obtained following this step will be referred as the 2035 No Build traffic volume. It should be noted that only traffic assignment as part of this effort. It is recommended that land use, population, and employment be verified and refined as necessary as part of future studies.

Model Update

The 2040 roadway network was modified in the 2040 CCMPO TransCAD model to add the proposed roadway joining SH 286, south of Yorktown Blvd., with PR 22 on North Padre Island. Rodd Field Rd was also extended south to connect with the proposed road. The resulting link volumes obtained following this step will be referred as the 2035 Build traffic volume.

Estimation of Traffic Diversion for Build Condition

In order to estimate the shift of traffic to the new roadways, the traffic assignment results from the 2035 No Build roadway network was compared with that of 2035 Build roadway network using a cutline analysis. A cutline is an imaginary line drawn through the major corridors in the region. For this study, a total of eight cutlines was assumed, as shown in **Figure 4**. **Table 7** shows the percent of traffic that shifted to the new roadways for the 2035 Build condition.

The cutline analysis shows that a reduction of 7.6 percent from SH 358 (cutline 1-1), which means that 7.6 percent of daily traffic shifts to the proposed roadway. Cutline 1-3 shows a 13 percent increase, this includes the traffic from SH 358/PR 22 but also includes induced demand from the addition of the proposed roadway facility. Cutlines 2-1 and 2-2 shows that 15.3 percent of daily traffic from SH 358/PR 22 shifts to the proposed roadway and that there is very little induced demand.

The results of the cutline analysis show that the proposed roadway will produce some induced demand in the urban areas and that local traffic will divert to the proposed facility. However, the greatest diversion can be seen for vehicles headed to North Padre Island with a 15 percent shift in traffic.

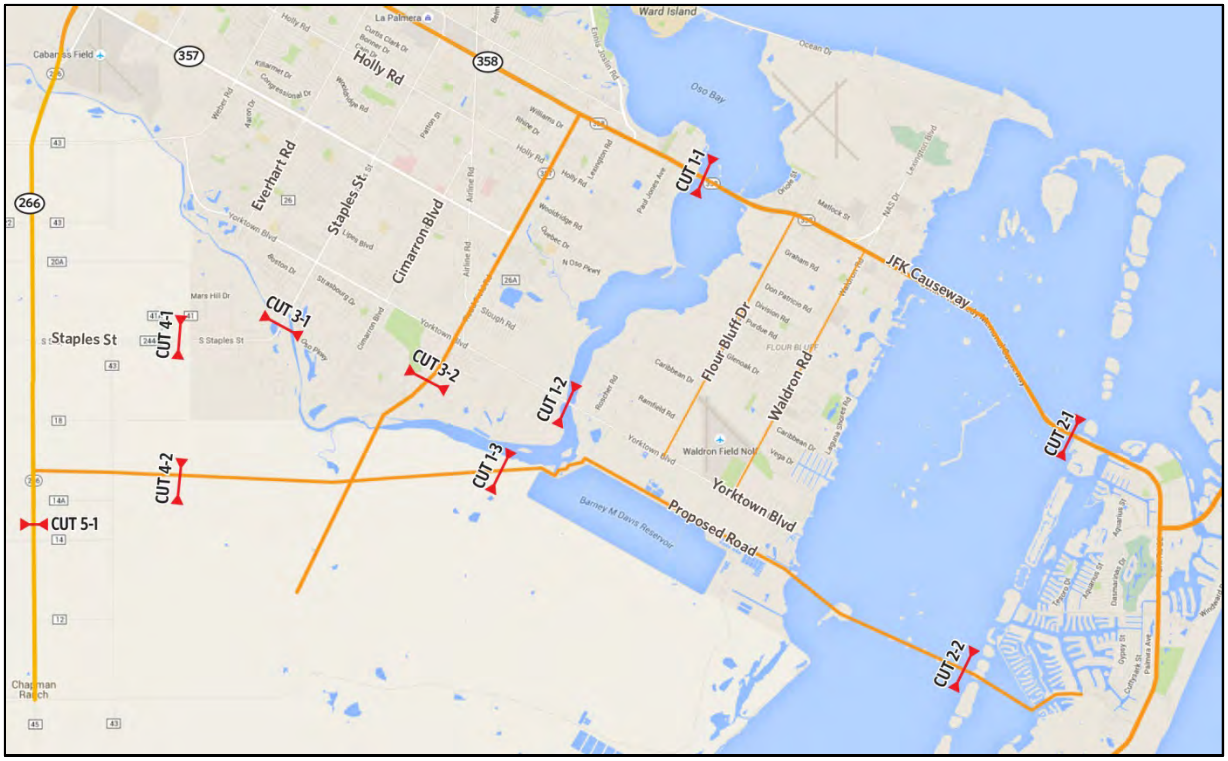


Figure 4: Cutline Locations

Table 7: Cutline Analysis Results

Cutline	2035 No Build	2035 Build	Percent Change	Percent Shift[1]
1-1	56,840	52,515	-7.6%	
1-2	10,686	10,739	0.5%	
1-3	-	*8,764*	-	*13.0%*
2-1	56,265	47,681	-15.3%	
2-2	-	8,692		15.4%
3-1	10,570	9,626	-8.9%	
3-2	-	6,405	-	60.6%
4-1	4,982	4,139	-16.9%	
4-2	-	4,249	-	85.3%
5-1	6,583	7,161	8.8%	

[1] Includes induced demand.

Intersection Turning Movement Forecasting

The existing 2015 and forecasted 2035 No Build and Build approach volumes were used to run TURNS5 software in order to obtain intersection tuning movements. TURNS5 is a spreadsheet-based intersection turning movement balancing tool for developing intersection turning movement volumes, based on the intersection balancing techniques described in National Cooperative Highway Research Program (NCHRP) Report 255 (Ref. 5). It is designed to develop future turning volumes based on existing year AADT, intersection turn volumes, and future year forecasted AADT.

For this study, existing year counts, future year AADT volume forecasts obtained from the TransCAD model, K-factors, and D-factors were used as inputs to estimate turning movements for future No Build and Build conditions. Turning movement counts obtained from TURNS5 were then checked for reasonableness and accordingly adjusted based on engineering judgment.

Future Year 2035 Analysis

The future year 2035 traffic results for the SH 358/PR 22 corridor are summarized in **Table 8** for No Build conditions and **Table 9** for Build conditions and the output files are presented in the Appendix. The LOS on SH 358/PR 22 remains unchanged in both 2035 No Build and Build conditions. All segments operate at LOS D or better, with the exception of the segment west of Staples, which will operate at LOS E/F. The proposed roadway will operate at LOS A in the 2035 Build condition.

Table 8: SH 358/PR 22 Segment Level of Service – 2035 No Build

Segment	Number of Lanes	Volume (veh/hr)		Density (veh/mi/ln)		LOS	
		EB PM	WB AM	EB PM	WB AM	EB PM	WB AM
West of Staples St	3	6,253	6,960	37.4	48.6	E	F
West of Rodd Field Rd	3	4,401	4,899	22.5	26.2	C	D
East of Rodd Field Rd	3	5,168	5,752	27.6	33.3	D	D
East of Flour Bluff Dr	3	3,973	4,422	20.0	23.1	C	C
At JFK Bridge	2	2,667	2,969	20.2	23.2	C	C

Table 9: SH 358/PR 22 and Proposed Roadway Segment Level of Service – 2035 Build

Segment	Number of Lanes	Volume (veh/hr)		Density (veh/mi/ln)		LOS	
		EB PM	WB AM	EB PM	WB AM	EB PM	WB AM
SH 358/PR 22							
West of Staples St	3	6,156	6,853	36.4	46.9	E	F
West of Rodd Field Rd	3	4,265	4,748	21.7	25.2	C	C
East of Rodd Field Rd	3	4,835	5,381	25.3	30.0	C	D
East of Flour Bluff Dr	3	3,571	3,974	17.9	20.4	B	C
At JFK Bridge	2	2,260	2,516	17.0	19.3	B	C
Proposed Regional Parkway							
Segment B	2	200	230	1.8	2.0	A	A
Segment A	2	410	460	3.6	4.1	A	A

The results for the intersection analysis with the improvements are summarized in **Table 10** and the intersection improvements are summarized in **Table 11**. A warrant analysis would need to be conducted to document the signal warrants being met prior to the installation of a traffic signal.

The analyzed intersections operate at LOS E/F in 2035 No Build conditions. In 2035 Build conditions, the intersections operate at LOS D or better with the improvements as described in **Table 11**. The three intersections of the proposed roadway will operate at LOS B. In this study, only the PM peak is considered for the future year intersection analysis, as it represents the worst case.

Table 10: Year 2035 Intersection Level of Service

Intersection	No Build PM		Build PM	
	Delay/Veh (sec)	LOS	Delay/Veh (sec)	LOS
Staples and SH 286	78.0[1]	F	34.3	C
Staples St and Yorktown Blvd	151.0	F	38.5	D
Rodd Field Rd and Yorktown Blvd	283.3[2]	F	48.4	D
Flour Bluff Dr and Yorktown Blvd	75.9[2]	F	8.1	A
Commodores Dr and Park Rd 22	112.9	F	38.4	D
Whitecap Blvd and Park Rd 22	74.2	E	25.7	C
Proposed Regional Parkway and SH 286	-	-	19.1	B
Proposed Regional Parkway and Rodd Field Rd	-	-	16.5	B
Proposed Regional Parkway and PR 22	-	-	15.8	B

[1] All-way stop controlled intersection.
[2] Two-way stop controlled intersection. Highest approach delay reported

Table 11: Summary of Recommended Intersection Improvements

Intersection	Build Improvements
Staples St and SH 286	• Construct two left-turn lanes, two through lanes, and one right-turn lane on the southbound approach • Construct one left-turn lane, one through lane, and one right-turn lane on the westbound approach • Construct one left-turn lane, two through lanes, and one right turn lane on the northbound approach • Construct one left-turn lane and one shared through/right-turn lane on the eastbound approach
Staples St and Yorktown Blvd	• Construct an additional left-turn lane and one right-turn lane on the southbound approach • Construct an additional left-turn lane on the westbound approach • Construct one right-turn lane on the eastbound approach
Yorktown Blvd and Rodd Field Rd	• Install traffic signal • Extend Rodd Field Rd to the south • Construct one left-turn lane, one through lane, and one right-turn lane on the southbound approach • Construct one left-turn lane, one through lane, and one shared through/right-turn lane on the westbound approach • Construct one left-turn lane, one through lane, and one right-turn lane on the northbound approach • Construct two left-turn lanes, one through lane, and one right-turn lane on the eastbound approach
Yorktown Blvd and Flour Bluff Dr[2]	• Install traffic signal • Construct one left-turn lane on the southbound approach • Construct one left-turn lane on the westbound approach
Commodores Dr and PR 22	• No recommended improvements
Whitecap Blvd and PR 22	• No recommended improvements
Proposed Regional Parkway and SH 286	• Install traffic signal • Construct one left-turn lane on the southbound approach • Construct one left-turn lane and one right-turn lane on the westbound approach • Construct one right-turn lane on the northbound approach
Proposed Regional Parkway and Rodd Field Rd	• Install traffic signal • Construct one left-turn lane and one right-turn lane on the southbound approach • Construct two through lanes and one right-turn lane on the westbound approach • Construct one left-turn lane and two through lanes on the eastbound approach
Proposed Regional Parkway and PR 22	• Install traffic signal • Construct one right-turn lane on the southbound approach • Construct one left-turn lane on the northbound approach • Construct one left-turn lane and one shared left/right-turn lane on the eastbound approach

Summary and Recommendations

This technical memorandum presented the traffic volume projections and evaluated the impacts of the proposed Regional Parkway between SH 286 and PR 22 in Corpus Christi. The results of the analysis indicate that traffic operations will improve with the proposed Segments A & B and extension of Rodd Field Rd. The main findings and recommendations are as follows:

- The 2040 CCMPO TransCAD travel demand model roadways were updated as part of this study. It should be noted that only traffic assignment was run. It is recommended that land use, employment, and population be verified and updated accordingly as part of a future study.
- The results of the traffic assignment effort indicate that the proposed roadway will produce some induced demand in the urban areas and 7.6 percent of local traffic from SH 358/PR 22 will divert to the proposed facility.
- The greatest diversion can be seen for vehicles headed to North Padre Island with a 15.3 percent shift in traffic from SH 358/PR 22, indicating Segments A & B will serve as an alternate access road for North Padre Island.
- Based on the crash data provided by CCMPO, the crash analysis showed a decrease in crashes for year 2014 and partial year 2015. The data appeared to be complete; further investigation into the cause of the decrease is recommended.
- The crash analysis results showed that the study segments had a five year average safety ratio ranging from 0.8 to 3.4, meaning the segments ranged from 20 percent less to 240 percent higher crash occurrences than similar facilities.
  - The crash analysis included a wide variety of road sections including two-lane highway, four-lane highway, and arterial road.
  - Additionally, unobserved variables (driver behavior, road delineation, environmental conditions, etc.) that can affect the variability in the safety ratios were unknown.
- The highest number of fatalities (19) occurred on SH 358. This proposed parallel access route to North Padre Island will provide improved safety and reduce the number of crashes based on the projected diversion of traffic.
- Based on the results of the Synchro analysis, the intersections will operate at LOS E/F in 2035 No Build conditions. Operations will improve under 2035 Build conditions to LOS D with intersection improvements and the proposed roadway.
- The proposed roadway segments will operate at LOS A with the intersections operating at LOS B based on the HCS and Synchro analysis.
- Based on the travel demand modeling result, the proposed Regional Parkway shows the following benefits:
  - Provides access to the growing area south of Yorktown Boulevard.
  - Provides a direct connection to SH 286 with limited number of signalized intersections.
  - Offers an alternate route for island evacuation.

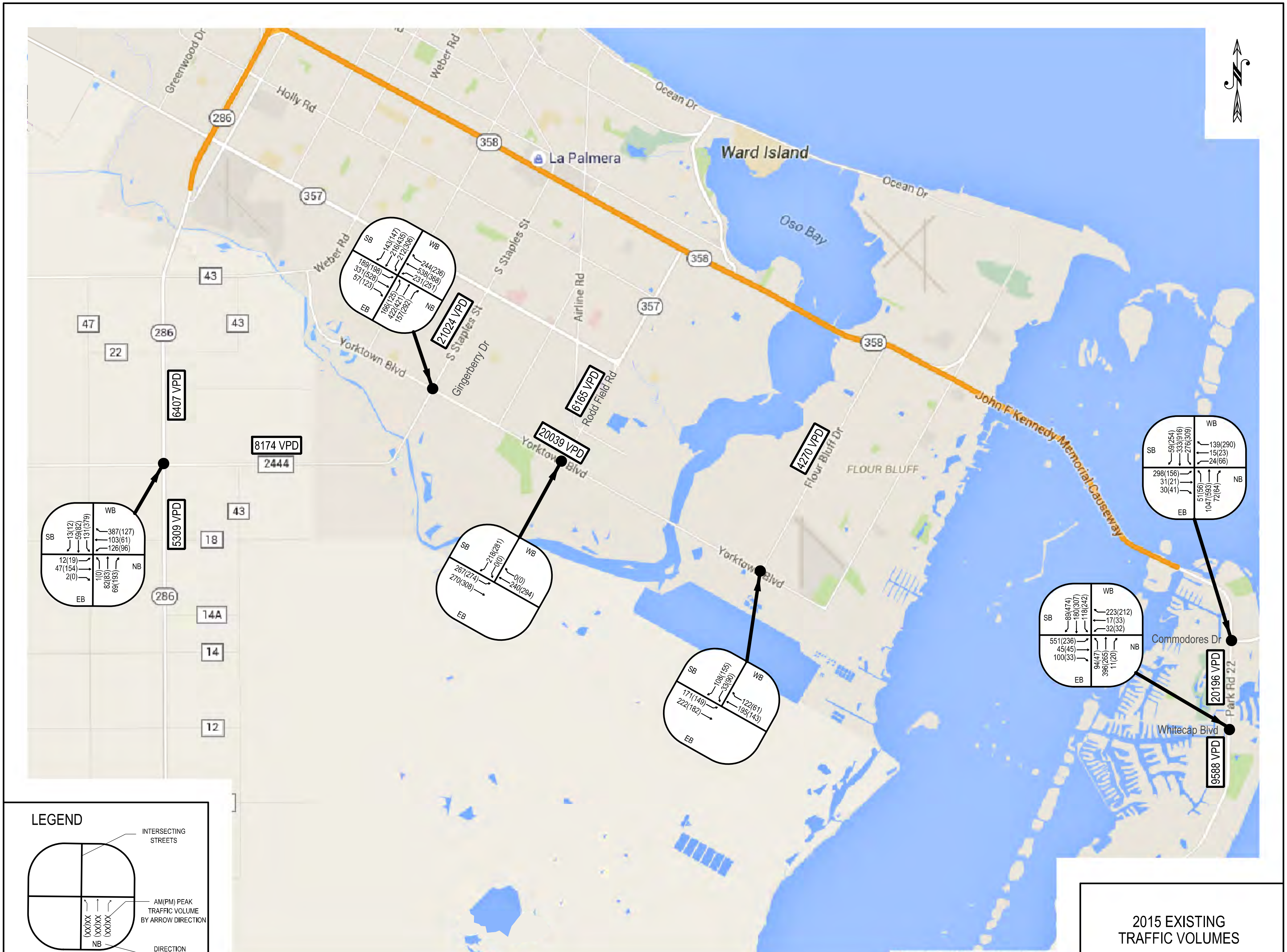
- In order to accurately assess the impacts of traffic rerouting as a result of intersection delays, congestion on SPID, or hurricane evacuation, it is recommended that further detailed analysis carried out using a Dynamic Traffic Assignment Model.

References:

1. Texas Department of Transportation Data Management System Webpage. http://txdot.ms2soft.com/
2. Highway Capacity Manual (HCM), Transportation Research Board, Washington, D.C., 2010.
3. Texas Strategic Safety Highway Plan, Texas Department of Transportation, 2010-2014.
4. Statewide Traffic Crash Rates, Texas Department of Transportation, 2010-2014.
5. Pedersen, N.J. and Samdahl, D.R. Highway Traffic Data for Urbanized Area Project Planning and Design, National Cooperative Highway Research Program (NCHRP), Report 255.

REGIONAL PARKWAY PEL STUDY

APPENDIX A



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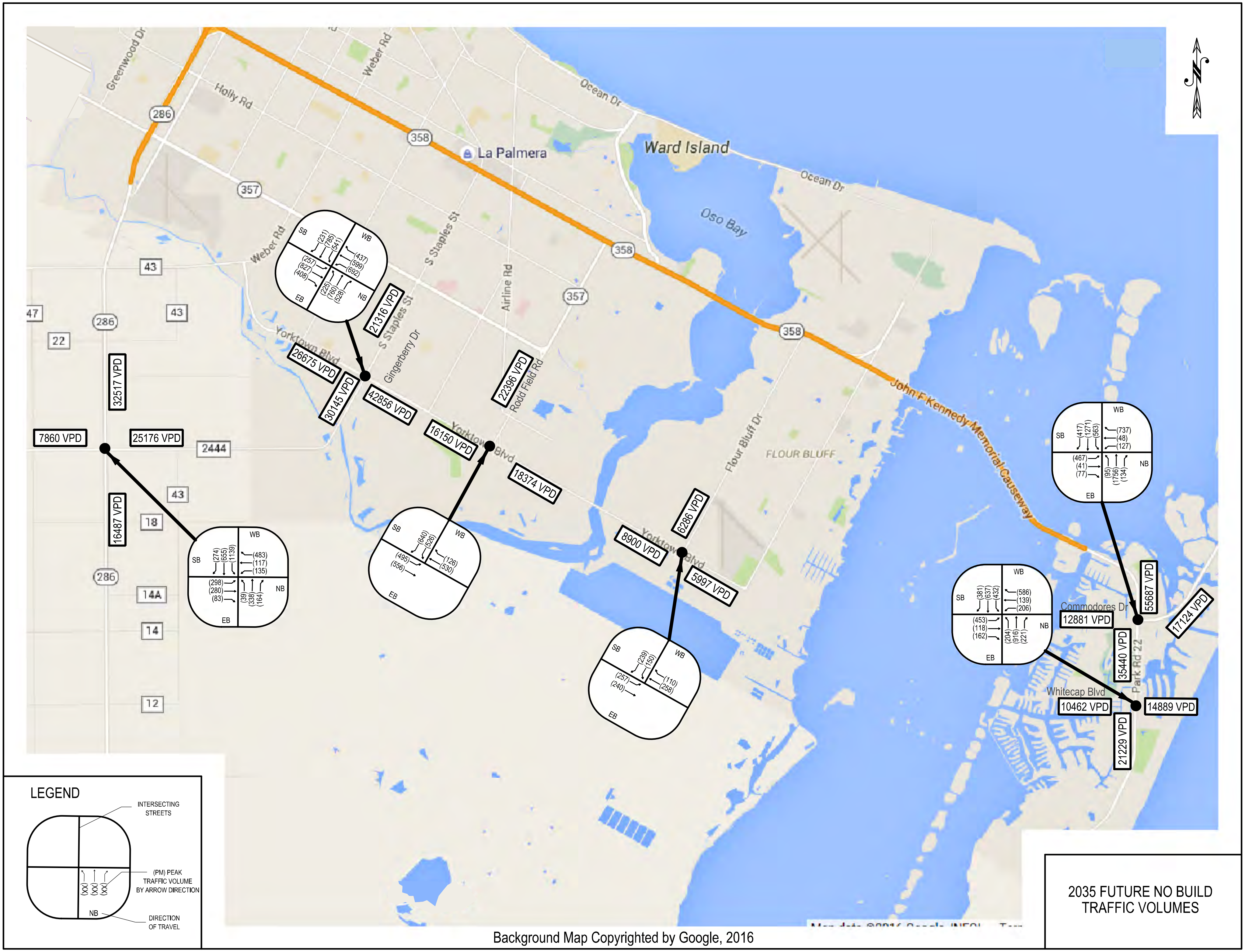
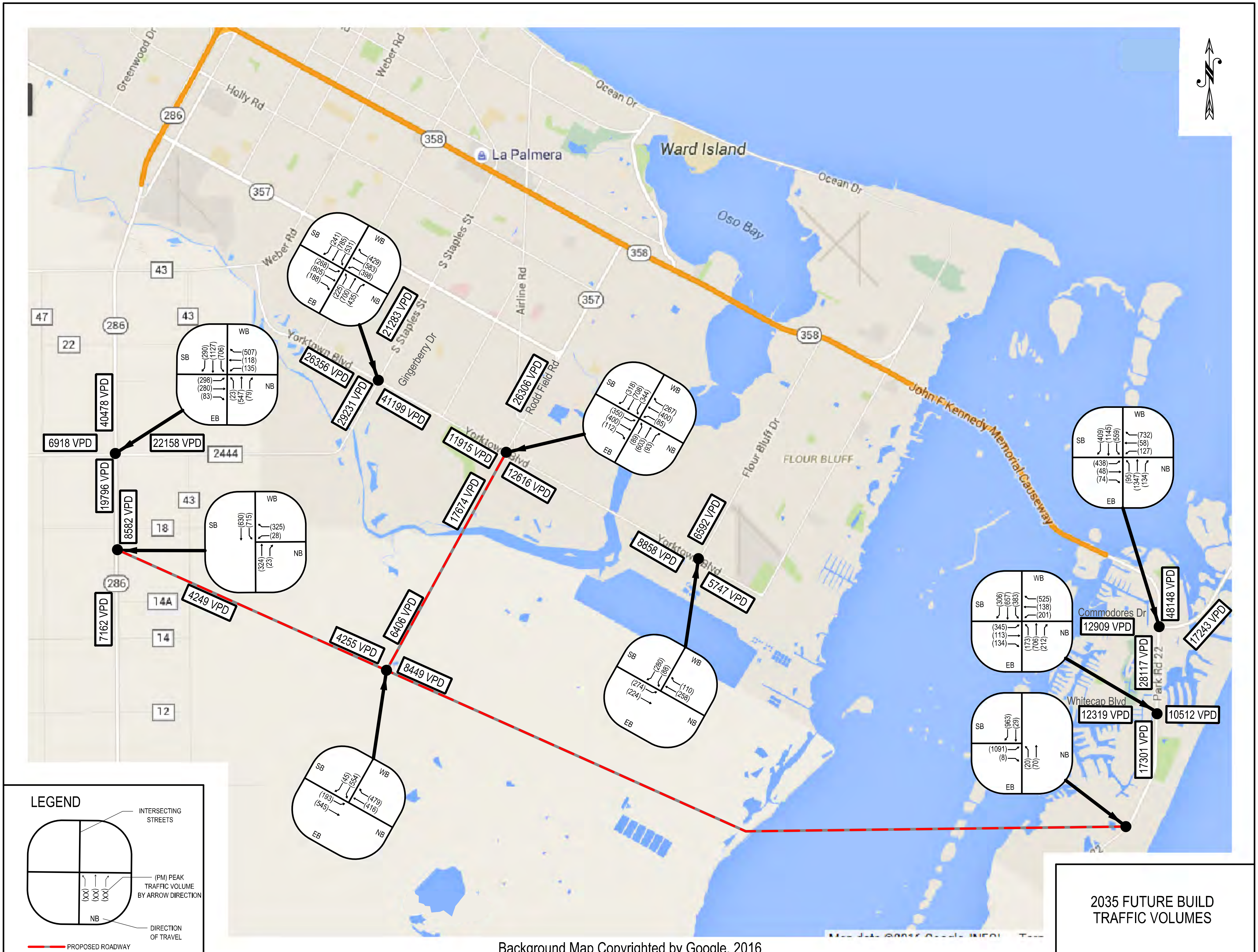
2015 EXISTING TRAFFIC VOLUMES



2035 FUTURE NO BUILD TRAFFIC VOLUMES

Background Map Copyrighted by Google, 2016

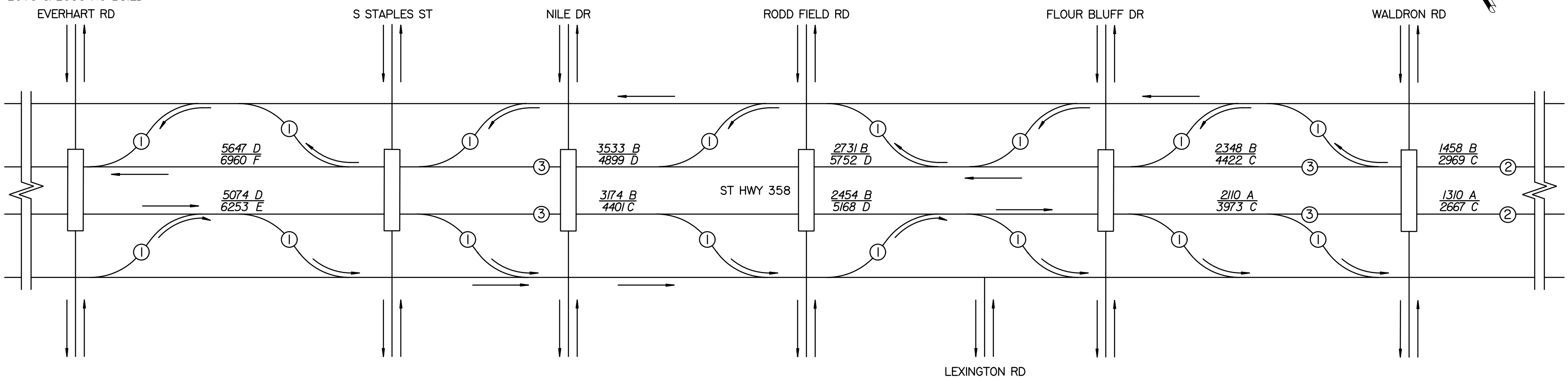


2035 FUTURE BUILD TRAFFIC VOLUMES

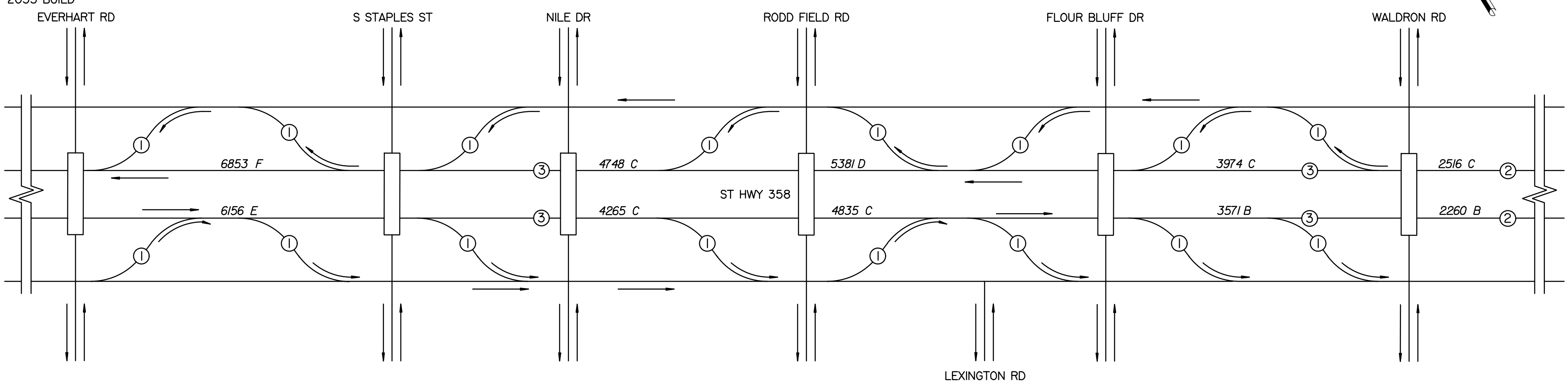
Background Map Copyrighted by Google, 2016

YEAR 2015 AND 2035 NO-BUILD AND BUILD DESIGN HOURLY VOLUMES
AND LEVEL OF SERVICE PROJECTIONS

2015 & 2035 NO BUILD



2035 BUILD

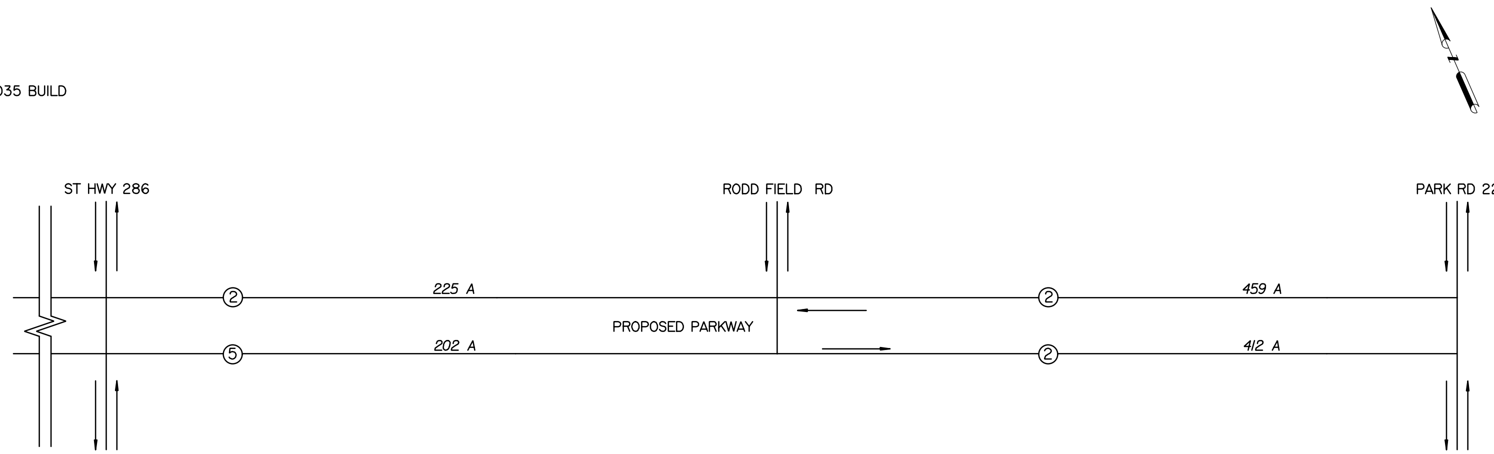


LEGEND
2015 Volumes and LOS - XXXX X
2035 Volumes and LOS - XXXX X
(1) # of Lanes
—— Ramp Reconfigurations

NOTES:
1) Not to scale
2) Cross streets are not shown at actual angle to roadway
3) Traffic numbers are Design Hourly Volume (DHV)

YEAR 2035 BUILD DESIGN HOURLY VOLUMES
AND LEVEL OF SERVICE PROJECTIONS

2035 BUILD



LEGEND
2035 Volumes and LOS - XXXX X
(1) # of Lanes
—— Ramp Reconfigurations

NOTES:
1) Not to scale
2) Cross streets are not shown at actual angle to roadway
3) Traffic numbers are Design Hourly Volume (DHV)

S Staples Street at SH 286

Thursday, November 19, 2015

Turning Movement Count

	Southbound					Westbound					Northbound					Eastbound				
	SH 286					S Staples Street					SH 286					S Staples Street				
Time	**Left**	**Thru**	**Right**	**U-Turn**	**Peds**	**Left**	**Thru**	**Right**	**U-Turn**	**Peds**	**Left**	**Thru**	**Right**	**U-Turn**	**Peds**	**Left**	**Thru**	**Right**	**U-Turn**	**Peds**
7:00	16	15	4	0	0	41	18	75	0	0	0	9	16	0	0	1	7	0	0	0
7:15	15	9	3	0	0	43	16	105	0	0	0	31	15	0	0	6	9	0	0	0
7:30	41	14	4	0	0	26	30	118	0	0	1	23	17	0	0	3	16	1	0	0
7:45	37	13	4	0	0	27	41	88	0	0	0	15	17	0	0	0	11	1	0	0
8:00	38	23	2	0	0	30	16	76	0	0	0	13	20	0	0	3	11	0	0	0
8:15	23	19	5	0	0	36	23	51	0	0	0	14	20	0	0	3	10	0	0	0
8:30	35	20	1	0	0	29	17	48	0	0	0	25	33	0	0	1	11	0	0	0
8:45	26	15	4	0	0	26	13	44	0	0	0	25	30	0	0	3	6	0	0	0

	Southbound					Westbound					Northbound					Eastbound				
	SH 286					S Staples Street					SH 286					S Staples Street				
Time	**Left**	**Thru**	**Right**	**U-Turn**	**Peds**	**Left**	**Thru**	**Right**	**U-Turn**	**Peds**	**Left**	**Thru**	**Right**	**U-Turn**	**Peds**	**Left**	**Thru**	**Right**	**U-Turn**	**Peds**
16:00	60	32	8	0	0	22	15	22	0	0	0	16	34	0	0	2	21	1	0	0
16:15	79	25	5	0	0	21	13	25	0	0	0	21	39	0	0	4	20	0	0	0
16:30	78	26	0	0	0	20	17	48	0	0	0	16	40	0	0	2	21	2	0	0
16:45	108	22	4	0	0	27	8	26	0	0	0	17	35	0	0	6	27	0	0	0
17:00	91	22	8	0	0	27	21	29	0	0	0	20	47	0	0	10	30	0	0	0
17:15	122	20	1	0	0	21	17	47	0	0	0	21	44	0	0	5	40	0	0	0
17:30	107	21	2	0	0	24	13	24	0	0	0	24	46	0	0	2	44	0	0	0
17:45	59	19	1	0	0	24	10	27	0	0	0	18	56	0	0	2	40	0	0	0

Study Name **S Staples Street at Yorktown Boulevard**
Start Date **11/19/2015**
Start Time **7:00 AM**
Site Code
Project **Dallas**

Type **Road**
Classification **All Vehicles (no classification)**

	S Staples Street Southbound				Yorktown Boulevard Westbound				S Staple Street Northbound				Yorktown Boulevard Eastbound			
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn
7:00 AM	36	47	12	8	48	82	60	6	25	80	33	1	17	46	7	0
7:15 AM	34	51	30	6	58	147	62	6	35	114	37	0	21	62	9	0
7:30 AM	60	38	32	8	46	128	61	5	51	112	21	0	54	74	9	0
7:45 AM	46	75	33	6	41	142	70	13	35	96	52	0	48	91	21	0
8:00 AM	45	52	48	7	58	121	51	4	42	100	47	3	66	104	18	0
8:15 AM	51	56	26	5	39	90	39	11	39	99	51	5	39	95	17	0
8:30 AM	55	55	24	8	32	86	58	8	26	102	47	4	22	83	11	0
8:45 AM	39	60	25	6	39	89	46	13	26	120	30	9	33	80	14	0

	S Staples Street Southbound				Yorktown Boulevard Westbound				S Staple Street Northbound				Yorktown Boulevard Eastbound			
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn
4:00 PM	56	74	29	10	45	87	39	9	15	77	40	0	44	100	11	0
4:15 PM	58	86	30	9	57	102	43	12	26	67	51	0	45	79	16	0
4:30 PM	84	104	20	4	63	82	41	8	30	66	54	0	24	89	17	0
4:45 PM	73	90	20	4	41	84	37	15	27	69	58	0	33	105	16	0
5:00 PM	69	108	37	8	56	96	44	10	34	85	65	4	50	148	31	1
5:15 PM	57	115	39	15	46	87	59	15	31	116	78	6	50	127	29	1
5:30 PM	72	95	32	7	42	95	65	14	25	106	72	3	52	135	36	0
5:45 PM	74	117	39	4	55	90	68	13	22	114	77	0	44	118	27	0

Study Name **Rodd Field Rd at Yorktown Blvd**
Start Date **12/03/2015**
Start Time **7:00 AM**
Site Code
Project **Houston**

Type **Road**
Classification **All Vehicles (no classification)**

	Rodd Field Rd Southbound				Yorktown Blvd Westbound				n/a Northbound				Yorktown Blvd Eastbound			
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn
7:00 AM	0		40	0		48	0	0					53	59		0
7:15 AM	0		42	0		58	0	0					82	66		0
7:30 AM	0		49	0		58	0	0					68	74		0
7:45 AM	0		64	0		66	0	0					61	72		0
8:00 AM	0		63	0		58	0	0					56	58		0
8:15 AM	0		40	0		57	0	0					63	41		0
8:30 AM	0		38	0		46	0	0					69	55		0
8:45 AM	0		57	0		62	0	0					46	41		0

	Rodd Field Rd Southbound				Yorktown Blvd Westbound				n/a Northbound				Yorktown Blvd Eastbound			
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn
4:00 PM	0		69	0		60	0	0					47	56		0
4:15 PM	0		78	0		86	0	0					62	66		0
4:30 PM	0		65	0		70	0	0					35	58		0
4:45 PM	0		73	0		94	0	0					64	57		0
5:00 PM	0		71	0		63	0	0					75	69		0
5:15 PM	0		68	0		81	0	0					65	70		0
5:30 PM	0		81	0		74	0	0					59	71		0
5:45 PM	0		61	0		76	0	0					75	98		0

Study Name Flour Bluff Drive at Yorktown Boulevard
Start Date 11/19/2015
Start Time 7:00 AM
Site Code
Project Dallas

Type Road
Classification All Vehicles (no classification)

	Flour Bluff Drive Southbound				Yorktown Boulevard Westbound				Driveway Northbound				Yorktown Boulevard Eastbound			
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn
7:00 AM	10	0	15	0	0	30	25	0	0	0	0	0	30	50	0	0
7:15 AM	10	0	23	0	0	29	36	0	0	0	0	0	42	76	0	0
7:30 AM	9	0	28	0	0	51	38	0	0	0	0	0	47	53	0	0
7:45 AM	7	0	32	0	0	65	27	0	0	0	0	0	37	56	0	0
8:00 AM	7	0	25	0	0	50	21	0	0	0	0	0	45	37	0	0
8:15 AM	6	0	21	0	0	31	15	0	0	0	0	0	26	23	0	0
8:30 AM	8	0	24	0	0	39	12	0	0	0	0	0	15	46	0	0
8:45 AM	10	0	27	0	0	41	18	0	0	0	0	0	25	25	0	0

	Flour Bluff Drive Southbound				Yorktown Boulevard Westbound				Driveway Northbound				Yorktown Boulevard Eastbound			
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn
4:00 PM	16	0	37	0	0	69	15	0	0	0	0	0	24	32	0	0
4:15 PM	19	0	36	0	0	95	20	0	0	0	0	0	18	42	0	0
4:30 PM	24	0	55	0	0	78	15	0	0	0	0	0	24	33	0	0
4:45 PM	18	1	35	0	0	45	14	0	0	0	0	0	28	32	0	0
5:00 PM	16	0	50	0	0	36	18	0	0	0	1	0	41	43	0	0
5:15 PM	26	0	27	0	0	44	10	0	0	0	0	0	51	44	0	0
5:30 PM	27	0	38	0	0	35	17	0	0	0	0	0	33	53	0	0
5:45 PM	21	0	40	0	0	28	16	0	0	0	0	0	24	42	0	0

Study Name Commodores at Park Rd 22
Start Date 4/16/2015
Start Time 7:00 AM
Site Code
Project

Type Road
Classification All Vehicles (no classification)

	PR22 Southbound				SH 361 Westbound				PR22 Northbound				Commodores Eastbound			
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn
7:00 AM	48	46	9		4	3	22		8	187	13		52	6	0	
7:15 AM	52	79	6		4	0	16		6	249	20		80	10	8	
7:30 AM	76	90	10		4	4	36		15	261	15		96	7	5	
7:45 AM	86	70	20		5	3	43		18	352	17		63	6	14	
8:00 AM	62	94	23		11	8	44		12	185	20		59	8	3	
8:15 AM	84	99	23		6	3	23		8	171	18		46	7	4	
8:30 AM	94	101	26		6	3	48		9	162	11		44	4	7	
8:45 AM	73	102	20		8	5	31		12	182	13		51	2	4	

	PR22 Southbound				SH 361 Westbound				PR22 Northbound				Commodores Eastbound			
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn
4:00 PM	76	165	58		21	6	56		19	140	12		39	3	8	
4:15 PM	81	226	62		13	8	74		14	156	12		38	6	11	
4:30 PM	70	210	52		12	11	94		8	133	16		23	6	13	
4:45 PM	77	197	55		10	5	74		16	148	10		38	5	12	
5:00 PM	73	243	75		19	8	69		14	158	12		36	7	7	
5:15 PM	91	189	61		14	4	76		20	146	14		36	3	11	
5:30 PM	73	215	64		15	6	75		10	150	17		56	6	8	
5:45 PM	72	221	54		14	5	70		10	116	18		28	5	13	

Study Name White Cap at Park Rd 22
Start Date 3/18/2014
Start Time 7:00 AM
Site Code
Project Houston

Type Road
Classification All Vehicles (no classification)

	PR22 Southbound				Whitecap Westbound				PR22 Northbound				Yorktown Blvd Eastbound			
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn
7:00 AM	13	25	12		9	7	52		21	59	1		126	14	2	
7:15 AM	22	53	16		7	3	42		25	84	1		137	13	19	
7:30 AM	25	65	17		15	5	60		24	129	9		146	14	55	
7:45 AM	23	34	23		7	3	53		32	119	1		121	11	16	
8:00 AM	47	26	32		3	6	60		13	52	0		130	7	10	
8:15 AM	25	31	32		7	5	59		8	51	0		115	8	4	
8:30 AM	24	29	27		4	5	42		7	55	0		111	9	6	
8:45 AM	34	34	40		4	6	28		11	52	0		89	11	6	

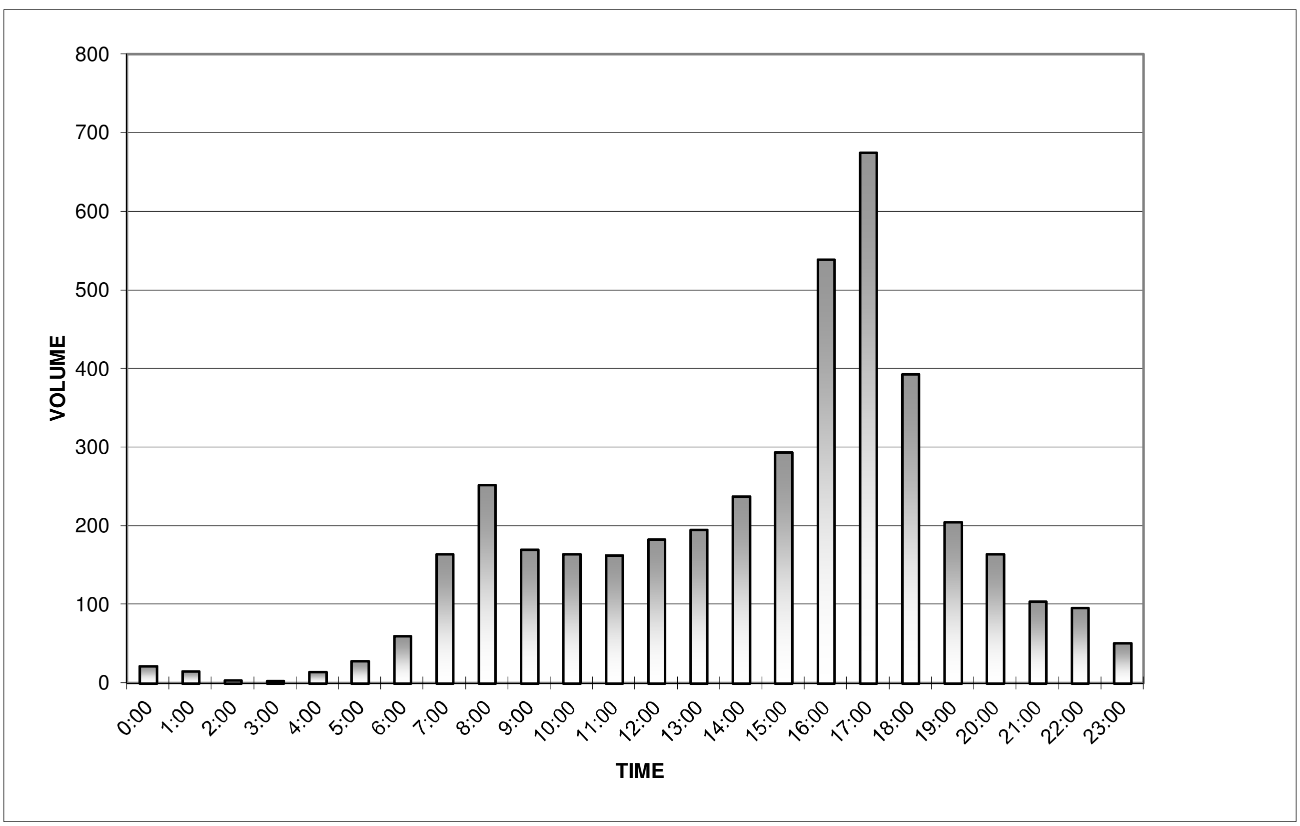
	PR22 Southbound				Whitecap Westbound				PR22 Northbound				Yorktown Blvd Eastbound			
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn
4:00 PM	60	73	72		8	9	52		11	80	4		0	15	7	
4:15 PM	69	77	122		2	5	45		13	66	3		54	10	14	
4:30 PM	46	59	98		10	9	46		13	83	9		55	12	6	
4:45 PM	46	78	84		7	13	56		10	63	4		58	8	6	
5:00 PM	61	62	117		5	12	46		13	60	8		79	15	9	
5:15 PM	58	84	102		12	6	60		13	76	4		54	8	12	
5:30 PM	54	74	123		4	8	59		9	73	3		61	15	7	
5:45 PM	69	87	132		11	7	47		12	56	5		42	7	5	

EB S Staples Street East of SH 286

Date Began:
11/19/2015

TIME	0:00	0:15	0:30	0:45	TOTAL
0:00	6	2	9	5	22
1:00	6	2	3	4	15
2:00	0	0	1	3	4
3:00	1	2	0	0	3
4:00	4	3	5	2	14
5:00	4	8	7	9	28
6:00	8	12	10	30	60
7:00	35	26	44	59	164
8:00	62	54	71	65	252
9:00	43	42	46	39	170
10:00	29	48	50	37	164
11:00	36	42	47	38	163
12:00	53	36	52	42	183
13:00	54	41	48	52	195
14:00	51	59	54	74	238
15:00	73	64	75	82	294
16:00	110	124	137	168	539
17:00	157	170	191	157	675
18:00	120	120	83	70	393
19:00	51	45	59	50	205
20:00	45	40	37	42	164
21:00	28	36	23	17	104
22:00	20	26	32	18	96
23:00	9	17	15	10	51
				TOTAL:	4196

The A.M. peak hour from 8:00 to 9:00 is 252
The P.M. peak hour from 16:45 to 17:45 is 686

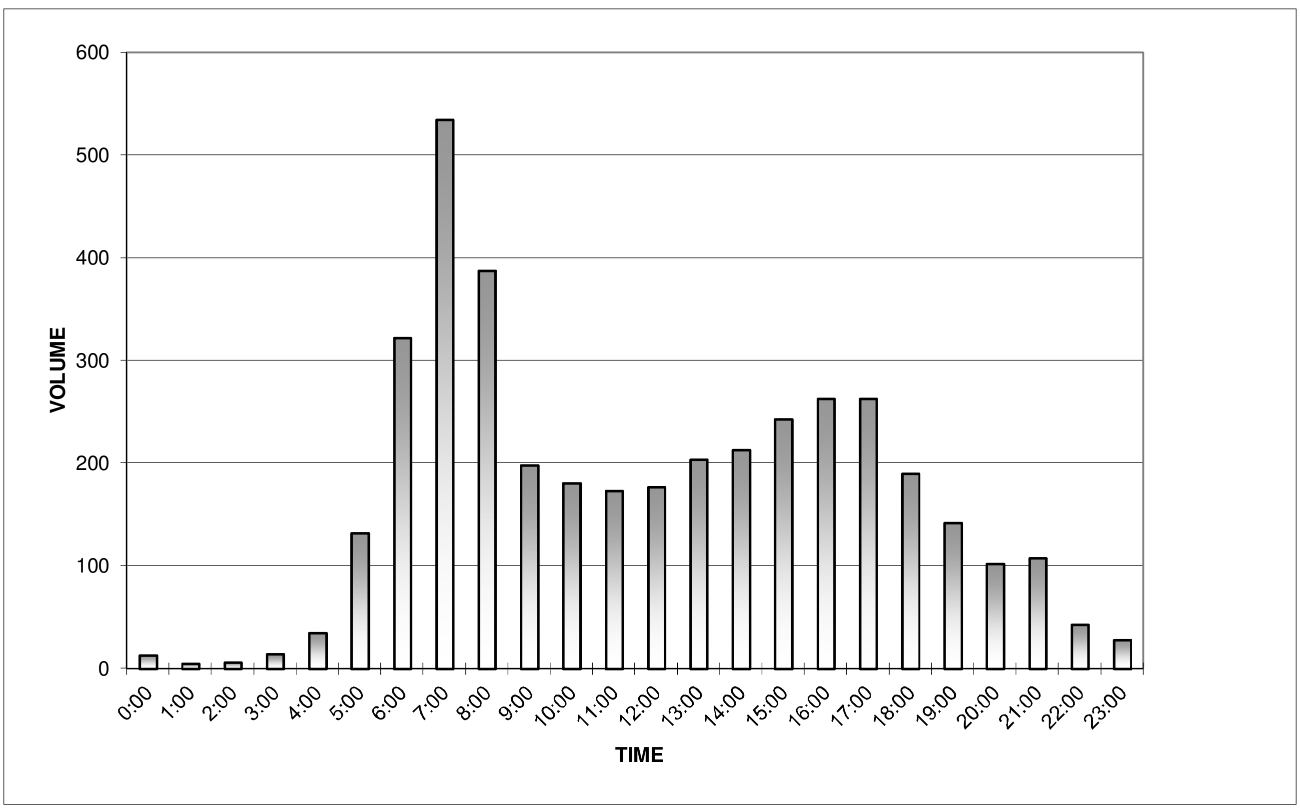


WB S Staples Street East of SH 286

Date Began:
11/19/2015

TIME	0:00	0:15	0:30	0:45	TOTAL
0:00	3	4	5	1	13
1:00	3	0	2	0	5
2:00	1	1	1	3	6
3:00	2	3	3	6	14
4:00	5	3	11	16	35
5:00	23	33	35	41	132
6:00	60	95	77	90	322
7:00	126	179	129	101	535
8:00	120	106	81	81	388
9:00	59	50	45	44	198
10:00	54	45	37	45	181
11:00	39	38	41	55	173
12:00	37	37	51	52	177
13:00	51	50	54	49	204
14:00	43	48	69	53	213
15:00	53	66	70	54	243
16:00	57	54	87	65	263
17:00	67	84	49	63	263
18:00	67	51	36	36	190
19:00	34	40	37	31	142
20:00	24	25	25	28	102
21:00	28	29	22	29	108
22:00	14	18	5	6	43
23:00	5	9	7	7	28
				TOTAL:	3978

The A.M. peak hour from 7:00 to 8:00 is 535
The P.M. peak hour from 16:30 to 17:30 is 303

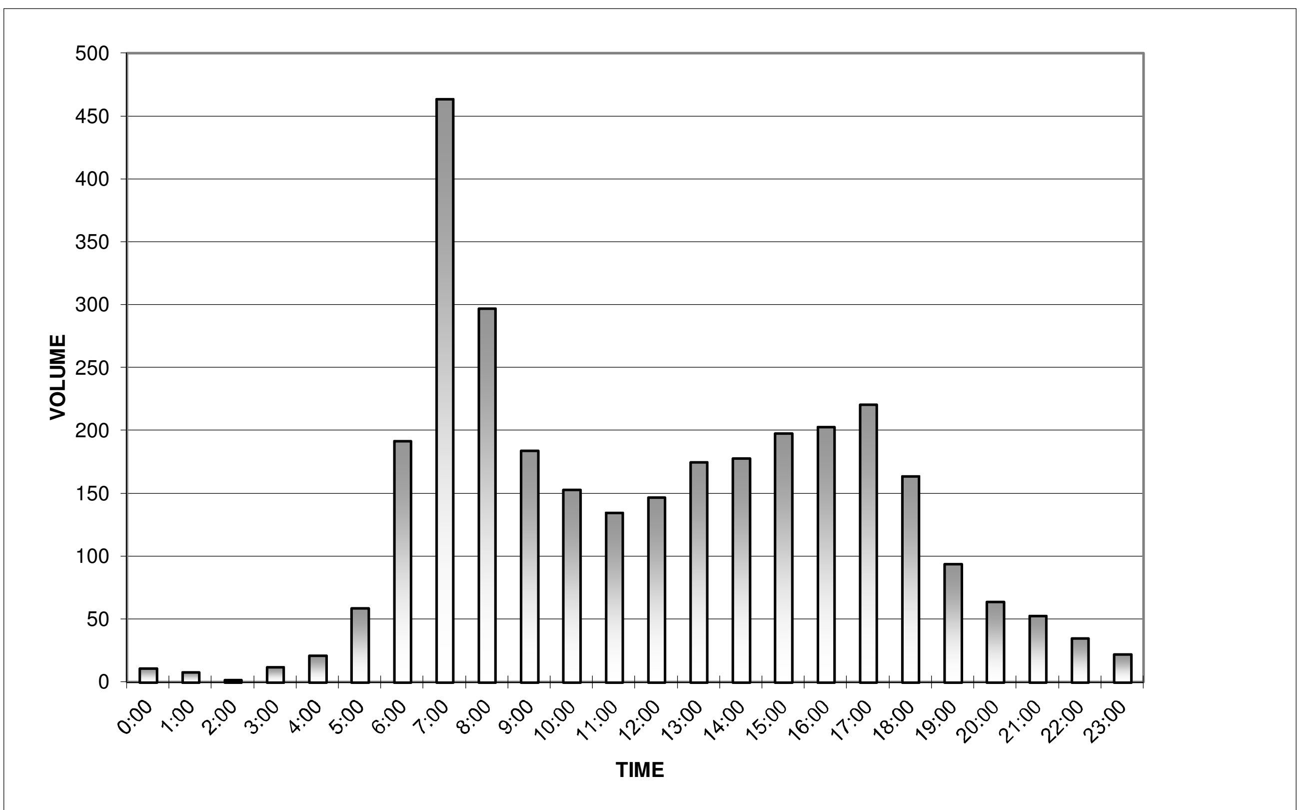


NB SH 286 North of S Staples Street (FM 2444)

Date Began:
11/19/2015

TIME	0:00	0:15	0:30	0:45	TOTAL
0:00	4	5	2	0	11
1:00	2	1	1	4	8
2:00	0	1	1	0	2
3:00	3	1	4	4	12
4:00	4	2	5	10	21
5:00	11	15	9	24	59
6:00	32	48	52	60	192
7:00	81	133	140	110	464
8:00	88	68	66	75	297
9:00	59	46	36	43	184
10:00	39	40	25	49	153
11:00	35	35	30	35	135
12:00	39	27	50	31	147
13:00	35	39	49	52	175
14:00	39	41	43	55	178
15:00	53	37	58	50	198
16:00	34	47	68	54	203
17:00	46	70	53	52	221
18:00	59	43	37	25	164
19:00	27	27	23	17	94
20:00	22	15	15	12	64
21:00	20	14	14	5	53
22:00	11	10	7	7	35
23:00	4	5	11	2	22
				TOTAL:	3092

The A.M. peak hour from 7:15 to 8:15 is 471
The P.M. peak hour from 16:30 to 17:30 is 238

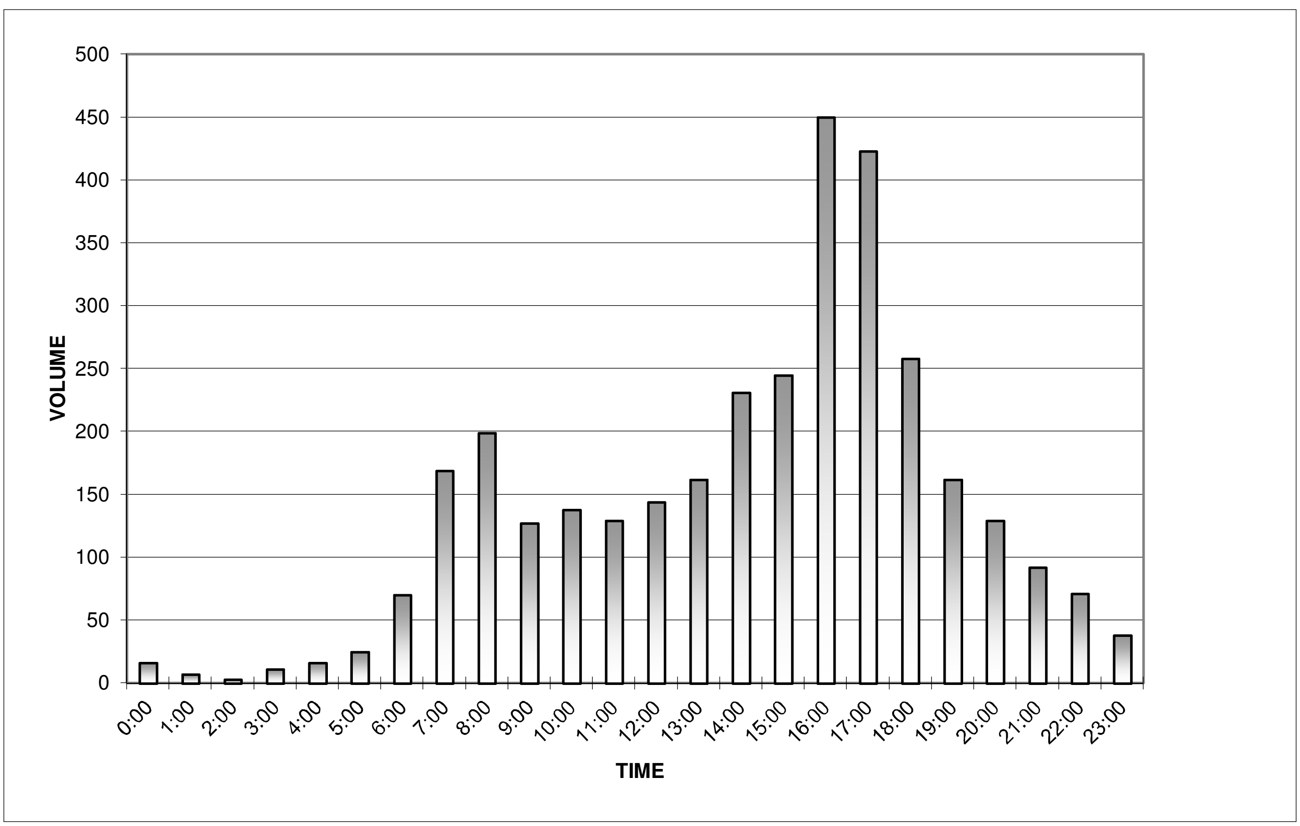


SB SH 286 North of S Staples Street (FM 2444)

Date Began:
11/19/2015

TIME	0:00	0:15	0:30	0:45	TOTAL
0:00	5	2	5	4	16
1:00	4	1	0	2	7
2:00	0	0	2	1	3
3:00	4	2	1	4	11
4:00	5	4	2	5	16
5:00	5	4	7	9	25
6:00	8	22	13	27	70
7:00	31	32	54	52	169
8:00	56	56	45	42	199
9:00	35	34	31	27	127
10:00	31	39	43	25	138
11:00	31	34	26	38	129
12:00	32	39	38	35	144
13:00	46	36	38	42	162
14:00	58	51	46	76	231
15:00	47	49	60	89	245
16:00	91	116	120	123	450
17:00	127	123	110	63	423
18:00	74	73	63	48	258
19:00	33	29	53	47	162
20:00	27	43	32	27	129
21:00	32	27	20	13	92
22:00	17	21	21	12	71
23:00	9	16	8	5	38
				TOTAL:	3315

The A.M. peak hour from 7:30 to 8:30 is 218
The P.M. peak hour from 16:30 to 17:30 is 493

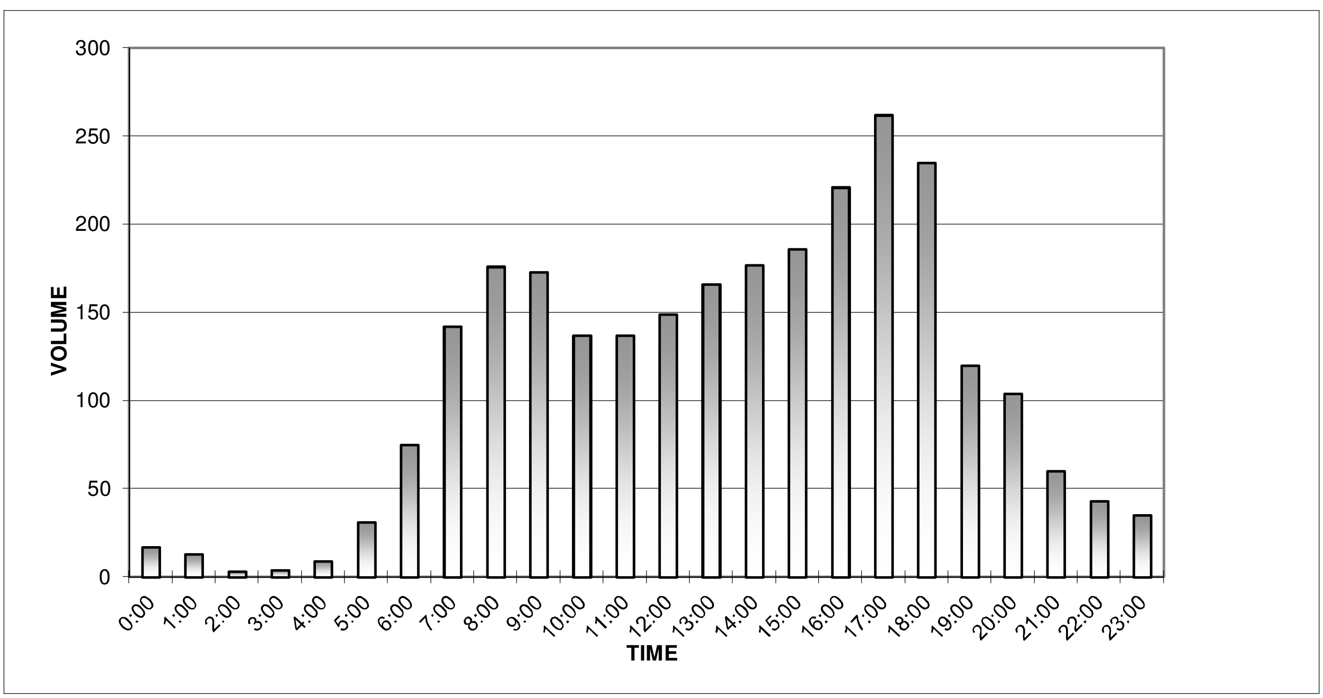


NB SH 286 South of S Staples Street (FM 2444)

Date Began:
11/19/2015

TIME	0:00	0:15	0:30	0:45	TOTAL
0:00	4	5	6	2	17
1:00	2	2	5	4	13
2:00	1	0	1	1	3
3:00	1	1	1	1	4
4:00	2	2	5	0	9
5:00	5	8	5	13	31
6:00	15	13	16	31	75
7:00	26	46	39	31	142
8:00	32	34	62	48	176
9:00	49	37	42	45	173
10:00	32	40	31	34	137
11:00	30	36	42	29	137
12:00	41	30	45	33	149
13:00	38	29	50	49	166
14:00	35	48	32	62	177
15:00	50	41	51	44	186
16:00	45	56	59	61	221
17:00	61	60	67	74	262
18:00	80	57	49	49	235
19:00	28	35	32	25	120
20:00	29	22	26	27	104
21:00	18	15	18	9	60
22:00	10	14	14	5	43
23:00	10	7	11	7	35
				TOTAL:	2675

The A.M. peak hour from 8:30 to 9:30 is 196
The P.M. peak hour from 17:15 to 18:15 is 281

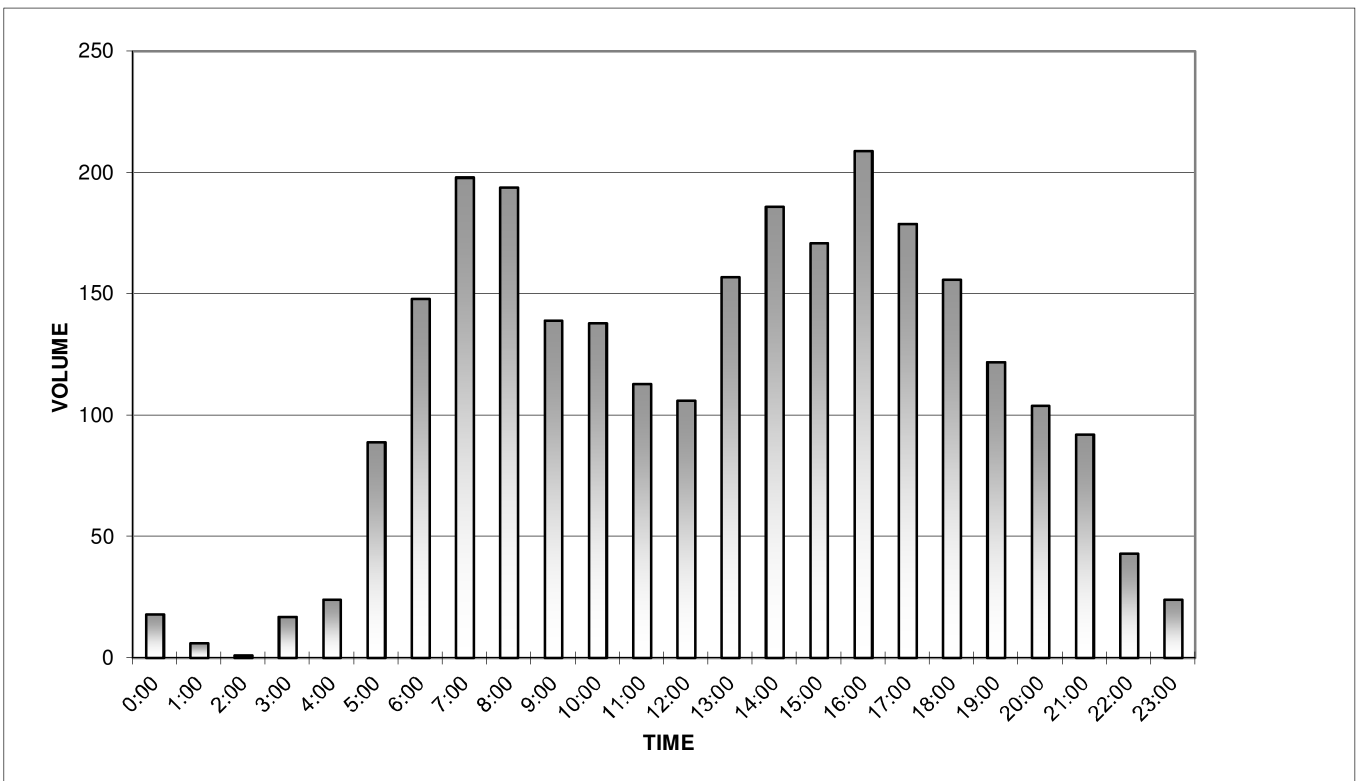


SB SH 286 South of S Staples Street (FM 2444)

Date Began:
11/19/2015

TIME	0:00	0:15	0:30	0:45	TOTAL
0:00	6	3	6	3	18
1:00	3	1	1	1	6
2:00	1	0	0	0	1
3:00	5	5	2	5	17
4:00	5	4	8	7	24
5:00	10	22	26	31	89
6:00	30	47	37	34	148
7:00	53	54	43	48	198
8:00	50	58	46	40	194
9:00	34	35	33	37	139
10:00	30	42	31	35	138
11:00	20	29	25	39	113
12:00	20	25	32	29	106
13:00	46	32	41	38	157
14:00	47	44	49	46	186
15:00	36	51	42	42	171
16:00	55	45	59	50	209
17:00	45	51	40	43	179
18:00	42	51	29	34	156
19:00	26	33	36	27	122
20:00	24	30	26	24	104
21:00	23	29	20	20	92
22:00	16	12	10	5	43
23:00	5	10	4	5	24
				TOTAL:	2634

The A.M. peak hour from 7:45 to 8:45 is 202
The P.M. peak hour from 16:00 to 17:00 is 209

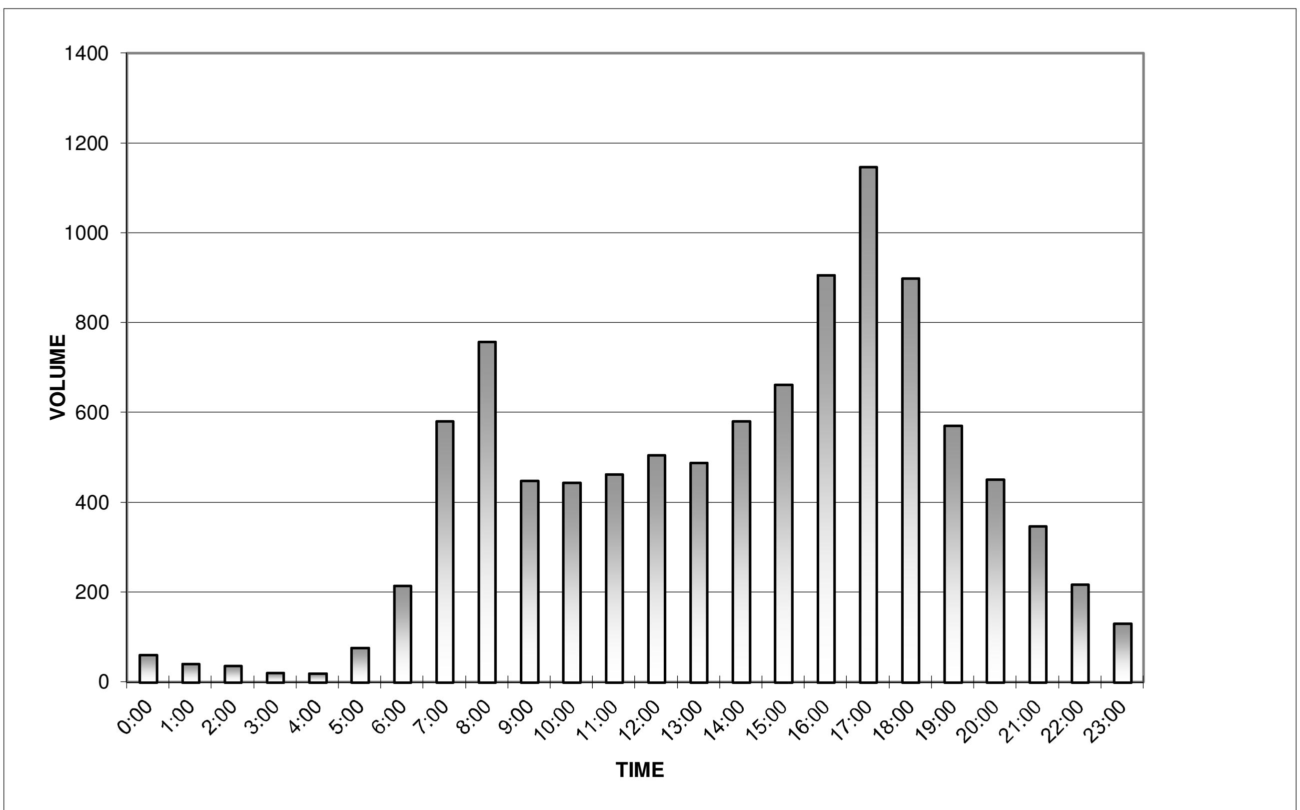


EB Yorktown Boulevard East of S Staples Street

Date Began:
11/19/2015

TIME	0:00	0:15	0:30	0:45	TOTAL
0:00	24	16	10	11	61
1:00	13	11	8	9	41
2:00	9	14	8	5	36
3:00	2	9	7	3	21
4:00	3	3	6	8	20
5:00	11	19	20	27	77
6:00	38	41	53	83	215
7:00	110	131	142	198	581
8:00	195	202	194	167	758
9:00	116	129	105	99	449
10:00	101	100	131	112	444
11:00	121	117	112	113	463
12:00	126	111	152	116	505
13:00	114	128	120	126	488
14:00	131	141	139	170	581
15:00	147	157	169	190	663
16:00	201	214	244	248	907
17:00	282	295	281	289	1147
18:00	266	238	193	202	899
19:00	169	136	139	127	571
20:00	138	115	94	105	452
21:00	86	98	90	73	347
22:00	60	61	50	46	217
23:00	37	45	26	22	130
				TOTAL:	10073

The A.M. peak hour from 7:45 to 8:45 is 789
The P.M. peak hour from 17:00 to 18:00 is 1147

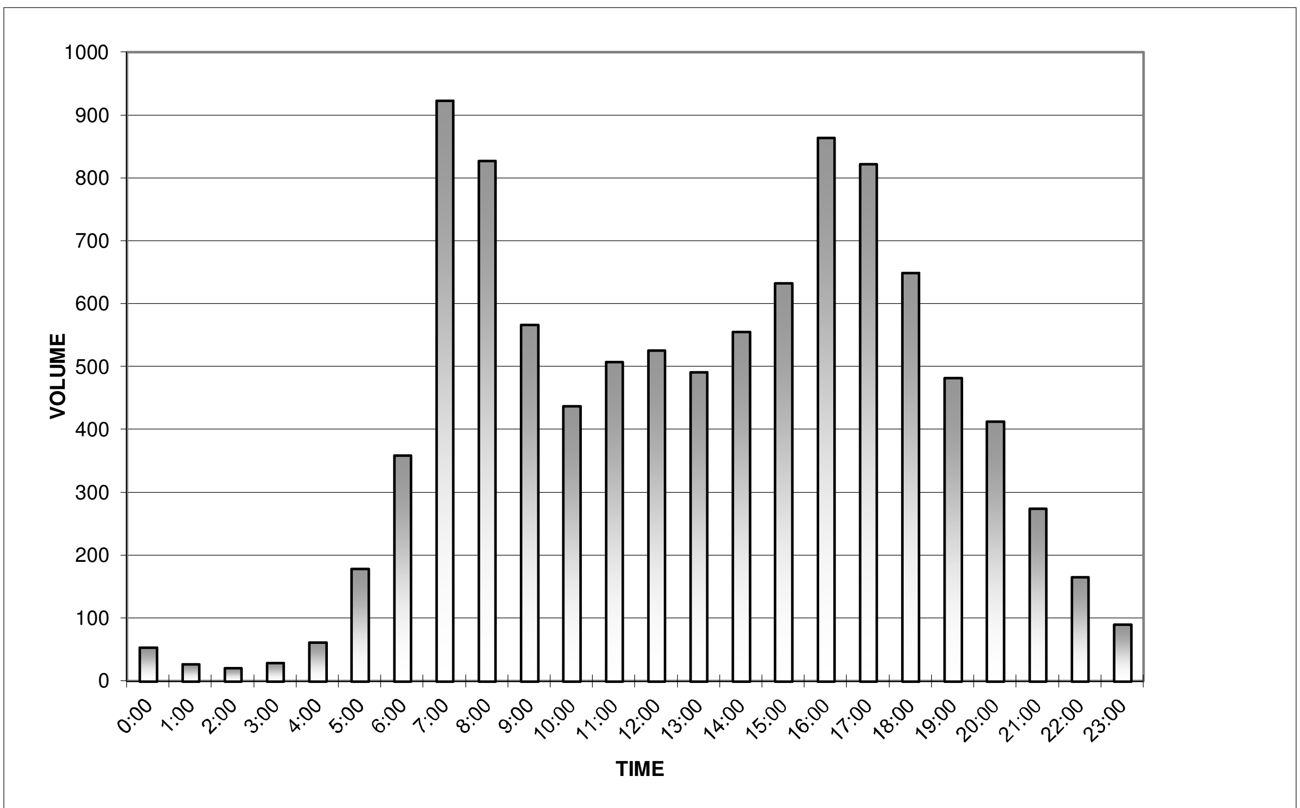


WB Yorktown Boulevard East of S Staples Street

Date Began:
11/19/2015

TIME	0:00	0:15	0:30	0:45	TOTAL
0:00	18	17	12	7	54
1:00	4	10	8	5	27
2:00	4	8	6	3	21
3:00	6	7	7	9	29
4:00	11	12	19	20	62
5:00	27	51	50	51	179
6:00	67	77	95	120	359
7:00	186	255	232	251	924
8:00	238	188	201	201	828
9:00	178	140	120	129	567
10:00	116	85	130	107	438
11:00	104	127	124	153	508
12:00	128	137	119	142	526
13:00	139	125	124	104	492
14:00	131	151	147	127	556
15:00	165	167	153	148	633
16:00	194	243	232	195	864
17:00	202	205	214	202	823
18:00	190	167	155	138	650
19:00	135	128	104	115	482
20:00	112	92	108	101	413
21:00	96	76	50	53	275
22:00	60	42	27	37	166
23:00	31	20	23	16	90
				TOTAL:	9966

The A.M. peak hour from 7:15 to 8:15 is 976
The P.M. peak hour from 16:15 to 17:15 is 872

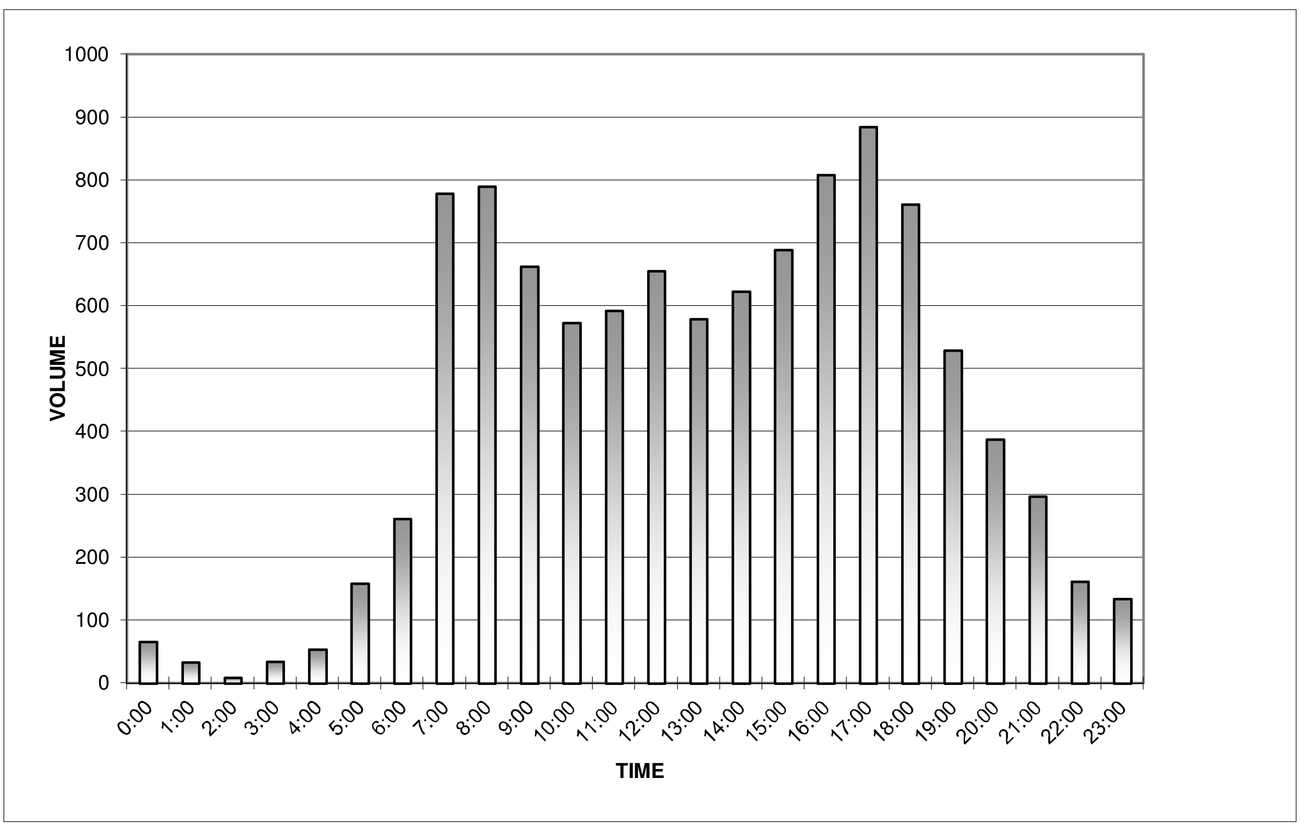


NB S Staples Street North of Yorktown Boulevard

Date Began:
11/19/2015

TIME	0:00	0:15	0:30	0:45	TOTAL
0:00	19	16	21	10	66
1:00	9	11	5	8	33
2:00	1	3	2	3	9
3:00	6	8	6	14	34
4:00	5	10	16	23	54
5:00	26	43	41	48	158
6:00	43	58	76	84	261
7:00	147	208	206	218	779
8:00	207	209	177	197	790
9:00	176	173	155	159	663
10:00	150	120	145	158	573
11:00	158	128	148	158	592
12:00	168	161	161	166	656
13:00	148	141	140	150	579
14:00	152	135	166	170	623
15:00	195	185	161	148	689
16:00	191	188	219	210	808
17:00	195	232	234	224	885
18:00	214	212	172	164	762
19:00	167	120	132	110	529
20:00	117	92	80	99	388
21:00	89	81	65	62	297
22:00	46	42	39	35	162
23:00	50	32	35	17	134
				TOTAL:	10524

The A.M. peak hour from 7:30 to 8:30 is 840
The P.M. peak hour from 17:15 to 18:15 is 904

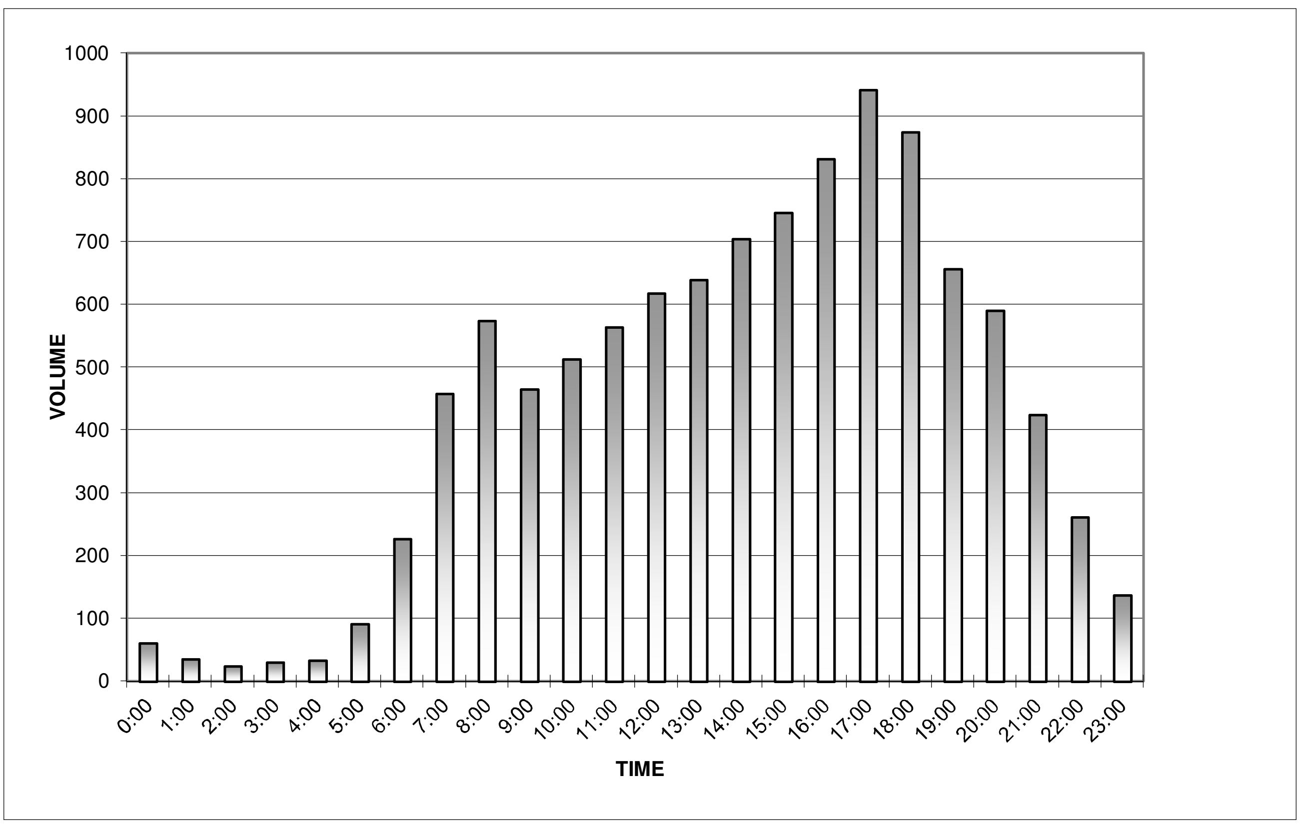


SB S Staples Street North of Yorktown Boulevard

Date Began:
11/19/2015

TIME	0:00	0:15	0:30	0:45	TOTAL
0:00	23	17	10	11	61
1:00	11	10	7	7	35
2:00	10	8	2	4	24
3:00	3	10	8	9	30
4:00	4	7	7	15	33
5:00	21	19	23	28	91
6:00	48	51	57	71	227
7:00	88	104	115	151	458
8:00	147	135	148	144	574
9:00	123	118	103	121	465
10:00	118	127	127	141	513
11:00	131	145	162	126	564
12:00	161	155	158	144	618
13:00	167	160	145	167	639
14:00	173	167	199	165	704
15:00	203	182	171	190	746
16:00	181	195	240	216	832
17:00	238	234	226	244	942
18:00	241	199	233	202	875
19:00	173	171	175	138	657
20:00	176	155	118	141	590
21:00	120	109	108	87	424
22:00	79	68	54	60	261
23:00	45	40	29	23	137
				TOTAL:	10500

The A.M. peak hour from 7:45 to 8:45 is 581
The P.M. peak hour from 17:15 to 18:15 is 945

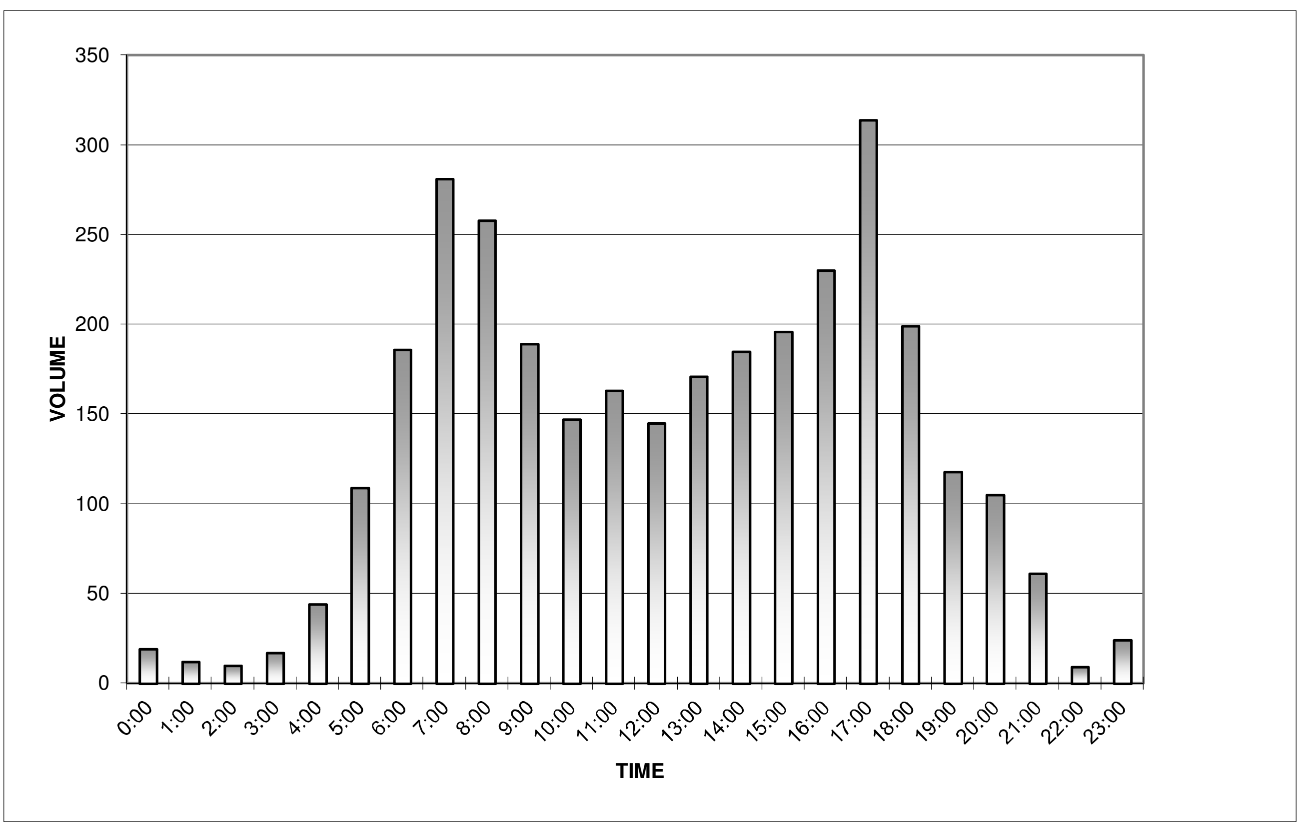


NB Rodd Field Road North of Yorktown Boulevard

Date Began:
11/19/2015

TIME	0:00	0:15	0:30	0:45	TOTAL
0:00	5	6	4	4	19
1:00	5	3	4	0	12
2:00	2	2	1	5	10
3:00	2	1	5	9	17
4:00	6	6	12	20	44
5:00	16	32	26	35	109
6:00	34	43	41	68	186
7:00	83	77	51	70	281
8:00	61	69	73	55	258
9:00	57	43	46	43	189
10:00	38	34	41	34	147
11:00	32	36	46	49	163
12:00	29	44	32	40	145
13:00	42	63	30	36	171
14:00	45	48	51	41	185
15:00	52	50	43	51	196
16:00	40	60	54	76	230
17:00	80	71	79	84	314
18:00	51	57	36	55	199
19:00	36	36	24	22	118
20:00	28	28	29	20	105
21:00	23	20	10	8	61
22:00	7	2	0	0	9
23:00	9	8	5	2	24
				TOTAL:	3192

The A.M. peak hour from 7:00 to 8:00 is 281
The P.M. peak hour from 17:00 to 18:00 is 314



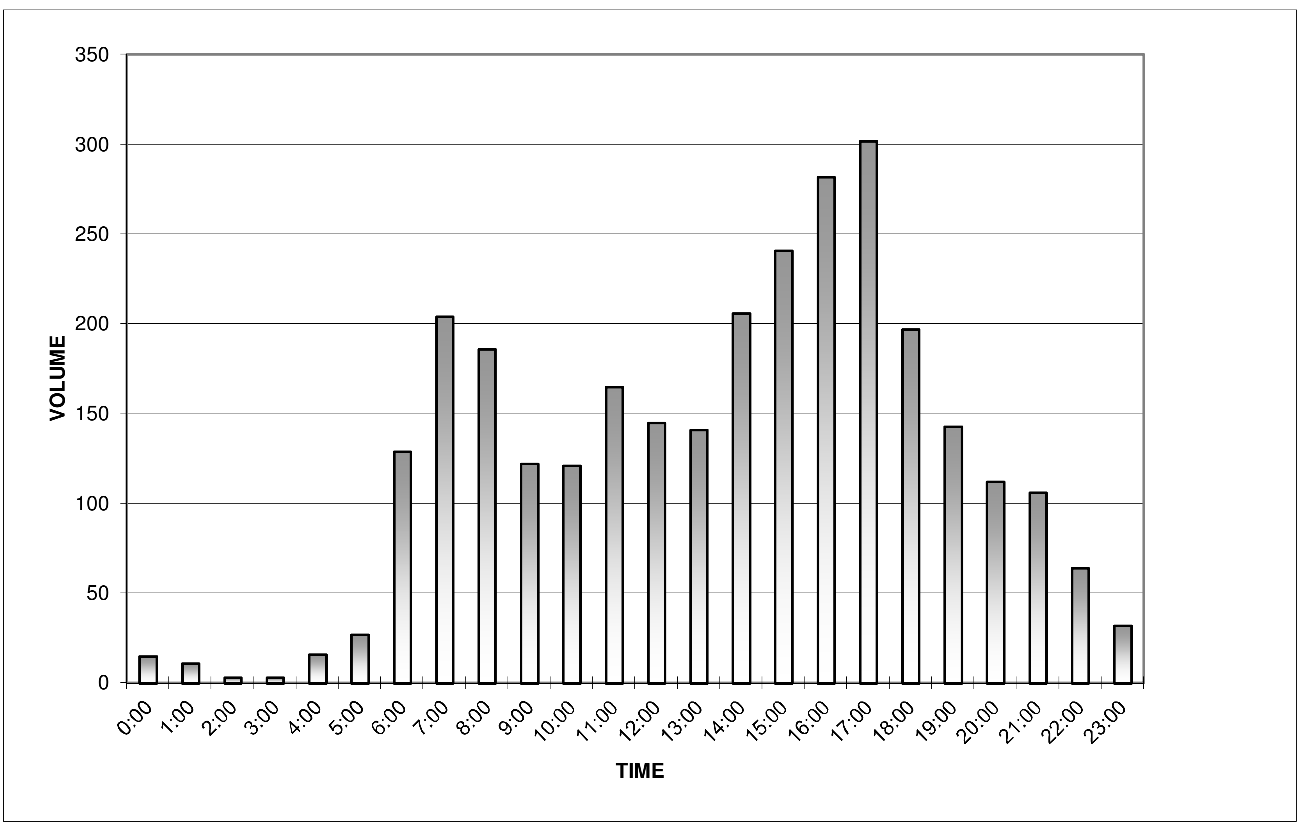
SB Rodd Field Road North of Yorktown Boulevard

Date Began:
11/19/2015

TIME	0:00	0:15	0:30	0:45	TOTAL
0:00	4	6	1	4	15
1:00	1	6	3	1	11
2:00	1	0	1	1	3
3:00	0	1	1	1	3
4:00	4	2	5	5	16
5:00	11	4	6	6	27
6:00	28	19	42	40	129
7:00	40	46	57	61	204
8:00	51	34	59	42	186
9:00	24	30	31	37	122
10:00	31	32	29	29	121
11:00	46	37	36	46	165
12:00	41	35	37	32	145
13:00	39	27	31	44	141
14:00	49	40	57	60	206
15:00	57	54	69	61	241
16:00	75	81	69	57	282
17:00	73	85	79	65	302
18:00	56	57	53	31	197
19:00	43	43	25	32	143
20:00	33	28	24	27	112
21:00	28	26	24	28	106
22:00	14	19	22	9	64
23:00	11	12	7	2	32
				TOTAL:	2973

The A.M. peak hour from 7:15 to 8:15 is 215

The P.M. peak hour from 17:00 to 18:00 is 302

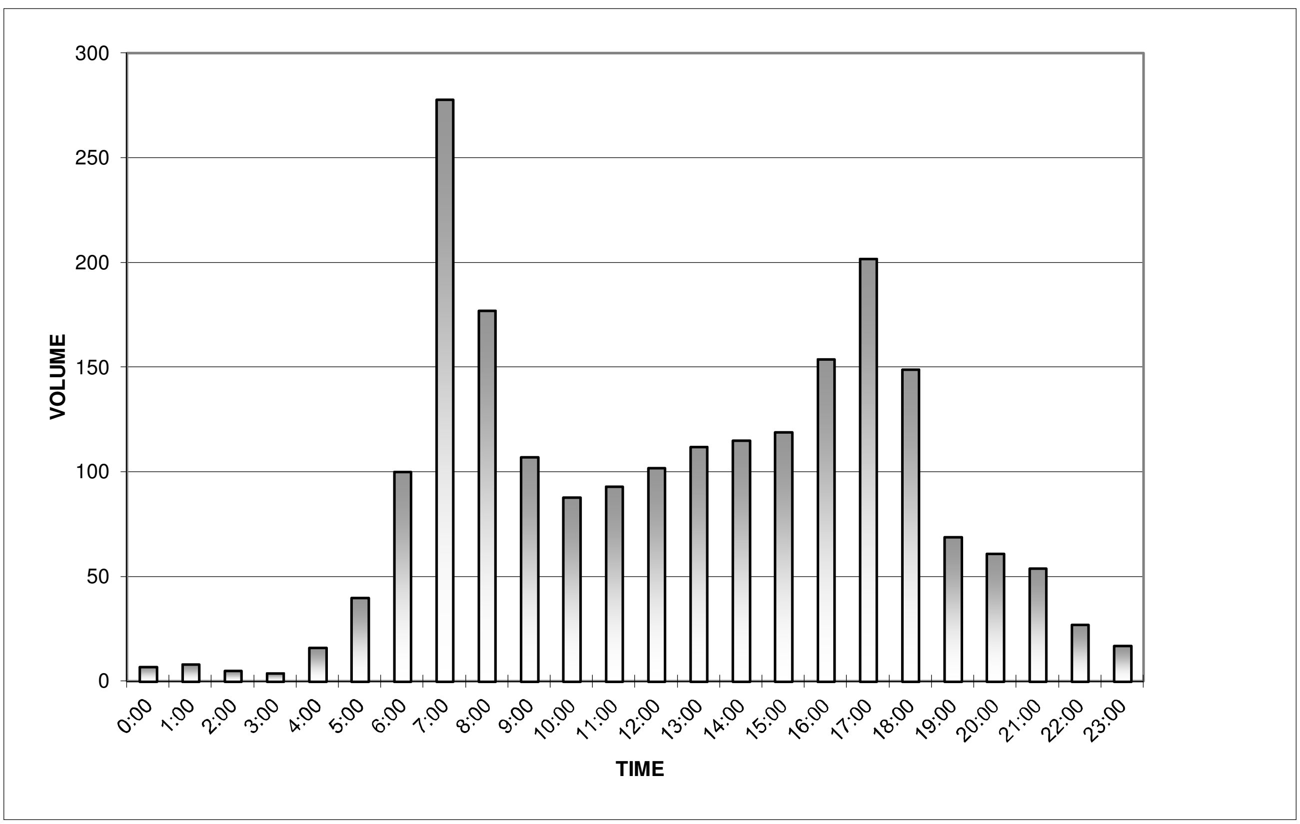


NB Flour Bluff Drive North of Yorktown Boulevard

Date Began:
11/19/2015

TIME	0:00	0:15	0:30	0:45	TOTAL
0:00	1	4	2	0	7
1:00	3	2	2	1	8
2:00	2	2	0	1	5
3:00	1	2	0	1	4
4:00	1	1	9	5	16
5:00	3	6	18	13	40
6:00	22	18	27	33	100
7:00	55	74	86	63	278
8:00	63	47	22	45	177
9:00	28	26	31	22	107
10:00	28	16	16	28	88
11:00	16	23	24	30	93
12:00	37	27	15	23	102
13:00	32	29	31	20	112
14:00	21	31	37	26	115
15:00	25	25	33	36	119
16:00	34	42	35	43	154
17:00	54	59	49	40	202
18:00	48	30	30	41	149
19:00	18	14	22	15	69
20:00	17	13	19	12	61
21:00	17	10	18	9	54
22:00	9	6	6	6	27
23:00	2	3	8	4	17
				TOTAL:	2104

The A.M. peak hour from 7:15 to 8:15 is 286
The P.M. peak hour from 16:45 to 17:45 is 205

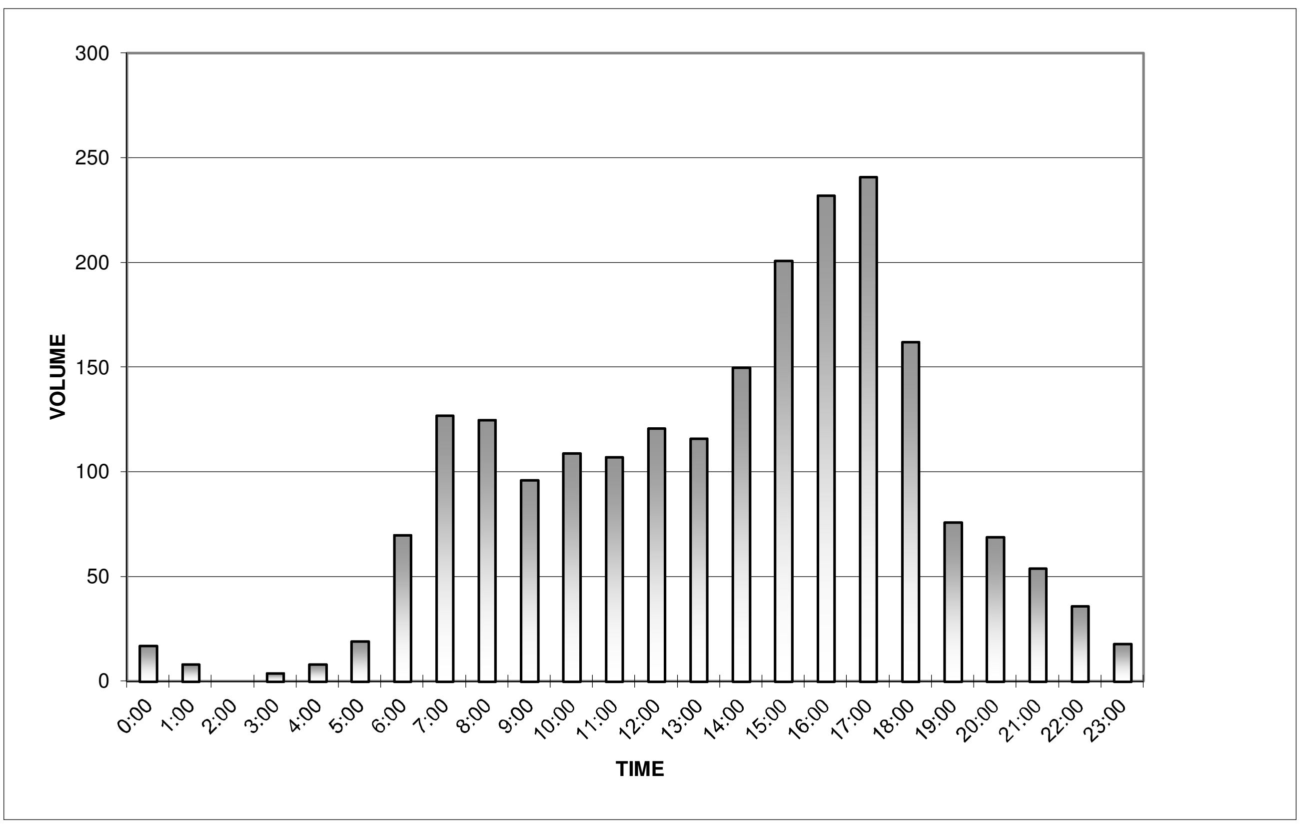


SB Flour Bluff Drive North of Yorktown Boulevard

Date Began:
11/19/2015

TIME	0:00	0:15	0:30	0:45	TOTAL
0:00	4	6	3	4	17
1:00	4	4	0	0	8
2:00	0	0	0	0	0
3:00	1	1	1	1	4
4:00	1	2	0	5	8
5:00	1	3	5	10	19
6:00	8	9	18	35	70
7:00	22	31	34	40	127
8:00	29	29	32	35	125
9:00	31	20	19	26	96
10:00	34	22	30	23	109
11:00	33	30	24	20	107
12:00	28	30	33	30	121
13:00	27	21	26	42	116
14:00	33	34	39	44	150
15:00	52	36	48	65	201
16:00	48	55	78	51	232
17:00	63	52	65	61	241
18:00	46	41	43	32	162
19:00	22	17	23	14	76
20:00	18	24	12	15	69
21:00	17	13	15	9	54
22:00	15	6	6	9	36
23:00	6	7	4	1	18
				TOTAL:	2166

The A.M. peak hour from 7:15 to 8:15 is 134
The P.M. peak hour from 16:15 to 17:15 is 247

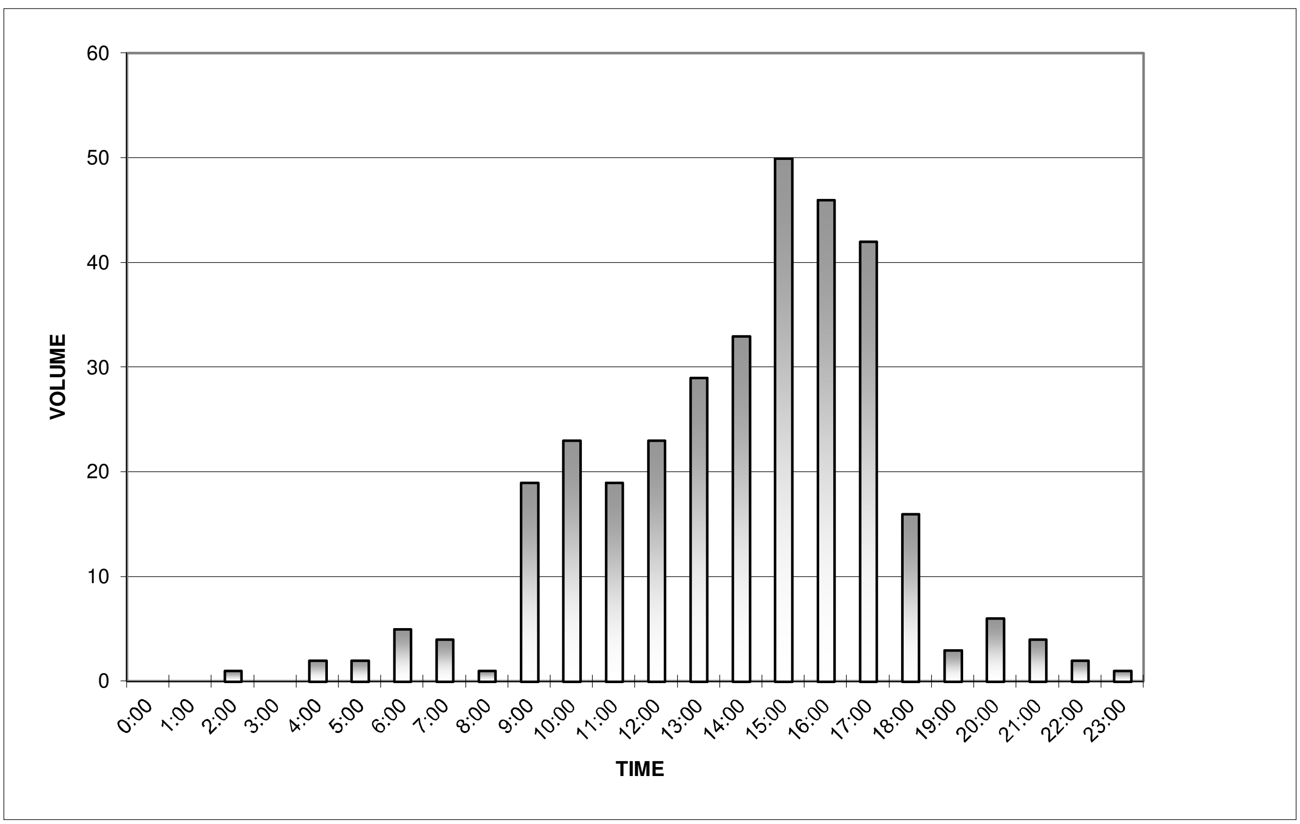


NB Park Road 22 (S Padre Drive) South of Sea Pines Drive

Date Began:
11/19/2015

TIME	0:00	0:15	0:30	0:45	TOTAL
0:00	0	0	0	0	0
1:00	0	0	0	0	0
2:00	0	0	0	1	1
3:00	0	0	0	0	0
4:00	0	2	0	0	2
5:00	0	0	1	1	2
6:00	0	0	2	3	5
7:00	1	0	1	2	4
8:00	0	0	1	0	1
9:00	2	2	3	12	19
10:00	6	4	2	11	23
11:00	5	3	5	6	19
12:00	4	4	6	9	23
13:00	8	8	7	6	29
14:00	7	9	7	10	33
15:00	10	14	18	8	50
16:00	11	14	10	11	46
17:00	12	8	15	7	42
18:00	6	7	3	0	16
19:00	2	0	1	0	3
20:00	2	3	1	0	6
21:00	0	0	0	4	4
22:00	0	0	0	2	2
23:00	0	1	0	0	1
				TOTAL:	331

The A.M. peak hour from 9:15 to 10:15 is 23
The P.M. peak hour from 14:45 to 15:45 is 52

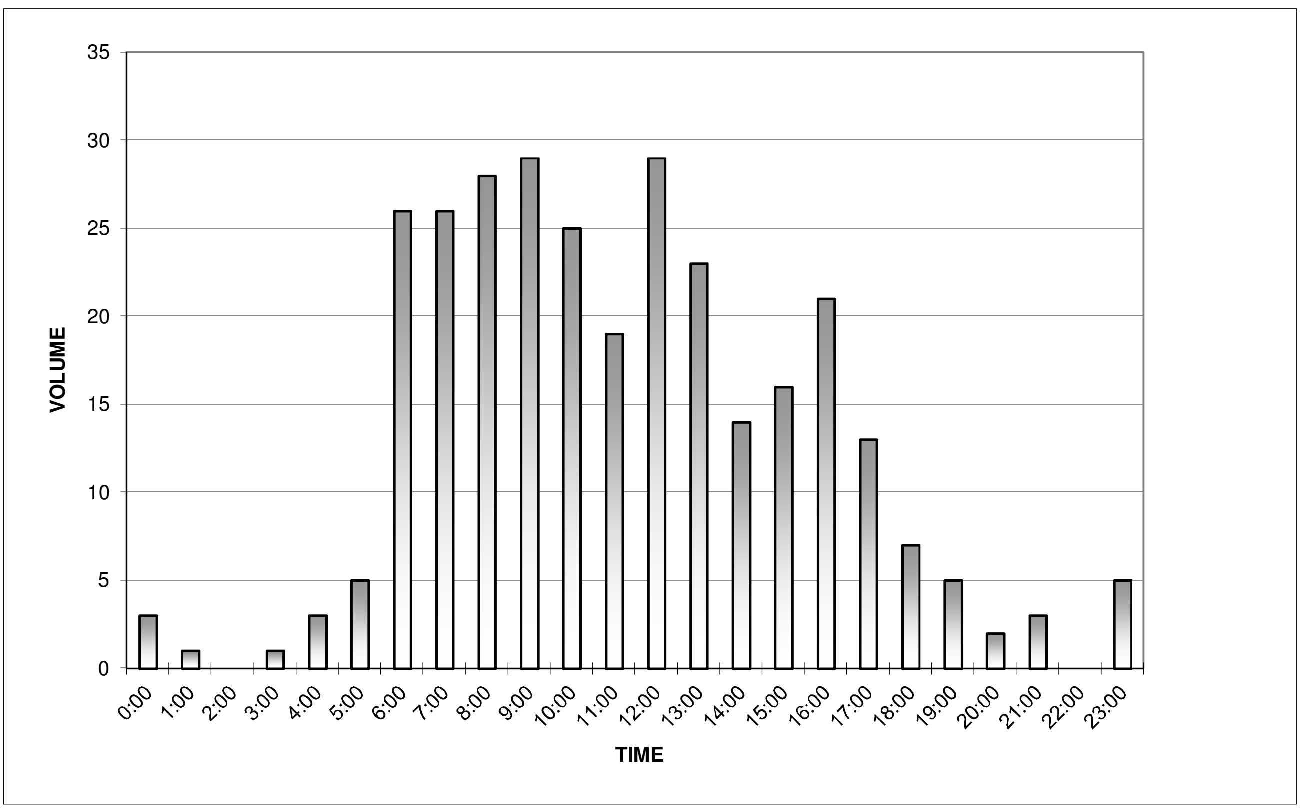


SB Park Road 22 (S Padre Drive) South of Sea Pines Drive

Date Began:
11/19/2015

TIME	0:00	0:15	0:30	0:45	TOTAL
0:00	0	0	3	0	3
1:00	0	0	1	0	1
2:00	0	0	0	0	0
3:00	0	1	0	0	1
4:00	0	1	1	1	3
5:00	1	1	3	0	5
6:00	5	9	6	6	26
7:00	4	7	7	8	26
8:00	6	6	9	7	28
9:00	6	12	5	6	29
10:00	3	8	7	7	25
11:00	6	5	5	3	19
12:00	5	2	10	12	29
13:00	8	5	5	5	23
14:00	3	5	3	3	14
15:00	2	4	4	6	16
16:00	6	4	7	4	21
17:00	3	4	6	0	13
18:00	2	3	0	2	7
19:00	1	1	1	2	5
20:00	1	1	0	0	2
21:00	0	2	0	1	3
22:00	0	0	0	0	0
23:00	2	1	0	2	5
				TOTAL:	304

The A.M. peak hour from 8:30 to 9:30 is 34
The P.M. peak hour from 15:45 to 16:45 is 23

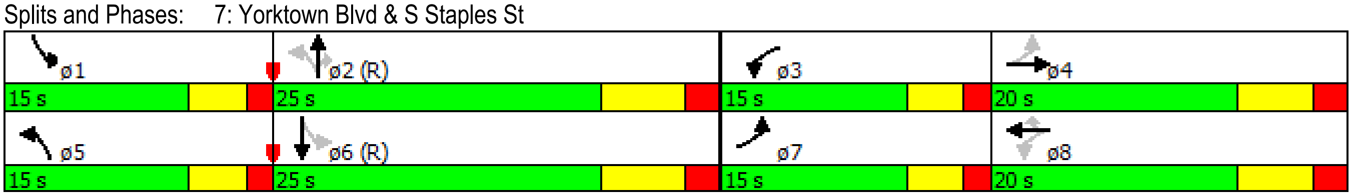


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	189	331	57	231	538	244	166	422	157	212	216	143
Future Volume (vph)	189	331	57	231	538	244	166	422	157	212	216	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	12	12	12	12	12	12	12	12
Storage Length (ft)	200		0	269		266	244		194	348		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.978				0.850			0.850		0.940	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1711	3346	0	1770	3539	1583	1770	3539	1583	1770	3327	0
Flt Permitted	0.301			0.411			0.525			0.445		
Satd. Flow (perm)	542	3346	0	766	3539	1583	978	3539	1583	829	3327	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23				260			185		152	
Link Speed (mph)		40			40			50			30	
Link Distance (ft)		1666			5358			5629			1088	
Travel Time (s)		28.4			91.3			76.8			24.7	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	201	352	61	246	572	260	177	449	167	226	230	152
Shared Lane Traffic (%)												
Lane Group Flow (vph)	201	413	0	246	572	260	177	449	167	226	382	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			18			18			18	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2		2	6		
Detector Phase	7	4		3	8	8	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	2.0	8.0		2.0	8.0	8.0	2.0	12.0	12.0	2.0	12.0	
Minimum Split (s)	6.7	34.0		6.7	33.0	33.0	6.7	36.0	36.0	6.7	36.0	
Total Split (s)	15.0	20.0		15.0	20.0	20.0	15.0	25.0	25.0	15.0	25.0	
Total Split (%)	20.0%	26.7%		20.0%	26.7%	26.7%	20.0%	33.3%	33.3%	20.0%	33.3%	
Maximum Green (s)	10.3	13.7		10.3	13.7	13.7	10.3	18.3	18.3	10.3	18.3	
Yellow Time (s)	3.2	4.3		3.2	4.3	4.3	3.2	4.7	4.7	3.2	4.7	
All-Red Time (s)	1.5	2.0		1.5	2.0	2.0	1.5	2.0	2.0	1.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.7	6.3		4.7	6.3	6.3	4.7	6.7	6.7	4.7	6.7	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	0.5	1.0		0.5	1.0	1.0	0.5	1.0	1.0	0.5	1.0	
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	
Walk Time (s)		7.0			7.0	7.0		7.0	7.0		7.0	
Flash Dont Walk (s)		19.0			18.0	18.0		17.0	17.0		17.0	
Pedestrian Calls (#/hr)		0			0	0		0	0		0	
Act Effct Green (s)	23.4	13.2		24.5	13.8	13.8	31.3	22.0	22.0	33.2	23.0	
Actuated g/C Ratio	0.31	0.18		0.33	0.18	0.18	0.42	0.29	0.29	0.44	0.31	
v/c Ratio	0.67	0.68		0.66	0.88	0.52	0.37	0.43	0.28	0.48	0.34	
Control Delay	27.4	33.4		26.0	47.0	8.0	14.0	24.2	4.6	15.6	13.9	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	27.4	33.4		26.0	47.0	8.0	14.0	24.2	4.6	15.6	13.9	
LOS	C	C		C	D	A	B	C	A	B	B	
Approach Delay		31.4			32.8			17.8			14.5	
Approach LOS		C			C			B			B	

Intersection Summary	
Area Type: Other	
Cycle Length: 75	
Actuated Cycle Length: 75	
Offset: 9.5 (13%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 85	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 25.1	Intersection LOS: C
Intersection Capacity Utilization 67.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 7: Yorktown Blvd & S Staples St



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	298	31	30	24	15	139	51	1047	72	276	333	59
Future Volume (vph)	298	31	30	24	15	139	51	1047	72	276	333	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	15	12	12	11	12	12	12
Storage Length (ft)	161		0	92		0	245		244	1000		446
Storage Lanes	2		1	1		1	1		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3351	1881	1599	1787	1881	1759	1787	3574	1546	3467	3574	1599
Flt Permitted	0.377			0.909			0.950			0.950		
Satd. Flow (perm)	1330	1881	1599	1710	1881	1759	1787	3574	1546	3467	3574	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			155			216			147			159
Link Speed (mph)		35			35			55			55	
Link Distance (ft)		287			1160			1197			1682	
Travel Time (s)		5.6			22.6			14.8			20.9	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	351	36	35	28	18	164	60	1232	85	325	392	69
Shared Lane Traffic (%)												
Lane Group Flow (vph)	351	36	35	28	18	164	60	1232	85	325	392	69
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		22			12			24			36	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane					Yes							
Headway Factor	1.04	1.00	1.00	1.00	1.00	0.88	1.00	1.00	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		Free			2			6
Detector Phase	7	4	4	3	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	8.0	10.0	10.0	8.0	10.0		2.0	10.0	10.0	2.0	10.0	10.0
Minimum Split (s)	14.2	34.0	34.0	14.2	16.5		8.1	38.0	38.0	8.1	36.0	36.0
Total Split (s)	21.2	21.5	21.5	21.2	26.5		26.1	43.4	43.4	26.1	27.4	27.4
Total Split (%)	18.1%	18.3%	18.3%	18.1%	22.6%		22.3%	37.0%	37.0%	22.3%	23.4%	23.4%
Maximum Green (s)	15.0	15.0	15.0	15.0	20.0		20.0	36.0	36.0	20.0	20.0	20.0
Yellow Time (s)	3.3	3.6	3.6	3.3	3.6		3.6	5.0	5.0	3.6	5.0	5.0
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		2.5	2.4	2.4	2.5	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.5	6.5	6.2	6.5		6.1	7.4	7.4	6.1	7.4	7.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5
Recall Mode	None	None	None	None	None		None	Min	Min	None	Min	Min
Walk Time (s)		7.0	7.0					7.0	7.0		7.0	7.0
Flash Dont Walk (s)		17.0	17.0					21.0	21.0		19.0	19.0
Pedestrian Calls (#/hr)		5	5					5	5		5	5
Act Effct Green (s)	18.6	13.7	13.7	12.8	11.4	87.5	19.8	37.1	37.1	11.5	33.3	33.3
Actuated g/C Ratio	0.21	0.16	0.16	0.15	0.13	1.00	0.23	0.42	0.42	0.13	0.38	0.38
v/c Ratio	0.63	0.12	0.09	0.11	0.07	0.09	0.15	0.81	0.12	0.72	0.29	0.10
Control Delay	34.4	35.1	0.5	28.0	39.3	0.1	27.0	30.7	0.6	47.3	28.5	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.4	35.1	0.5	28.0	39.3	0.1	27.0	30.7	0.6	47.3	28.5	0.3
LOS	C	D	A	C	D	A	C	C	A	D	C	A
Approach Delay		31.6			7.2			28.7			33.8	
Approach LOS		C			A			C			C	

Intersection Summary	
Area Type: Other	
Cycle Length: 117.2	
Actuated Cycle Length: 87.5	
Natural Cycle: 105	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 28.9	Intersection LOS: C
Intersection Capacity Utilization 68.7%	ICU Level of Service C
Analysis Period (min) 15	

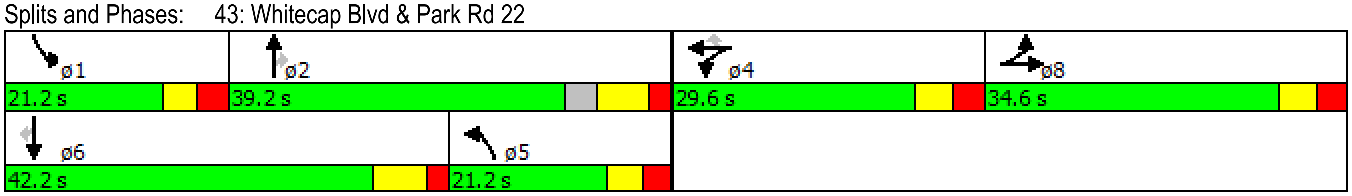
Splits and Phases: 39: Commodores Dr & Park Rd 22

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	551	45	100	32	17	223	94	396	11	118	180	89
Future Volume (vph)	551	45	100	32	17	223	94	396	11	118	180	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	12	13	12	12	10	12	10	11	12	10
Storage Length (ft)	0		0	206		0	145		81	207		207
Storage Lanes	1		0	1		1	1		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt		0.897				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1847	1744	0	1847	1881	1599	1668	3574	1492	3351	3574	1492
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1847	1744	0	1847	1881	1599	1668	3574	1492	3351	3574	1492
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		80				237			140			149
Link Speed (mph)		35			35			55			55	
Link Distance (ft)		2514			889			1499			4642	
Travel Time (s)		49.0			17.3			18.6			57.5	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	586	48	106	34	18	237	100	421	12	126	191	95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	586	154	0	34	18	237	100	421	12	126	191	95
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			13			48			48	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane					Yes							
Headway Factor	0.96	0.96	1.00	0.96	1.00	1.00	1.09	1.00	1.09	1.04	1.00	1.09
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	8	8		4	4		5	2		1	6	
Permitted Phases						4			2			6
Detector Phase	8	8		4	4	4	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	2.0	10.0	10.0	2.0	10.0	10.0
Minimum Split (s)	27.6	27.6		13.6	13.6	13.6	8.2	31.2	31.2	8.2	17.2	17.2
Total Split (s)	34.6	34.6		29.6	29.6	29.6	21.2	39.2	39.2	21.2	42.2	42.2
Total Split (%)	27.1%	27.1%		23.2%	23.2%	23.2%	16.6%	30.7%	30.7%	16.6%	33.1%	33.1%
Maximum Green (s)	28.0	28.0		23.0	23.0	23.0	15.0	32.0	32.0	15.0	35.0	35.0
Yellow Time (s)	3.6	3.6		3.6	3.6	3.6	3.3	5.0	5.0	3.3	5.0	5.0
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	2.9	2.2	2.2	2.9	2.2	2.2
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6	6.6	6.2	7.2	7.2	6.2	7.2	7.2
Lead/Lag							Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	Min	Min	None	Min	Min
Walk Time (s)	7.0	7.0						7.0	7.0		7.0	7.0
Flash Dont Walk (s)	14.0	14.0						17.0	17.0		20.0	20.0
Pedestrian Calls (#/hr)	5	5						5	5		5	5
Act Effct Green (s)	28.4	28.4		8.5	8.5	8.5	12.6	17.1	17.1	8.9	16.4	16.4
Actuated g/C Ratio	0.32	0.32		0.09	0.09	0.09	0.14	0.19	0.19	0.10	0.18	0.18
v/c Ratio	1.01	0.25		0.20	0.10	0.65	0.43	0.62	0.03	0.38	0.29	0.24
Control Delay	72.1	14.8		42.8	41.3	14.8	43.0	37.4	0.2	43.2	35.0	2.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.1	14.8		42.8	41.3	14.8	43.0	37.4	0.2	43.2	35.0	2.6
LOS	E	B		D	D	B	D	D	A	D	C	A
Approach Delay		60.2			19.8			37.6			30.0	
Approach LOS		E			B			D			C	

Intersection Summary	
Area Type: Other	
Cycle Length: 127.6	
Actuated Cycle Length: 89.8	
Natural Cycle: 85	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.01	
Intersection Signal Delay: 41.9	Intersection LOS: D
Intersection Capacity Utilization 72.3%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 43: Whitecap Blvd & Park Rd 22



Intersection						
Int Delay, s/veh	6					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	240	0	267	0	0	218
Future Vol, veh/h	240	0	267	0	0	218
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	253	0	281	0	0	229

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	510	281	0	0	281	0
Stage 1	281	-	-	-	-	-
Stage 2	229	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	523	758	-	-	1282	-
Stage 1	767	-	-	-	-	-
Stage 2	809	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	523	758	-	-	1282	-
Mov Cap-2 Maneuver	523	-	-	-	-	-
Stage 1	767	-	-	-	-	-
Stage 2	809	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.1	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	523	1282	-
HCM Lane V/C Ratio	-	-	0.483	-	-
HCM Control Delay (s)	-	-	18.1	0	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	2.6	0	-

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	171	222	0	0	195	122	0	0	0	33	0	108
Future Vol, veh/h	171	222	0	0	195	122	0	0	0	33	0	108
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	92	92	94	94	92	92	92	94	92	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	182	236	0	0	207	130	0	0	0	35	0	115

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	337	0	0	236	0	0	930	937	236	872	872	272
Stage 1	-	-	-	-	-	-	600	600	-	272	272	-
Stage 2	-	-	-	-	-	-	330	337	-	600	600	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1222	-	-	1331	-	-	248	265	803	271	289	767
Stage 1	-	-	-	-	-	-	488	490	-	734	685	-
Stage 2	-	-	-	-	-	-	683	641	-	488	490	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1222	-	-	1331	-	-	183	220	803	235	240	767
Mov Cap-2 Maneuver	-	-	-	-	-	-	183	220	-	235	240	-
Stage 1	-	-	-	-	-	-	405	406	-	608	685	-
Stage 2	-	-	-	-	-	-	581	641	-	405	406	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.7	0	0	15.2
HCM LOS			A	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1222	-	-	1331	-	-	501
HCM Lane V/C Ratio	-	0.149	-	-	-	-	-	0.299
HCM Control Delay (s)	0	8.5	0	-	0	-	-	15.2
HCM Lane LOS	A	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	-	0.5	-	-	0	-	-	1.2

Intersection	
Intersection Delay, s/veh	34.3
Intersection LOS	D

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	12	47	2	0	126	103	387	0	1	82	69
Future Vol, veh/h	0	12	47	2	0	126	103	387	0	1	82	69
Peak Hour Factor	0.92	0.88	0.88	0.88	0.92	0.88	0.88	0.88	0.92	0.88	0.88	0.88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	14	53	2	0	143	117	440	0	1	93	78
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	10.4	48.8	12
HCM LOS	B	E	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	1%	20%	20%	65%
Vol Thru, %	54%	77%	17%	29%
Vol Right, %	45%	3%	63%	6%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	152	61	616	203
LT Vol	1	12	126	131
Through Vol	82	47	103	59
RT Vol	69	2	387	13
Lane Flow Rate	173	69	700	231
Geometry Grp	1	1	1	1
Degree of Util (X)	0.298	0.125	0.97	0.412
Departure Headway (Hd)	6.308	6.484	4.99	6.423
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	573	556	721	556
Service Time	4.308	4.484	3.058	4.515
HCM Lane V/C Ratio	0.302	0.124	0.971	0.415
HCM Control Delay	12	10.4	48.8	14
HCM Lane LOS	B	B	E	B
HCM 95th-tile Q	1.2	0.4	14.8	2

Intersection				
Intersection Delay, s/veh				
Intersection LOS				

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	131	59	13
Future Vol, veh/h	0	131	59	13
Peak Hour Factor	0.92	0.88	0.88	0.88
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	149	67	15
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	14
HCM LOS	B

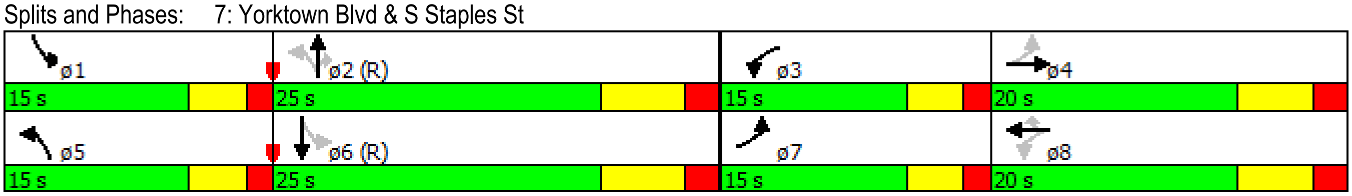
Lane

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	198	528	123	251	368	236	125	421	292	306	435	147
Future Volume (vph)	198	528	123	251	368	236	125	421	292	306	435	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	12	12	12	12	12	12	12	12
Storage Length (ft)	200		0	269		266	244		194	348		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.972				0.850			0.850		0.962	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1711	3325	0	1770	3539	1583	1770	3539	1583	1770	3405	0
Flt Permitted	0.528			0.255			0.423			0.386		
Satd. Flow (perm)	951	3325	0	475	3539	1583	788	3539	1583	719	3405	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		33				241			298		58	
Link Speed (mph)		40			40			50			30	
Link Distance (ft)		1666			5358			5629			1088	
Travel Time (s)		28.4			91.3			76.8			24.7	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	202	539	126	256	376	241	128	430	298	312	444	150
Shared Lane Traffic (%)												
Lane Group Flow (vph)	202	665	0	256	376	241	128	430	298	312	594	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			18			18			18	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2		2	6		
Detector Phase	7	4		3	8	8	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	2.0	8.0		2.0	8.0	8.0	2.0	12.0	12.0	2.0	12.0	
Minimum Split (s)	6.7	34.0		6.7	33.0	33.0	6.7	36.0	36.0	6.7	36.0	
Total Split (s)	15.0	20.0		15.0	20.0	20.0	15.0	25.0	25.0	15.0	25.0	
Total Split (%)	20.0%	26.7%		20.0%	26.7%	26.7%	20.0%	33.3%	33.3%	20.0%	33.3%	
Maximum Green (s)	10.3	13.7		10.3	13.7	13.7	10.3	18.3	18.3	10.3	18.3	
Yellow Time (s)	3.2	4.3		3.2	4.3	4.3	3.2	4.7	4.7	3.2	4.7	
All-Red Time (s)	1.5	2.0		1.5	2.0	2.0	1.5	2.0	2.0	1.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.7	6.3		4.7	6.3	6.3	4.7	6.7	6.7	4.7	6.7	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	0.5	1.0		0.5	1.0	1.0	0.5	1.0	1.0	0.5	1.0	
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	
Walk Time (s)		7.0			7.0	7.0		7.0	7.0		7.0	
Flash Dont Walk (s)		19.0			18.0	18.0		17.0	17.0		17.0	
Pedestrian Calls (#/hr)		0			0	0		0	0		0	
Act Effct Green (s)	24.6	14.7		26.6	15.7	15.7	27.3	19.2	19.2	34.2	24.2	
Actuated g/C Ratio	0.33	0.20		0.35	0.21	0.21	0.36	0.26	0.26	0.46	0.32	
v/c Ratio	0.51	0.98		0.78	0.51	0.46	0.35	0.48	0.48	0.68	0.52	
Control Delay	20.4	62.0		34.9	29.7	7.4	14.7	26.1	6.0	22.1	21.6	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	20.4	62.0		34.9	29.7	7.4	14.7	26.1	6.0	22.1	21.6	
LOS	C	E		C	C	A	B	C	A	C	C	
Approach Delay		52.3			25.0			17.4			21.8	
Approach LOS		D			C			B			C	

Intersection Summary	
Area Type: Other	
Cycle Length: 75	
Actuated Cycle Length: 75	
Offset: 9.5 (13%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 85	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 29.1	Intersection LOS: C
Intersection Capacity Utilization 79.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 7: Yorktown Blvd & S Staples St



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	156	21	41	66	23	290	56	593	64	309	916	254
Future Volume (vph)	156	21	41	66	23	290	56	593	64	309	916	254
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	15	12	12	11	12	12	12
Storage Length (ft)	161		0	92		0	245		244	1000		446
Storage Lanes	2		1	1		1	1		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3351	1881	1599	1787	1881	1759	1787	3574	1546	3467	3574	1599
Flt Permitted	0.357			0.800			0.950			0.950		
Satd. Flow (perm)	1259	1881	1599	1505	1881	1759	1787	3574	1546	3467	3574	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			155			309			147			270
Link Speed (mph)		35			35			55			55	
Link Distance (ft)		287			1160			1197			1682	
Travel Time (s)		5.6			22.6			14.8			20.9	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	166	22	44	70	24	309	60	631	68	329	974	270
Shared Lane Traffic (%)												
Lane Group Flow (vph)	166	22	44	70	24	309	60	631	68	329	974	270
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		22			12			24			36	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane					Yes							
Headway Factor	1.04	1.00	1.00	1.00	1.00	0.88	1.00	1.00	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Free	Prot	NA	Perm	Prot	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		Free			2			6
Detector Phase	7	4	4	3	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	8.0	10.0	10.0	8.0	10.0		2.0	10.0	10.0	2.0	10.0	10.0
Minimum Split (s)	14.2	34.0	34.0	14.2	16.5		8.1	38.0	38.0	8.1	36.0	36.0
Total Split (s)	21.2	21.5	21.5	21.2	26.5		26.1	43.4	43.4	26.1	27.4	27.4
Total Split (%)	18.1%	18.3%	18.3%	18.1%	22.6%		22.3%	37.0%	37.0%	22.3%	23.4%	23.4%
Maximum Green (s)	15.0	15.0	15.0	15.0	20.0		20.0	36.0	36.0	20.0	20.0	20.0
Yellow Time (s)	3.3	3.6	3.6	3.3	3.6		3.6	5.0	5.0	3.6	5.0	5.0
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9		2.5	2.4	2.4	2.5	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.5	6.5	6.2	6.5		6.1	7.4	7.4	6.1	7.4	7.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5
Recall Mode	None	None	None	None	None		None	Min	Min	None	Min	Min
Walk Time (s)		7.0	7.0					7.0	7.0		7.0	7.0
Flash Dont Walk (s)		17.0	17.0					21.0	21.0		19.0	19.0
Pedestrian Calls (#/hr)		5	5					5	5		5	5
Act Effct Green (s)	17.8	12.7	12.7	13.8	12.7	68.5	7.5	16.9	16.9	10.4	25.4	25.4
Actuated g/C Ratio	0.26	0.19	0.19	0.20	0.19	1.00	0.11	0.25	0.25	0.15	0.37	0.37
v/c Ratio	0.23	0.06	0.10	0.21	0.07	0.18	0.31	0.71	0.14	0.62	0.73	0.35
Control Delay	19.5	29.5	0.5	23.1	29.6	0.2	35.9	30.4	0.6	35.8	29.0	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.5	29.5	0.5	23.1	29.6	0.2	35.9	30.4	0.6	35.8	29.0	5.4
LOS	B	C	A	C	C	A	D	C	A	D	C	A
Approach Delay		16.8			5.9			28.2			26.4	
Approach LOS		B			A			C			C	

Intersection Summary	
Area Type: Other	
Cycle Length: 117.2	
Actuated Cycle Length: 68.5	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 23.3	Intersection LOS: C
Intersection Capacity Utilization 57.1%	ICU Level of Service B
Analysis Period (min) 15	

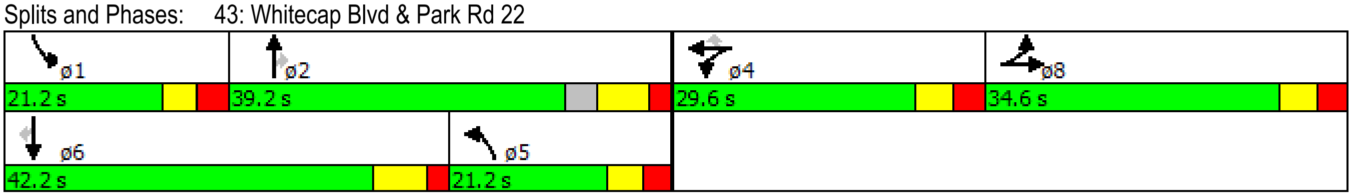
Splits and Phases: 39: Commodores Dr & Park Rd 22

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	236	45	33	32	33	212	47	265	20	242	307	474
Future Volume (vph)	236	45	33	32	33	212	47	265	20	242	307	474
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	12	13	12	12	10	12	10	11	12	10
Storage Length (ft)	0		0	206		0	145		81	207		207
Storage Lanes	1		0	1		1	1		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt		0.937				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1847	1821	0	1847	1881	1599	1668	3574	1492	3351	3574	1492
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1847	1821	0	1847	1881	1599	1668	3574	1492	3351	3574	1492
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27				214			140			479
Link Speed (mph)		35			35			55			55	
Link Distance (ft)		2514			889			1499			4642	
Travel Time (s)		49.0			17.3			18.6			57.5	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	238	45	33	32	33	214	47	268	20	244	310	479
Shared Lane Traffic (%)												
Lane Group Flow (vph)	238	78	0	32	33	214	47	268	20	244	310	479
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			13			48			48	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane					Yes							
Headway Factor	0.96	0.96	1.00	0.96	1.00	1.00	1.09	1.00	1.09	1.04	1.00	1.09
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	8	8		4	4		5	2		1	6	
Permitted Phases						4			2			6
Detector Phase	8	8		4	4	4	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	2.0	10.0	10.0	2.0	10.0	10.0
Minimum Split (s)	27.6	27.6		13.6	13.6	13.6	8.2	31.2	31.2	8.2	17.2	17.2
Total Split (s)	34.6	34.6		29.6	29.6	29.6	21.2	39.2	39.2	21.2	42.2	42.2
Total Split (%)	27.1%	27.1%		23.2%	23.2%	23.2%	16.6%	30.7%	30.7%	16.6%	33.1%	33.1%
Maximum Green (s)	28.0	28.0		23.0	23.0	23.0	15.0	32.0	32.0	15.0	35.0	35.0
Yellow Time (s)	3.6	3.6		3.6	3.6	3.6	3.3	5.0	5.0	3.3	5.0	5.0
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	2.9	2.2	2.2	2.9	2.2	2.2
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6	6.6	6.2	7.2	7.2	6.2	7.2	7.2
Lead/Lag							Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	Min	Min	None	Min	Min
Walk Time (s)	7.0	7.0						7.0	7.0		7.0	7.0
Flash Dont Walk (s)	14.0	14.0						17.0	17.0		20.0	20.0
Pedestrian Calls (#/hr)	5	5						5	5		5	5
Act Effct Green (s)	15.5	15.5		8.3	8.3	8.3	8.5	13.2	13.2	11.2	21.7	21.7
Actuated g/C Ratio	0.20	0.20		0.11	0.11	0.11	0.11	0.17	0.17	0.15	0.29	0.29
v/c Ratio	0.63	0.20		0.16	0.16	0.59	0.25	0.43	0.05	0.49	0.30	0.62
Control Delay	36.9	20.6		36.8	36.8	12.9	38.0	31.3	0.2	35.4	25.5	7.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.9	20.6		36.8	36.8	12.9	38.0	31.3	0.2	35.4	25.5	7.0
LOS	D	C		D	D	B	D	C	A	D	C	A
Approach Delay		32.8			18.5			30.3			19.3	
Approach LOS		C			B			C			B	

Intersection Summary	
Area Type: Other	
Cycle Length: 127.6	
Actuated Cycle Length: 75.7	
Natural Cycle: 85	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 23.2	Intersection LOS: C
Intersection Capacity Utilization 55.2%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 43: Whitecap Blvd & Park Rd 22



Intersection	
Int Delay, s/veh	9.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	294	0	274	0	0	281
Future Vol, veh/h	294	0	274	0	0	281
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	316	0	295	0	0	302

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	597	295	0	0	295	0
Stage 1	295	-	-	-	-	-
Stage 2	302	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	466	744	-	-	1266	-
Stage 1	755	-	-	-	-	-
Stage 2	750	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	466	744	-	-	1266	-
Mov Cap-2 Maneuver	466	-	-	-	-	-
Stage 1	755	-	-	-	-	-
Stage 2	750	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	27.5	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	466	1266	-
HCM Lane V/C Ratio	-	-	0.678	-	-
HCM Control Delay (s)	-	-	27.5	0	-
HCM Lane LOS	-	-	D	A	-
HCM 95th %tile Q(veh)	-	-	5	0	-

Intersection	
Int Delay, s/veh	7.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	149	182	0	0	143	61	0	0	0	90	0	155
Future Vol, veh/h	149	182	0	0	143	61	0	0	0	90	0	155
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	92	92	95	95	92	92	92	95	92	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	157	192	0	0	151	64	0	0	0	95	0	163

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	215	0	0	192	0	0	769	720	192	688	688	183
Stage 1	-	-	-	-	-	-	505	505	-	183	183	-
Stage 2	-	-	-	-	-	-	264	215	-	505	505	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1355	-	-	1381	-	-	318	354	850	360	369	859
Stage 1	-	-	-	-	-	-	549	540	-	819	748	-
Stage 2	-	-	-	-	-	-	741	725	-	549	540	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1355	-	-	1381	-	-	232	308	850	324	321	859
Mov Cap-2 Maneuver	-	-	-	-	-	-	232	308	-	324	321	-
Stage 1	-	-	-	-	-	-	478	470	-	713	748	-
Stage 2	-	-	-	-	-	-	600	725	-	478	470	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.6	0	0	17.8
HCM LOS			A	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1355	-	-	1381	-	-	535
HCM Lane V/C Ratio	-	0.116	-	-	-	-	-	0.482
HCM Control Delay (s)	0	8	0	-	0	-	-	17.8
HCM Lane LOS	A	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	-	0.4	-	-	0	-	-	2.6

Intersection	
Intersection Delay, s/veh	38
Intersection LOS	E

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	19	154	0	0	96	61	127	0	0	83	193
Future Vol, veh/h	0	19	154	0	0	96	61	127	0	0	83	193
Peak Hour Factor	0.92	0.89	0.89	0.89	0.92	0.89	0.89	0.89	0.92	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	21	173	0	0	108	69	143	0	0	93	217
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	16.7	22.5	19.5
HCM LOS	C	C	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	11%	34%	80%
Vol Thru, %	30%	89%	21%	17%
Vol Right, %	70%	0%	45%	3%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	276	173	284	473
LT Vol	0	19	96	379
Through Vol	83	154	61	82
RT Vol	193	0	127	12
Lane Flow Rate	310	194	319	531
Geometry Grp	1	1	1	1
Degree of Util (X)	0.596	0.43	0.647	1
Departure Headway (Hd)	6.924	7.965	7.295	6.868
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	527	459	504	526
Service Time	4.882	5.887	5.221	4.938
HCM Lane V/C Ratio	0.588	0.423	0.633	1.01
HCM Control Delay	19.5	16.7	22.5	65.8
HCM Lane LOS	C	C	C	F
HCM 95th-tile Q	3.9	2.1	4.6	13.9

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	379	82	12
Future Vol, veh/h	0	379	82	12
Peak Hour Factor	0.92	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	426	92	13
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	65.8
HCM LOS	F

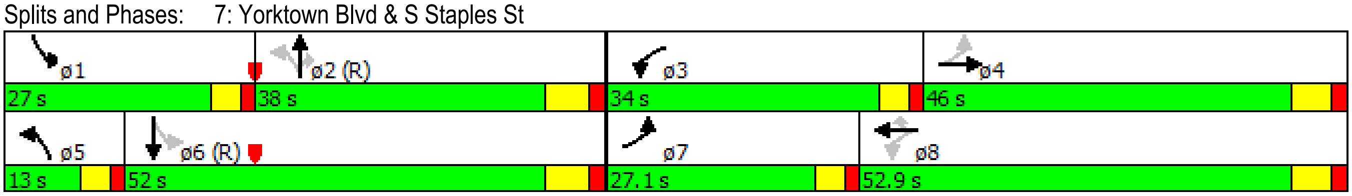
Lane

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	257	827	408	692	599	437	225	760	528	541	785	231
Future Volume (vph)	257	827	408	692	599	437	225	760	528	541	785	231
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	12	12	12	12	12	12	12	12
Storage Length (ft)	200		0	269		266	244		194	348		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt		0.950				0.850			0.850		0.966	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1711	3250	0	1770	3539	1583	1770	3539	1583	1770	3419	0
Flt Permitted	0.419			0.090			0.128			0.111		
Satd. Flow (perm)	754	3250	0	168	3539	1583	238	3539	1583	207	3419	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		58				374			339		27	
Link Speed (mph)		40			40			50			30	
Link Distance (ft)		1666			5358			5629			1088	
Travel Time (s)		28.4			91.3			76.8			24.7	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	262	844	416	706	611	446	230	776	539	552	801	236
Shared Lane Traffic (%)												
Lane Group Flow (vph)	262	1260	0	706	611	446	230	776	539	552	1037	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			18			18			18	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2		2	6		
Detector Phase	7	4		3	8	8	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	2.0	8.0		2.0	8.0	8.0	2.0	12.0	12.0	2.0	12.0	
Minimum Split (s)	6.7	34.0		6.7	33.0	33.0	6.7	36.0	36.0	6.7	36.0	
Total Split (s)	27.1	46.0		34.0	52.9	52.9	13.0	38.0	38.0	27.0	52.0	
Total Split (%)	18.7%	31.7%		23.4%	36.5%	36.5%	9.0%	26.2%	26.2%	18.6%	35.9%	
Maximum Green (s)	22.4	39.7		29.3	46.6	46.6	8.3	31.3	31.3	22.3	45.3	
Yellow Time (s)	3.2	4.3		3.2	4.3	4.3	3.2	4.7	4.7	3.2	4.7	
All-Red Time (s)	1.5	2.0		1.5	2.0	2.0	1.5	2.0	2.0	1.5	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.7	6.3		4.7	6.3	6.3	4.7	6.7	6.7	4.7	6.7	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	0.5	1.0		0.5	1.0	1.0	0.5	1.0	1.0	0.5	1.0	
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	
Walk Time (s)		7.0			7.0	7.0		7.0	7.0		7.0	
Flash Dont Walk (s)		19.0			18.0	18.0		17.0	17.0		17.0	
Pedestrian Calls (#/hr)		0			0	0		0	0		0	
Act Effct Green (s)	57.1	39.7		75.3	53.2	53.2	41.6	31.3	31.3	60.3	45.3	
Actuated g/C Ratio	0.39	0.27		0.52	0.37	0.37	0.29	0.22	0.22	0.42	0.31	
v/c Ratio	0.66	1.35		1.72	0.47	0.55	1.48	1.02	0.89	1.69	0.95	
Control Delay	29.8	204.6		364.4	37.3	9.5	276.5	92.3	37.8	354.1	65.9	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	29.8	204.6		364.4	37.3	9.5	276.5	92.3	37.8	354.1	65.9	
LOS	C	F		F	D	A	F	F	D	F	E	
Approach Delay		174.5			161.3			100.7			166.0	
Approach LOS		F			F			F			F	

Intersection Summary	
Area Type: Other	
Cycle Length: 145	
Actuated Cycle Length: 145	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 145	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.72	
Intersection Signal Delay: 151.0	Intersection LOS: F
Intersection Capacity Utilization 143.9%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 7: Yorktown Blvd & S Staples St

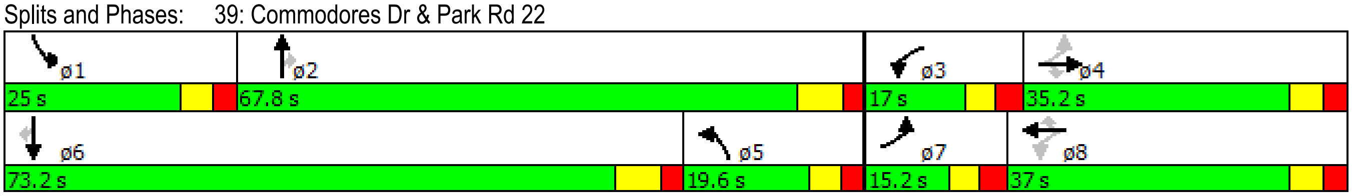


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	467	41	77	127	48	737	95	1756	134	563	1271	417
Future Volume (vph)	467	41	77	127	48	737	95	1756	134	563	1271	417
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	15	12	12	11	12	12	12
Storage Length (ft)	161		0	92		0	245		244	1000		446
Storage Lanes	2		1	1		1	1		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3351	1881	1599	1787	1881	1759	1787	3574	1546	3467	3574	1599
Flt Permitted	0.724			0.707			0.950			0.950		
Satd. Flow (perm)	2554	1881	1599	1330	1881	1759	1787	3574	1546	3467	3574	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			181			262			119			444
Link Speed (mph)		35			35			55			55	
Link Distance (ft)		287			1160			1197			1682	
Travel Time (s)		5.6			22.6			14.8			20.9	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	497	44	82	135	51	784	101	1868	143	599	1352	444
Shared Lane Traffic (%)												
Lane Group Flow (vph)	497	44	82	135	51	784	101	1868	143	599	1352	444
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		22			12			24			36	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane					Yes							
Headway Factor	1.04	1.00	1.00	1.00	1.00	0.88	1.00	1.00	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Detector Phase	7	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	8.0	10.0	10.0	8.0	10.0	10.0	2.0	10.0	10.0	2.0	10.0	10.0
Minimum Split (s)	14.2	34.0	34.0	14.2	16.5	16.5	8.1	38.0	38.0	8.1	36.0	36.0
Total Split (s)	15.2	35.2	35.2	17.0	37.0	37.0	19.6	67.8	67.8	25.0	73.2	73.2
Total Split (%)	10.5%	24.3%	24.3%	11.7%	25.5%	25.5%	13.5%	46.8%	46.8%	17.2%	50.5%	50.5%
Maximum Green (s)	9.0	28.7	28.7	10.8	30.5	30.5	13.5	60.4	60.4	18.9	65.8	65.8
Yellow Time (s)	3.3	3.6	3.6	3.3	3.6	3.6	3.6	5.0	5.0	3.6	5.0	5.0
All-Red Time (s)	2.9	2.9	2.9	2.9	2.9	2.9	2.5	2.4	2.4	2.5	2.4	2.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.2	6.5	6.5	6.2	6.5	6.5	6.1	7.4	7.4	6.1	7.4	7.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Recall Mode	None	None	None	None	None	None	None	Min	Min	None	Min	Min
Walk Time (s)		7.0	7.0					7.0	7.0		7.0	7.0
Flash Dont Walk (s)		17.0	17.0					21.0	21.0		19.0	19.0
Pedestrian Calls (#/hr)		5	5					5	5		5	5
Act Effct Green (s)	38.9	29.6	29.6	40.7	30.5	30.5	19.3	60.4	60.4	18.9	60.0	60.0
Actuated g/C Ratio	0.27	0.20	0.20	0.28	0.21	0.21	0.13	0.42	0.42	0.13	0.41	0.41
v/c Ratio	0.68	0.11	0.17	0.33	0.13	1.36	0.43	1.26	0.20	1.33	0.91	0.48
Control Delay	49.0	48.6	0.8	39.5	47.6	202.0	66.1	157.1	7.2	209.2	50.1	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.0	48.6	0.8	39.5	47.6	202.0	66.1	157.1	7.2	209.2	50.1	3.9
LOS	D	D	A	D	D	F	E	F	A	F	D	A
Approach Delay		42.6			171.3			142.6			81.3	
Approach LOS		D			F			F			F	

Intersection Summary	
Area Type: Other	
Cycle Length: 145	
Actuated Cycle Length: 145	
Natural Cycle: 145	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.36	
Intersection Signal Delay: 112.9	Intersection LOS: F
Intersection Capacity Utilization 124.2%	ICU Level of Service H
Analysis Period (min) 15	

Splits and Phases: 39: Commodores Dr & Park Rd 22

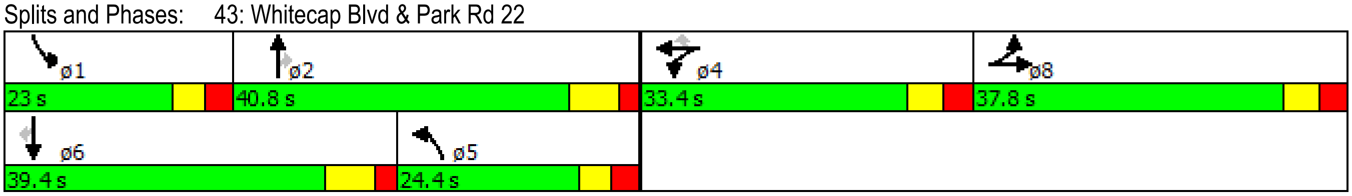


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	453	118	162	206	139	586	204	916	221	432	637	381
Future Volume (vph)	453	118	162	206	139	586	204	916	221	432	637	381
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	12	13	12	12	10	12	10	11	12	10
Storage Length (ft)	0		0	206		0	145		81	207		207
Storage Lanes	1		0	1		1	1		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt		0.913				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1847	1775	0	1847	1881	1599	1668	3574	1492	3351	3574	1492
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1847	1775	0	1847	1881	1599	1668	3574	1492	3351	3574	1492
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		48				281			133			370
Link Speed (mph)		35			35			55			55	
Link Distance (ft)		2514			889			1499			4642	
Travel Time (s)		49.0			17.3			18.6			57.5	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	458	119	164	208	140	592	206	925	223	436	643	385
Shared Lane Traffic (%)												
Lane Group Flow (vph)	458	283	0	208	140	592	206	925	223	436	643	385
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			13			48			48	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane					Yes							
Headway Factor	0.96	0.96	1.00	0.96	1.00	1.00	1.09	1.00	1.09	1.04	1.00	1.09
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	8	8		4	4		5	2		1	6	
Permitted Phases						4			2			6
Detector Phase	8	8		4	4	4	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	2.0	10.0	10.0	2.0	10.0	10.0
Minimum Split (s)	27.6	27.6		13.6	13.6	13.6	8.2	31.2	31.2	8.2	17.2	17.2
Total Split (s)	37.8	37.8		33.4	33.4	33.4	24.4	40.8	40.8	23.0	39.4	39.4
Total Split (%)	28.0%	28.0%		24.7%	24.7%	24.7%	18.1%	30.2%	30.2%	17.0%	29.2%	29.2%
Maximum Green (s)	31.2	31.2		26.8	26.8	26.8	18.2	33.6	33.6	16.8	32.2	32.2
Yellow Time (s)	3.6	3.6		3.6	3.6	3.6	3.3	5.0	5.0	3.3	5.0	5.0
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	2.9	2.2	2.2	2.9	2.2	2.2
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6	6.6	6.2	7.2	7.2	6.2	7.2	7.2
Lead/Lag							Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	Min	Min	None	Min	Min
Walk Time (s)	7.0	7.0						7.0	7.0		7.0	7.0
Flash Dont Walk (s)	14.0	14.0						17.0	17.0		20.0	20.0
Pedestrian Calls (#/hr)	5	5						5	5		5	5
Act Effct Green (s)	31.2	31.2		26.8	26.8	26.8	20.7	33.6	33.6	16.8	29.7	29.7
Actuated g/C Ratio	0.23	0.23		0.20	0.20	0.20	0.15	0.25	0.25	0.12	0.22	0.22
v/c Ratio	1.08	0.63		0.57	0.38	1.09	0.81	1.04	0.47	1.05	0.82	0.62
Control Delay	113.8	45.8		55.8	50.3	92.6	79.6	90.1	20.9	112.6	59.1	9.9
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	113.8	45.8		55.8	50.3	92.6	79.6	90.1	20.9	112.6	59.1	9.9
LOS	F	D		E	D	F	E	F	C	F	E	A
Approach Delay		87.8			78.1			77.1			62.1	
Approach LOS		F			E			E			E	

Intersection Summary	
Area Type: Other	
Cycle Length: 135	
Actuated Cycle Length: 135	
Natural Cycle: 135	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.09	
Intersection Signal Delay: 74.2	Intersection LOS: E
Intersection Capacity Utilization 103.7%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 43: Whitecap Blvd & Park Rd 22



Intersection	
Intersection Delay, s/veh	78.1
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	298	280	83	0	135	117	483	0	39	338	164
Future Vol, veh/h	0	298	280	83	0	135	117	483	0	39	338	164
Peak Hour Factor	0.92	0.89	0.89	0.89	0.92	0.89	0.89	0.89	0.92	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	335	315	93	0	152	131	543	0	44	380	184
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	78.5	76.9	77.7
HCM LOS	F	F	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	7%	45%	18%	55%
Vol Thru, %	62%	42%	16%	32%
Vol Right, %	30%	13%	66%	13%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	541	661	735	2068
LT Vol	39	298	135	1139
Through Vol	338	280	117	655
RT Vol	164	83	483	274
Lane Flow Rate	608	743	826	2324
Geometry Grp	1	1	1	1
Degree of Util (X)	1	1	1	1
Departure Headway (Hd)	9.464	9.646	9.274	9.662
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	389	386	405	418
Service Time	7.464	7.646	7.274	7.662
HCM Lane V/C Ratio	1.563	1.925	2.04	5.56
HCM Control Delay	77.7	78.5	76.9	78.6
HCM Lane LOS	F	F	F	F
HCM 95th-tile Q	11.9	11.8	12.1	11.8

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	1139	655	274
Future Vol, veh/h	0	1139	655	274
Peak Hour Factor	0.92	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	1280	736	308
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	78.6
HCM LOS	F

Lane

Intersection	
Int Delay, s/veh	282.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	530	0	495	0	0	640
Future Vol, veh/h	530	0	495	0	0	640
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	570	0	532	0	0	688

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1220	532	0	0	532	0
Stage 1	532	-	-	-	-	-
Stage 2	688	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	~ 199	547	-	-	1036	-
Stage 1	589	-	-	-	-	-
Stage 2	~ 499	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 199	547	-	-	1036	-
Mov Cap-2 Maneuver	~ 199	-	-	-	-	-
Stage 1	589	-	-	-	-	-
Stage 2	~ 499	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 888.7	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	199	1036	-
HCM Lane V/C Ratio	-	-	2.864	-	-
HCM Control Delay (s)	-	-	$ 888.7	0	-
HCM Lane LOS	-	-	F	A	-
HCM 95th %tile Q(veh)	-	-	50.6	0	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	79.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	257	240	0	0	258	110	0	0	0	150	0	239
Future Vol, veh/h	257	240	0	0	258	110	0	0	0	150	0	239
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	92	92	95	95	92	92	92	95	92	95
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	271	253	0	0	272	116	0	0	0	158	0	252

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	387	0	0	253	0	0	1249	1181	253	1123	1123	329
Stage 1	-	-	-	-	-	-	794	794	-	329	329	-
Stage 2	-	-	-	-	-	-	455	387	-	794	794	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1171	-	-	1312	-	-	150	190	786	183	206	712
Stage 1	-	-	-	-	-	-	381	400	-	684	646	-
Stage 2	-	-	-	-	-	-	585	610	-	381	400	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1171	-	-	1312	-	-	77	139	786	~ 145	151	712
Mov Cap-2 Maneuver	-	-	-	-	-	-	77	139	-	~ 145	151	-
Stage 1	-	-	-	-	-	-	279	292	-	500	646	-
Stage 2	-	-	-	-	-	-	378	610	-	279	292	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.7	0	0	251.6
HCM LOS			A	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1171	-	-	1312	-	-	284
HCM Lane V/C Ratio	-	0.231	-	-	-	-	-	1.442
HCM Control Delay (s)	0	9	0	-	0	-	-	251.6
HCM Lane LOS	A	A	A	-	A	-	-	F
HCM 95th %tile Q(veh)	-	0.9	-	-	0	-	-	22.5

Notes

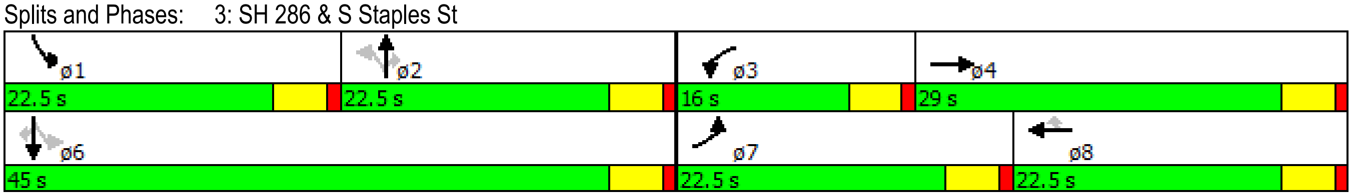
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	298	280	83	135	118	507	23	547	79	706	1127	290
Future Volume (vph)	298	280	83	135	118	507	23	547	79	706	1127	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		150	200		200	200		200
Storage Lanes	1		0	1		1	1		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt		0.966				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1799	0	1770	1863	1583	1770	3539	1583	3433	3539	1583
Flt Permitted	0.950			0.950			0.230			0.183		
Satd. Flow (perm)	1770	1799	0	1770	1863	1583	428	3539	1583	661	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16				435			182			320
Link Speed (mph)		65			65			70			70	
Link Distance (ft)		225			15925			3990			353	
Travel Time (s)		2.4			167.0			38.9			3.4	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	335	315	93	152	133	570	26	615	89	793	1266	326
Shared Lane Traffic (%)												
Lane Group Flow (vph)	335	408	0	152	133	570	26	615	89	793	1266	326
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8			2		1	6	
Permitted Phases						8	2		2	6		6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	7	4		3	8	8	2	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5		9.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	22.5	29.0		16.0	22.5	22.5	22.5	22.5	22.5	22.5	45.0	45.0
Total Split (%)	25.0%	32.2%		17.8%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	50.0%	50.0%
Maximum Green (s)	18.0	24.5		11.5	18.0	18.0	18.0	18.0	18.0	18.0	40.5	40.5
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Min	Min	Min	Min	Min	Min
Walk Time (s)	7.0	7.0			7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0			11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0			0	0	0	0	0	0	0	0
Act Effct Green (s)	17.9	22.3		10.7	15.0	15.0	17.4	17.4	17.4	39.5	39.5	39.5
Actuated g/C Ratio	0.21	0.26		0.12	0.17	0.17	0.20	0.20	0.20	0.46	0.46	0.46
v/c Ratio	0.91	0.86		0.69	0.41	0.90	0.30	0.86	0.19	0.91	0.78	0.36
Control Delay	65.3	48.1		54.9	35.6	27.8	41.3	47.5	0.9	37.0	24.3	3.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.3	48.1		54.9	35.6	27.8	41.3	47.5	0.9	37.0	24.3	3.2
LOS	E	D		D	D	C	D	D	A	D	C	A
Approach Delay		55.9			33.8			41.6			25.6	
Approach LOS		E			C			D			C	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 86	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay: 34.3	Intersection LOS: C
Intersection Capacity Utilization 77.6%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 3: SH 286 & S Staples St



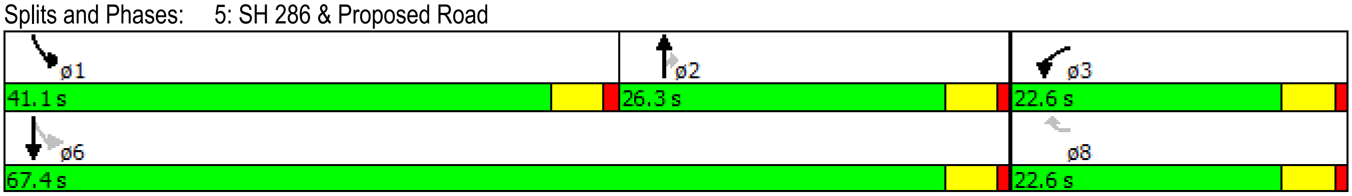
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	28	325	324	23	715	630
Future Volume (vph)	28	325	324	23	715	630
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		150	0	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.950				0.212	
Satd. Flow (perm)	1770	1583	1863	1583	395	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		365		26		
Link Speed (mph)	60		70			70
Link Distance (ft)	8915		264			3604
Travel Time (s)	101.3		2.6			35.1
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	31	365	364	26	803	708
Shared Lane Traffic (%)						
Lane Group Flow (vph)	31	365	364	26	803	708
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Number of Detectors	1	1	2	1	1	2
Detector Template	Left	Right	Thru	Right	Left	Thru
Leading Detector (ft)	20	20	100	20	20	100
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	20	20	6	20	20	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)			94			94
Detector 2 Size(ft)			6			6
Detector 2 Type			Cl+Ex			Cl+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	3		2		1	6
Permitted Phases		8		2	6	

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Detector Phase	3	8	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	9.5	22.5
Total Split (s)	22.6	22.6	26.3	26.3	41.1	67.4
Total Split (%)	25.1%	25.1%	29.2%	29.2%	45.7%	74.9%
Maximum Green (s)	18.1	18.1	21.8	21.8	36.6	62.9
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	None	Min
Walk Time (s)		7.0	7.0	7.0		7.0
Flash Dont Walk (s)		11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)		0	0	0		0
Act Effct Green (s)	8.6	8.2	19.0	19.0	58.7	58.7
Actuated g/C Ratio	0.11	0.11	0.25	0.25	0.77	0.77
v/c Ratio	0.16	0.74	0.78	0.06	0.86	0.49
Control Delay	33.2	13.6	41.0	10.5	23.8	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.2	13.6	41.0	10.5	23.8	5.1
LOS	C	B	D	B	C	A
Approach Delay	15.1		38.9			15.0
Approach LOS	B		D			B

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 76
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 19.1 Intersection LOS: B
Intersection Capacity Utilization 72.1% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 5: SH 286 & Proposed Road

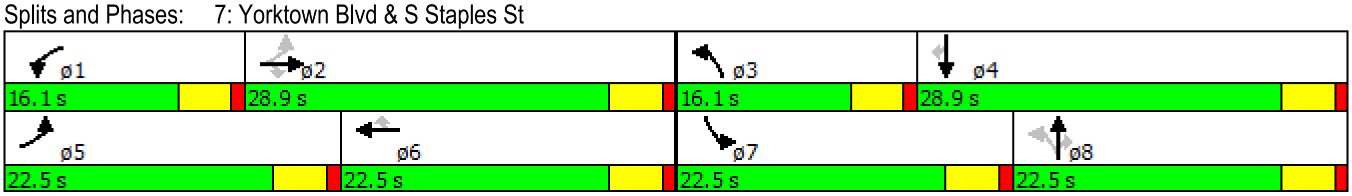


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	268	805	188	398	583	429	225	700	435	531	785	241
Future Volume (vph)	268	805	188	398	583	429	225	700	435	531	785	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		200	269		266	244		194	348		200
Storage Lanes	1		1	2		1	1		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3539	1583	1770	3539	1583	3433	3539	1583
Flt Permitted	0.204			0.950			0.221			0.950		
Satd. Flow (perm)	380	3539	1583	3433	3539	1583	412	3539	1583	3433	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			192			411			297			246
Link Speed (mph)		40			45			50			50	
Link Distance (ft)		1666			5358			5629			1088	
Travel Time (s)		28.4			81.2			76.8			14.8	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	273	821	192	406	595	438	230	714	444	542	801	246
Shared Lane Traffic (%)												
Lane Group Flow (vph)	273	821	192	406	595	438	230	714	444	542	801	246
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			18			18			18	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2			6	8		8			4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	22.5	28.9	28.9	16.1	22.5	22.5	16.1	22.5	22.5	22.5	28.9	28.9
Total Split (%)	25.0%	32.1%	32.1%	17.9%	25.0%	25.0%	17.9%	25.0%	25.0%	25.0%	32.1%	32.1%
Maximum Green (s)	18.0	24.4	24.4	11.6	18.0	18.0	11.6	18.0	18.0	18.0	24.4	24.4
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	Min	Min	Min	Min	Min
Walk Time (s)	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0		11.0	11.0		11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0		0	0		0	0	0	0	0
Act Effct Green (s)	37.1	23.5	23.5	11.6	20.9	20.9	29.2	18.1	18.1	17.0	24.1	24.1
Actuated g/C Ratio	0.42	0.27	0.27	0.13	0.24	0.24	0.33	0.20	0.20	0.19	0.27	0.27
v/c Ratio	0.71	0.87	0.34	0.90	0.71	0.64	0.75	0.98	0.79	0.82	0.83	0.40
Control Delay	27.6	42.8	5.9	63.2	37.7	9.3	36.1	66.6	23.4	45.7	39.2	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.6	42.8	5.9	63.2	37.7	9.3	36.1	66.6	23.4	45.7	39.2	5.8
LOS	C	D	A	E	D	A	D	E	C	D	D	A
Approach Delay		34.0			36.2			47.7			36.2	
Approach LOS		C			D			D			D	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 88.3	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 38.5	Intersection LOS: D
Intersection Capacity Utilization 83.1%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 7: Yorktown Blvd & S Staples St

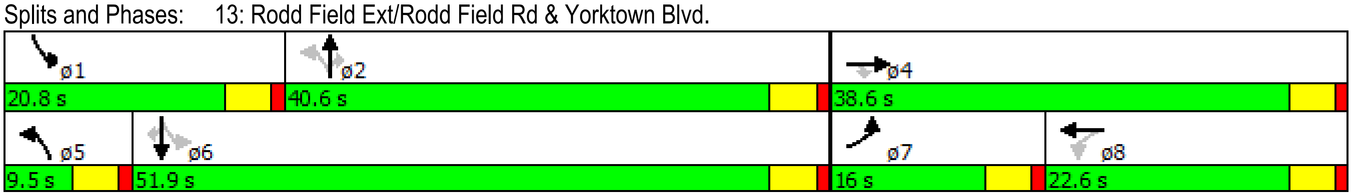


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	350	400	112	85	400	267	89	603	93	344	708	318
Future Volume (vph)	350	400	112	85	400	267	89	603	93	344	708	318
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	250		250	200		200	200		200
Storage Lanes	2		1	1		1	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.940				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1863	1583	1770	3327	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950			0.503			0.161			0.097		
Satd. Flow (perm)	3433	1863	1583	937	3327	0	300	1863	1583	181	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			120		140				164			280
Link Speed (mph)		45			45			50			50	
Link Distance (ft)		368			14864			13084			839	
Travel Time (s)		5.6			225.2			178.4			11.4	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.92
Adj. Flow (vph)	376	430	120	91	430	287	96	648	100	370	761	346
Shared Lane Traffic (%)												
Lane Group Flow (vph)	376	430	120	91	717	0	96	648	100	370	761	346
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases			4	8			2		2	6		6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	7	4	4	8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5		9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	16.0	38.6	38.6	22.6	22.6		9.5	40.6	40.6	20.8	51.9	51.9
Total Split (%)	16.0%	38.6%	38.6%	22.6%	22.6%		9.5%	40.6%	40.6%	20.8%	51.9%	51.9%
Maximum Green (s)	11.5	34.1	34.1	18.1	18.1		5.0	36.1	36.1	16.3	47.4	47.4
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead			Lag	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None		None	Min	Min	None	Min	Min
Walk Time (s)		7.0	7.0	7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		11.0	11.0	11.0	11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0	0	0			0	0		0	0
Act Effct Green (s)	11.5	34.1	34.1	18.1	18.1		40.7	35.7	35.7	56.5	48.9	48.9
Actuated g/C Ratio	0.12	0.34	0.34	0.18	0.18		0.41	0.36	0.36	0.57	0.49	0.49
v/c Ratio	0.95	0.67	0.19	0.54	1.00		0.49	0.97	0.15	1.02	0.83	0.38
Control Delay	79.3	34.4	5.2	50.0	66.9		20.8	61.4	1.0	81.9	32.4	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.3	34.4	5.2	50.0	66.9		20.8	61.4	1.0	81.9	32.4	4.9
LOS	E	C	A	D	E		C	E	A	F	C	A
Approach Delay		48.8			65.0			49.6			38.3	
Approach LOS		D			E			D			D	

Intersection Summary	
Area Type: Other	
Cycle Length: 100	
Actuated Cycle Length: 99.6	
Natural Cycle: 100	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.02	
Intersection Signal Delay: 48.4	Intersection LOS: D
Intersection Capacity Utilization 95.4%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 13: Rodd Field Ext/Rodd Field Rd & Yorktown Blvd.

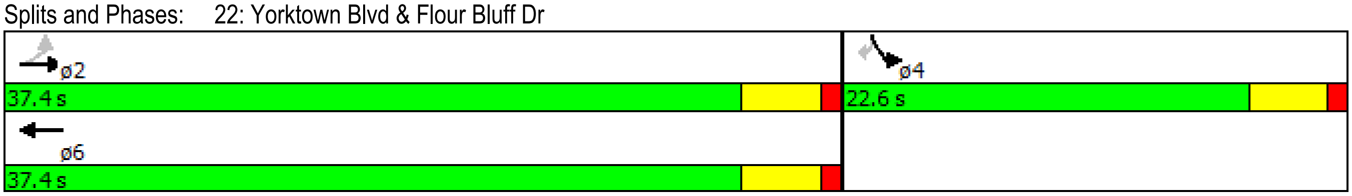


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	274	224	258	110	88	280
Future Volume (vph)	274	224	258	110	88	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150			0	100	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.960			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1788	0	1770	1583
Flt Permitted	0.527				0.950	
Satd. Flow (perm)	982	1863	1788	0	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			57			295
Link Speed (mph)		45	45		40	
Link Distance (ft)		1196	1189		1795	
Travel Time (s)		18.1	18.0		30.6	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	288	236	272	116	93	295
Shared Lane Traffic (%)						
Lane Group Flow (vph)	288	236	388	0	93	295
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (ft)	20	100	100		20	20
Trailing Detector (ft)	0	0	0		0	0
Detector 1 Position(ft)	0	0	0		0	0
Detector 1 Size(ft)	20	6	6		20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Detector 2 Position(ft)		94	94			
Detector 2 Size(ft)		6	6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector Phase	2	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	22.5	22.5	22.5		22.5	22.5
Total Split (s)	37.4	37.4	37.4		22.6	22.6
Total Split (%)	62.3%	62.3%	62.3%		37.7%	37.7%
Maximum Green (s)	32.9	32.9	32.9		18.1	18.1
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5		4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	None		Min	Min
Walk Time (s)	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effct Green (s)	16.2	16.2	16.2		8.0	8.0
Actuated g/C Ratio	0.48	0.48	0.48		0.24	0.24
v/c Ratio	0.62	0.27	0.44		0.22	0.49
Control Delay	12.7	5.8	6.3		14.7	5.9
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	12.7	5.8	6.3		14.7	5.9
LOS	B	A	A		B	A
Approach Delay		9.6	6.3		8.0	
Approach LOS		A	A		A	

Intersection Summary	
Area Type: Other	
Cycle Length: 60	
Actuated Cycle Length: 34	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.62	
Intersection Signal Delay: 8.1	Intersection LOS: A
Intersection Capacity Utilization 51.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 22: Yorktown Blvd & Flour Bluff Dr

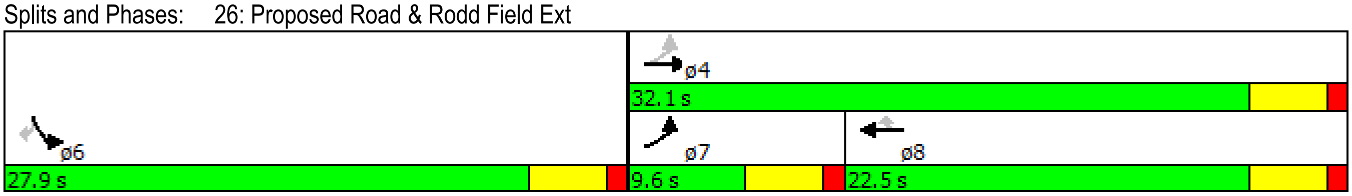


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	193	545	416	479	554	45
Future Volume (vph)	193	545	416	479	554	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200			250	0	200
Storage Lanes	1			1	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	3539	3539	1583	1770	1583
Flt Permitted	0.317				0.950	
Satd. Flow (perm)	590	3539	3539	1583	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				521		49
Link Speed (mph)		60	60		50	
Link Distance (ft)		14058	4325		13084	
Travel Time (s)		159.8	49.1		178.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	210	592	452	521	602	49
Shared Lane Traffic (%)						
Lane Group Flow (vph)	210	592	452	521	602	49
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		24	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2	1	1	1
Detector Template	Left	Thru	Thru	Right	Left	Right
Leading Detector (ft)	20	100	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	6	20	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94	94			
Detector 2 Size(ft)		6	6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases	4			8		6

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector Phase	7	4	8	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	9.6	32.1	22.5	22.5	27.9	27.9
Total Split (%)	16.0%	53.5%	37.5%	37.5%	46.5%	46.5%
Maximum Green (s)	5.1	27.6	18.0	18.0	23.4	23.4
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	Max	Max
Walk Time (s)		7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0	0	0	0
Act Effct Green (s)	23.2	23.2	13.6	13.6	23.5	23.5
Actuated g/C Ratio	0.42	0.42	0.24	0.24	0.42	0.42
v/c Ratio	0.59	0.40	0.52	0.67	0.81	0.07
Control Delay	18.4	12.1	20.4	6.8	26.5	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.4	12.1	20.4	6.8	26.5	4.4
LOS	B	B	C	A	C	A
Approach Delay		13.8	13.1		24.9	
Approach LOS		B	B		C	

Intersection Summary	
Area Type: Other	
Cycle Length: 60	
Actuated Cycle Length: 55.7	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 16.5	Intersection LOS: B
Intersection Capacity Utilization 64.1%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 26: Proposed Road & Rodd Field Ext

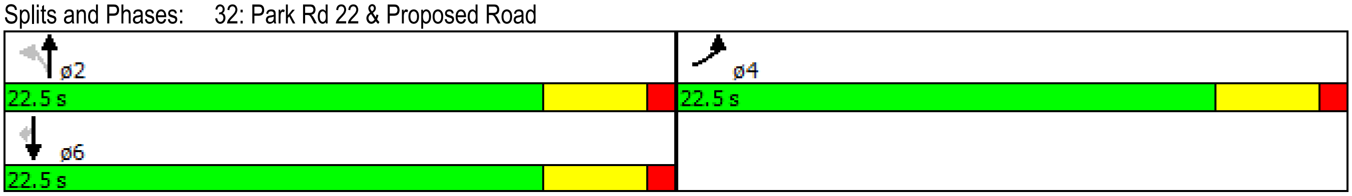


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰↰		↰	↑	↑	↱
Traffic Volume (vph)	1091	8	20	70	29	963
Future Volume (vph)	1091	8	20	70	29	963
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.97	0.95	1.00	1.00	1.00	1.00
Frt	0.999					0.850
Flt Protected	0.953		0.950			
Satd. Flow (prot)	3440	0	1770	1863	1863	1583
Flt Permitted	0.953		0.736			
Satd. Flow (perm)	3440	0	1371	1863	1863	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	2					1047
Link Speed (mph)	60			55	55	
Link Distance (ft)	20502			638	11466	
Travel Time (s)	233.0			7.9	142.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1186	9	22	76	32	1047
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1195	0	22	76	32	1047
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	24			12	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1		1	2	2	1
Detector Template	Left		Left	Thru	Thru	Right
Leading Detector (ft)	20		20	100	100	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	20		20	6	6	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)				94	94	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		Perm	NA	NA	Perm
Protected Phases	4			2	6	
Permitted Phases			2			6
Detector Phase	4		2	2	6	6
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Split (s)	22.5		22.5	22.5	22.5	22.5
Total Split (s)	22.5		22.5	22.5	22.5	22.5
Total Split (%)	50.0%		50.0%	50.0%	50.0%	50.0%
Maximum Green (s)	18.0		18.0	18.0	18.0	18.0
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5		4.5	4.5	4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		Max	Max	Max	Max
Walk Time (s)	7.0		7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0		0	0	0	0
Act Effct Green (s)	17.7		18.0	18.0	18.0	18.0
Actuated g/C Ratio	0.40		0.40	0.40	0.40	0.40
v/c Ratio	0.88		0.04	0.10	0.04	0.83
Control Delay	22.4		8.6	9.0	8.5	9.1
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	22.4		8.6	9.0	8.5	9.1
LOS	C		A	A	A	A
Approach Delay	22.4			8.9	9.1	
Approach LOS	C			A	A	

Intersection Summary	
Area Type: Other	
Cycle Length: 45	
Actuated Cycle Length: 44.7	
Natural Cycle: 45	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 15.8	Intersection LOS: B
Intersection Capacity Utilization 71.3%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 32: Park Rd 22 & Proposed Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	438	48	74	127	58	732	95	1347	134	559	1145	409
Future Volume (vph)	438	48	74	127	58	732	95	1347	134	559	1145	409
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	161		0	92		0	245		244	1000		446
Storage Lanes	2		1	1		1	1		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3467	1881	1599	1787	1881	1599	1787	3574	1599	3467	3574	1599
Flt Permitted	0.950			0.724			0.093			0.950		
Satd. Flow (perm)	3467	1881	1599	1362	1881	1599	175	3574	1599	3467	3574	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			88			387			126			435
Link Speed (mph)		35			35			55			55	
Link Distance (ft)		287			1160			1197			1682	
Travel Time (s)		5.6			22.6			14.8			20.9	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	466	51	79	135	62	779	101	1433	143	595	1218	435
Shared Lane Traffic (%)												
Lane Group Flow (vph)	466	51	79	135	62	779	101	1433	143	595	1218	435
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			12			24			36	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane					Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	pm+pt	NA	Free	pm+pt	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases			4	8		Free	2		2			6
Detector Phase	7	4	4	3	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	9.5	22.5		22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	22.5	30.9	30.9	14.1	22.5		22.5	58.0	58.0	27.0	62.5	62.5
Total Split (%)	17.3%	23.8%	23.8%	10.8%	17.3%		17.3%	44.6%	44.6%	20.8%	48.1%	48.1%
Maximum Green (s)	18.0	26.4	26.4	9.6	18.0		18.0	53.5	53.5	22.5	58.0	58.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None		Max	C-Max	C-Max	Max	Max	Max
Walk Time (s)	7.0	7.0	7.0		7.0		7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0		11.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0		0		0	0	0	0	0	0
Act Effct Green (s)	18.3	16.3	16.3	17.9	9.6	130.0	81.7	53.5	53.5	32.7	58.0	58.0
Actuated g/C Ratio	0.14	0.13	0.13	0.14	0.07	1.00	0.63	0.41	0.41	0.25	0.45	0.45
v/c Ratio	0.96	0.22	0.29	0.62	0.45	0.49	0.22	0.97	0.20	0.68	0.76	0.46
Control Delay	86.6	50.9	10.5	55.1	67.0	1.1	11.0	55.9	6.1	49.7	34.2	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	86.6	50.9	10.5	55.1	67.0	1.1	11.0	55.9	6.1	49.7	34.2	3.6
LOS	F	D	B	E	E	A	B	E	A	D	C	A
Approach Delay		73.5			12.7			49.0			32.4	
Approach LOS		E			B			D			C	

Intersection Summary

Area Type: Other
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 0 (0%), Referenced to phase 2:NBTL, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 38.4 Intersection LOS: D
Intersection Capacity Utilization 83.6% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 39: Park Rd 22 & Commodores Dr

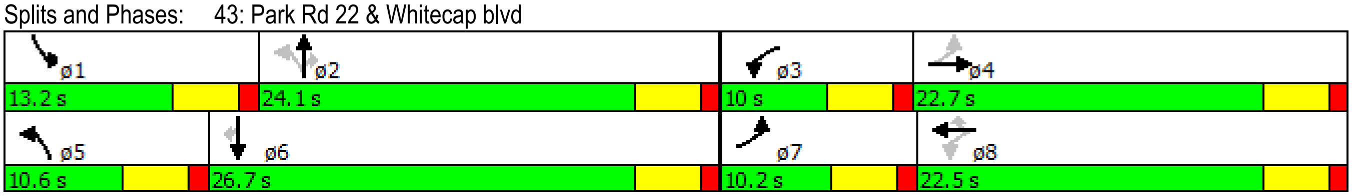
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	345	113	134	201	138	525	173	706	212	383	657	306
Future Volume (vph)	345	113	134	201	138	525	173	706	212	383	657	306
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	206		0	145		81	207		207
Storage Lanes	1		0	1		1	1		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt		0.919				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	1729	0	1787	1881	1599	1787	3574	1599	3467	3574	1599
Flt Permitted	0.660			0.479			0.309			0.950		
Satd. Flow (perm)	1242	1729	0	901	1881	1599	581	3574	1599	3467	3574	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		82				269			173			309
Link Speed (mph)		35			35			55			55	
Link Distance (ft)		2514			889			11466			4642	
Travel Time (s)		49.0			17.3			142.1			57.5	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	348	114	135	203	139	530	175	713	214	387	664	309
Shared Lane Traffic (%)												
Lane Group Flow (vph)	348	249	0	203	139	530	175	713	214	387	664	309
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			12			48			48	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane					Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2		2			6
Detector Phase	7	4		3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5		9.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	10.2	22.7		10.0	22.5	22.5	10.6	24.1	24.1	13.2	26.7	26.7
Total Split (%)	14.6%	32.4%		14.3%	32.1%	32.1%	15.1%	34.4%	34.4%	18.9%	38.1%	38.1%
Maximum Green (s)	5.7	18.2		5.5	18.0	18.0	6.1	19.6	19.6	8.7	22.2	22.2
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	Min	Min	None	Min	Min
Walk Time (s)		7.0			7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		11.0			11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0			0	0		0	0		0	0
Act Effct Green (s)	21.9	16.2		21.5	16.0	16.0	23.7	17.5	17.5	8.8	20.1	20.1
Actuated g/C Ratio	0.33	0.24		0.32	0.24	0.24	0.36	0.26	0.26	0.13	0.30	0.30
v/c Ratio	0.76	0.51		0.55	0.31	0.90	0.55	0.75	0.39	0.84	0.61	0.44
Control Delay	30.4	18.6		21.6	23.0	32.9	18.9	28.4	8.0	48.7	22.7	4.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.4	18.6		21.6	23.0	32.9	18.9	28.4	8.0	48.7	22.7	4.7
LOS	C	B		C	C	C	B	C	A	D	C	A
Approach Delay		25.5			28.7			22.9			26.0	
Approach LOS		C			C			C			C	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 66.2
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 25.7 Intersection LOS: C
Intersection Capacity Utilization 82.4% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 43: Park Rd 22 & Whitecap blvd



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Phone: Fax:
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Operational Analysis

Analyst:	mk
Agency or Company:	
Date Performed:	1/8/2016
Analysis Time Period:	Existing
Freeway/Direction:	SH_358_WB
From/To:	Rodd_Fld_Nile_Dr
Jurisdiction:	Corpus_Christi
Analysis Year:	2015
Description:	Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	3533	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	940	v
Trucks and buses	1	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.995	
Driver population factor, fp	1.00	
Flow rate, vp	1259	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	1259	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	18.0-	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

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Operational Analysis

Analyst:	mk
Agency or Company:	
Date Performed:	1/8/2016
Analysis Time Period:	Existing
Freeway/Direction:	SH_358_WB
From/To:	Rodd_Fld_Lexinton
Jurisdiction:	Corpus_Christi
Analysis Year:	2015

Description: Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	2731	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	726	v
Trucks and buses	1	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.995	
Driver population factor, fp	1.00	
Flow rate, vp	973	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	973	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	13.9	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

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Operational Analysis

Analyst:	mk
Agency or Company:	
Date Performed:	1/8/2016
Analysis Time Period:	Existing
Freeway/Direction:	SH_358_WB
From/To:	JFK_Bridge
Jurisdiction:	Corpus_Christi
Analysis Year:	2015
Description:	Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	1458	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	388	v
Trucks and buses	1	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.995	
Driver population factor, fp	1.00	
Flow rate, vp	779	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	779	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	11.1	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

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Operational Analysis

Analyst:	mk
Agency or Company:	
Date Performed:	1/8/2016
Analysis Time Period:	Existing
Freeway/Direction:	SH_358_WB
From/To:	Flour_Bluff_Waldron
Jurisdiction:	Corpus_Christi
Analysis Year:	2015

Description: Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	2348	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	624	v
Trucks and buses	1	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.995	
Driver population factor, fp	1.00	
Flow rate, vp	837	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	837	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	12.0	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

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Operational Analysis

Analyst:	mk
Agency or Company:	
Date Performed:	1/8/2016
Analysis Time Period:	Existing
Freeway/Direction:	SH_358_WB
From/To:	Everhart_Staples
Jurisdiction:	Corpus_Christi
Analysis Year:	2015
Description:	Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	5647	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1502	v
Trucks and buses	1	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.995	
Driver population factor, fp	1.00	
Flow rate, vp	2012	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	2012	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	62.4	mi/h
Number of lanes, N	3	
Density, D	32.3	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.65

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Operational Analysis

Analyst: mk
Agency or Company:
Date Performed: 1/8/2016
Analysis Time Period: Existing
Freeway/Direction: SH_358_EB
From/To: Rodd_Fld_Nile_Dr
Jurisdiction: Corpus_Christi
Analysis Year: 2015
Description: Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	3174	veh/h
Peak-hour factor, PHF	0.96	
Peak 15-min volume, v15	827	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	1113	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	1113	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	15.9	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

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Operational Analysis

Analyst:	mk
Agency or Company:	
Date Performed:	1/8/2016
Analysis Time Period:	Existing
Freeway/Direction:	SH_358_EB
From/To:	Rodd_Fld_Lexinton
Jurisdiction:	Corpus_Christi
Analysis Year:	2015

Description: Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	2454	veh/h
Peak-hour factor, PHF	0.96	
Peak 15-min volume, v15	639	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	861	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	861	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	12.3	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

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Operational Analysis

Analyst:	mk
Agency or Company:	
Date Performed:	1/8/2016
Analysis Time Period:	Existing
Freeway/Direction:	SH_358_EB
From/To:	JFK_Bridge
Jurisdiction:	Corpus_Christi
Analysis Year:	2015
Description:	Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	1310	veh/h
Peak-hour factor, PHF	0.96	
Peak 15-min volume, v15	341	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	689	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	689	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	9.8	pc/mi/ln
Level of service, LOS	A	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.65

Phone: Fax:
E-mail:

Operational Analysis

Analyst: mk
Agency or Company:
Date Performed: 1/8/2016
Analysis Time Period: Existing
Freeway/Direction: SH_358_EB
From/To: Flour_Bluff_Waldron
Jurisdiction: Corpus_Christi
Analysis Year: 2015
Description: Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	2110	veh/h
Peak-hour factor, PHF	0.96	
Peak 15-min volume, v15	549	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	740	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	740	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	10.6	pc/mi/ln
Level of service, LOS	A	

Overall results are not computed when free-flow speed is less than 55 mph.

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Phone: Fax:
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Operational Analysis

Analyst:	mk
Agency or Company:	
Date Performed:	1/8/2016
Analysis Time Period:	Existing
Freeway/Direction:	SH_358_EB
From/To:	Everhart_Staples
Jurisdiction:	Corpus_Christi
Analysis Year:	2015
Description:	Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	5074	veh/h
Peak-hour factor, PHF	0.96	
Peak 15-min volume, v15	1321	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	1779	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	1779	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	66.1	mi/h
Number of lanes, N	3	
Density, D	26.9	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

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Operational Analysis

Analyst: mk
Agency or Company:
Date Performed: 1/8/2016
Analysis Time Period: B
Freeway/Direction: SH_358_EB
From/To: Everhart_Staples
Jurisdiction: Corpus_Christi
Analysis Year: 2035
Description: Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	6156	veh/h
Peak-hour factor, PHF	0.96	
Peak 15-min volume, v15	1603	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	2159	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	2159	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	59.3	mi/h
Number of lanes, N	3	
Density, D	36.4	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

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Operational Analysis

Analyst:	mk
Agency or Company:	
Date Performed:	1/8/2016
Analysis Time Period:	Build
Freeway/Direction:	SH_358_EB
From/To:	Flour_Bluff_Waldron
Jurisdiction:	Corpus_Christi
Analysis Year:	2035

Description: Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	3571	veh/h
Peak-hour factor, PHF	0.96	
Peak 15-min volume, v15	930	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	1252	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	1252	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	3	
Density, D	17.9	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

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Phone: Fax:
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Operational Analysis

Analyst: mk
Agency or Company:
Date Performed: 1/8/2016
Analysis Time Period: B
Freeway/Direction: SH_358_EB
From/To: JFK_Bridge
Jurisdiction: Corpus_Christi
Analysis Year: 2035
Description: Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	2260	veh/h
Peak-hour factor, PHF	0.96	
Peak 15-min volume, v15	589	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	1189	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	1.00	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	3.2	mi/h
Free-flow speed, FFS	72.2	mi/h

LOS and Performance Measures

Flow rate, vp	1189	pc/h/ln
Free-flow speed, FFS	72.2	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	2	
Density, D	17.0	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.65

Phone: Fax:
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Operational Analysis

Analyst:	mk
Agency or Company:	
Date Performed:	1/8/2016
Analysis Time Period:	B
Freeway/Direction:	SH_358_EB
From/To:	Rodd_Fld_Lexinton
Jurisdiction:	Corpus_Christi
Analysis Year:	2035
Description:	Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	4835	veh/h
Peak-hour factor, PHF	0.96	
Peak 15-min volume, v15	1259	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	1696	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	1696	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	67.1	mi/h
Number of lanes, N	3	
Density, D	25.3	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.65

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Operational Analysis

Analyst:	mk
Agency or Company:	
Date Performed:	1/8/2016
Analysis Time Period:	B
Freeway/Direction:	SH_358_EB
From/To:	Rodd_Fld_Nile_Dr
Jurisdiction:	Corpus_Christi
Analysis Year:	2035
Description:	Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	4265	veh/h
Peak-hour factor, PHF	0.96	
Peak 15-min volume, v15	1111	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	1496	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	1496	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	69.0	mi/h
Number of lanes, N	3	
Density, D	21.7	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.65

Phone: Fax:
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Operational Analysis

Analyst:	mk
Agency or Company:	
Date Performed:	1/8/2016
Analysis Time Period:	B
Freeway/Direction:	SH_358_WB
From/To:	Everhart_Staples
Jurisdiction:	Corpus_Christi
Analysis Year:	2035

Description: Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	6853	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1823	v
Trucks and buses	1	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.995	
Driver population factor, fp	1.00	
Flow rate, vp	2442	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	2442	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	52.1	mi/h
Number of lanes, N	3	
Density, D	46.9	pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.65

Phone: Fax:
E-mail:

Operational Analysis

Analyst: mk
Agency or Company:
Date Performed: 1/8/2016
Analysis Time Period: Build
Freeway/Direction: SH_358_WB
From/To: Flour_Bluff_Waldron
Jurisdiction: Corpus_Christi
Analysis Year: 2035
Description: Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	3974	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1057	v
Trucks and buses	1	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.995	
Driver population factor, fp	1.00	
Flow rate, vp	1416	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	1416	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	69.5	mi/h
Number of lanes, N	3	
Density, D	20.4	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.65

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	mk
Agency or Company:	
Date Performed:	1/8/2016
Analysis Time Period:	B
Freeway/Direction:	SH_358_WB
From/To:	JFK_Bridge
Jurisdiction:	Corpus_Christi
Analysis Year:	2035
Description:	Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	2516	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	669	v
Trucks and buses	1	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.995	
Driver population factor, fp	1.00	
Flow rate, vp	1345	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	1.00	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	3.2	mi/h
Free-flow speed, FFS	72.2	mi/h

LOS and Performance Measures

Flow rate, vp	1345	pc/h/ln
Free-flow speed, FFS	72.2	mi/h
Average passenger-car speed, S	69.8	mi/h
Number of lanes, N	2	
Density, D	19.3	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.65

Phone: Fax:
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Operational Analysis

Analyst: mk
Agency or Company:
Date Performed: 1/8/2016
Analysis Time Period: B
Freeway/Direction: SH_358_WB
From/To: Rodd_Fld_Lexinton
Jurisdiction: Corpus_Christi
Analysis Year: 2035
Description: Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	5381	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1431	v
Trucks and buses	1	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.995	
Driver population factor, fp	1.00	
Flow rate, vp	1918	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	1918	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	64.0	mi/h
Number of lanes, N	3	
Density, D	30.0	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

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Operational Analysis

Analyst:	mk
Agency or Company:	
Date Performed:	1/8/2016
Analysis Time Period:	B
Freeway/Direction:	SH_358_WB
From/To:	Rodd_Fld_Nile_Dr
Jurisdiction:	Corpus_Christi
Analysis Year:	2035
Description:	Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	4748	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1263	v
Trucks and buses	1	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.995	
Driver population factor, fp	1.00	
Flow rate, vp	1692	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	1692	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	67.2	mi/h
Number of lanes, N	3	
Density, D	25.2	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.65

Phone: Fax:
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Operational Analysis

Analyst:	mk
Agency or Company:	
Date Performed:	1/8/2016
Analysis Time Period:	NB
Freeway/Direction:	SH_358_WB
From/To:	Rodd_Fld_Nile_Dr
Jurisdiction:	Corpus_Christi
Analysis Year:	2035

Description: Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	4899	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1303	v
Trucks and buses	1	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.995	
Driver population factor, fp	1.00	
Flow rate, vp	1746	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	1746	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	66.5	mi/h
Number of lanes, N	3	
Density, D	26.2	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

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Phone:                                     Fax:
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_________________________Operational Analysis__________________________________

Analyst:                mk
Agency or Company:
Date Performed:         1/8/2016
Analysis Time Period:   Nb
Freeway/Direction:      SH_358_WB
From/To:                Rodd_Fld_Lexinton
Jurisdiction:           Corpus_Christi
Analysis Year:          2035
Description:  Corpus_Christi_PEL_Project

_________________________Flow Inputs and Adjustments___________________________

Volume, V                                  5752           veh/h
Peak-hour factor, PHF                      0.94
Peak 15-min volume, v15                    1530           v
Trucks and buses                           1              %
Recreational vehicles                      0              %
Terrain type:                              Level
    Grade                                  -              %
    Segment length                         -              mi
Trucks and buses PCE, ET                   1.5
Recreational vehicle PCE, ER               1.2
Heavy vehicle adjustment, fHV              0.995
Driver population factor, fp               1.00
Flow rate, vp                              2050           pc/h/ln

_________________________Speed Inputs and Adjustments__________________________

Lane width                                 12.0           ft
Right-side lateral clearance               6.0            ft
Total ramp density, TRD                    2.00           ramps/mi
Number of lanes, N                         3
Free-flow speed:                           Base
     FFS or BFFS                           75.4           mi/h
Lane width adjustment, fLW                 0.0            mi/h
Lateral clearance adjustment, fLC          0.0            mi/h
TRD adjustment                             5.8            mi/h
Free-flow speed, FFS                       69.6           mi/h

_________________________LOS and Performance Measures__________________________

Flow rate, vp                              2050           pc/h/ln
Free-flow speed, FFS                       69.6           mi/h
Average passenger-car speed, S             61.6           mi/h
Number of lanes, N                         3
Density, D                                 33.3           pc/mi/ln
Level of service, LOS                      D
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Overall results are not computed when free-flow speed is less than 55 mph.

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Operational Analysis

Analyst:	mk
Agency or Company:	
Date Performed:	1/8/2016
Analysis Time Period:	Nb
Freeway/Direction:	SH_358_WB
From/To:	JFK_Bridge
Jurisdiction:	Corpus_Christi
Analysis Year:	2035
Description:	Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	2969	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	790	v
Trucks and buses	1	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.995	
Driver population factor, fp	1.00	
Flow rate, vp	1587	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	1.00	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	3.2	mi/h
Free-flow speed, FFS	72.2	mi/h

LOS and Performance Measures

Flow rate, vp	1587	pc/h/ln
Free-flow speed, FFS	72.2	mi/h
Average passenger-car speed, S	68.3	mi/h
Number of lanes, N	2	
Density, D	23.2	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

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Phone: Fax:
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Operational Analysis

Analyst: mk
Agency or Company:
Date Performed: 1/8/2016
Analysis Time Period: Nb
Freeway/Direction: SH_358_WB
From/To: Flour_Bluff_Waldron
Jurisdiction: Corpus_Christi
Analysis Year: 2035
Description: Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	4422	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1176	v
Trucks and buses	1	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.995	
Driver population factor, fp	1.00	
Flow rate, vp	1576	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	1576	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	68.4	mi/h
Number of lanes, N	3	
Density, D	23.1	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.65

Phone: Fax:
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Operational Analysis

Analyst:	mk
Agency or Company:	
Date Performed:	1/8/2016
Analysis Time Period:	Nb
Freeway/Direction:	SH_358_WB
From/To:	Everhart_Staples
Jurisdiction:	Corpus_Christi
Analysis Year:	2035
Description:	Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	6960	veh/h
Peak-hour factor, PHF	0.94	
Peak 15-min volume, v15	1851	v
Trucks and buses	1	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.995	
Driver population factor, fp	1.00	
Flow rate, vp	2480	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	2480	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	51.0	mi/h
Number of lanes, N	3	
Density, D	48.6	pc/mi/ln
Level of service, LOS	F	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.65

Phone: Fax:
E-mail:

Operational Analysis

Analyst: mk
Agency or Company:
Date Performed: 1/8/2016
Analysis Time Period: Nb
Freeway/Direction: SH_358_EB
From/To: Rodd_Fld_Nile_Dr
Jurisdiction: Corpus_Christi
Analysis Year: 2035
Description: Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	4401	veh/h
Peak-hour factor, PHF	0.96	
Peak 15-min volume, v15	1146	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	1543	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	1543	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	68.6	mi/h
Number of lanes, N	3	
Density, D	22.5	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.65

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	mk
Agency or Company:	
Date Performed:	1/8/2016
Analysis Time Period:	Nb
Freeway/Direction:	SH_358_EB
From/To:	Rodd_Fld_Lexinton
Jurisdiction:	Corpus_Christi
Analysis Year:	2035
Description:	Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	5168	veh/h
Peak-hour factor, PHF	0.96	
Peak 15-min volume, v15	1346	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	1812	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	1812	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	65.7	mi/h
Number of lanes, N	3	
Density, D	27.6	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.65

Phone: Fax:
E-mail:

Operational Analysis

Analyst: mk
Agency or Company:
Date Performed: 1/8/2016
Analysis Time Period: Nb
Freeway/Direction: SH_358_EB
From/To: JFK_Bridge
Jurisdiction: Corpus_Christi
Analysis Year: 2035
Description: Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	2667	veh/h
Peak-hour factor, PHF	0.96	
Peak 15-min volume, v15	695	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	1403	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	1.00	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	3.2	mi/h
Free-flow speed, FFS	72.2	mi/h

LOS and Performance Measures

Flow rate, vp	1403	pc/h/ln
Free-flow speed, FFS	72.2	mi/h
Average passenger-car speed, S	69.5	mi/h
Number of lanes, N	2	
Density, D	20.2	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.65

Phone: Fax:
E-mail:

Operational Analysis

Analyst: mk
Agency or Company:
Date Performed: 1/8/2016
Analysis Time Period: Nb
Freeway/Direction: SH_358_EB
From/To: Flour_Bluff_Waldron
Jurisdiction: Corpus_Christi
Analysis Year: 2035
Description: Corpus_Christi_PEL_Project

Flow Inputs and Adjustments

Volume, V	3973	veh/h
Peak-hour factor, PHF	0.96	
Peak 15-min volume, v15	1035	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	1393	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-side lateral clearance	6.0	ft
Total ramp density, TRD	2.00	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Base	
FFS or BFFS	75.4	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
TRD adjustment	5.8	mi/h
Free-flow speed, FFS	69.6	mi/h

LOS and Performance Measures

Flow rate, vp	1393	pc/h/ln
Free-flow speed, FFS	69.6	mi/h
Average passenger-car speed, S	69.6	mi/h
Number of lanes, N	3	
Density, D	20.0	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

```
                HCS 2010: Basic Freeway Segments Release 6.65



Phone:                                      Fax:
E-mail:

_________________________Operational Analysis__________________________________

Analyst:                mk
Agency or Company:
Date Performed:         1/8/2016
Analysis Time Period:   Nb
Freeway/Direction:      SH_358_EB
From/To:                Everhart_Staples
Jurisdiction:           Corpus_Christi
Analysis Year:          2035
Description:  Corpus_Christi_PEL_Project

_________________________Flow Inputs and Adjustments___________________________

Volume, V                                   6253           veh/h
Peak-hour factor, PHF                       0.96
Peak 15-min volume, v15                     1628           v
Trucks and buses                            2              %
Recreational vehicles                       0              %
Terrain type:                               Level
    Grade                                   -              %
    Segment length                          -              mi
Trucks and buses PCE, ET                    1.5
Recreational vehicle PCE, ER                1.2
Heavy vehicle adjustment, fHV               0.990
Driver population factor, fp                1.00
Flow rate, vp                               2193           pc/h/ln

_________________________Speed Inputs and Adjustments__________________________

Lane width                                  12.0           ft
Right-side lateral clearance                6.0            ft
Total ramp density, TRD                     2.00           ramps/mi
Number of lanes, N                          3
Free-flow speed:                            Base
     FFS or BFFS                            75.4           mi/h
Lane width adjustment, fLW                  0.0            mi/h
Lateral clearance adjustment, fLC           0.0            mi/h
TRD adjustment                              5.8            mi/h
Free-flow speed, FFS                        69.6           mi/h

_________________________LOS and Performance Measures__________________________

Flow rate, vp                               2193           pc/h/ln
Free-flow speed, FFS                        69.6           mi/h
Average passenger-car speed, S              58.6           mi/h
Number of lanes, N                          3
Density, D                                  37.4           pc/mi/ln
Level of service, LOS                       E
```

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Overall results are not computed when free-flow speed is less than 55 mph.
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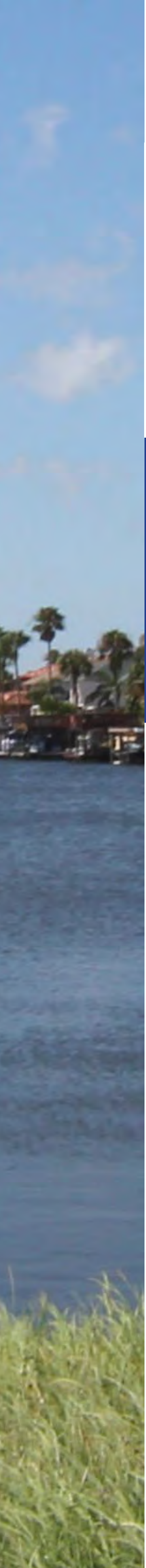
Appendix G

Crossing of the Laguna Madre Bridge Type Study



CROSSING OF THE LAGUNA MADRE BRIDGE TYPE STUDY

Regional Parkway Planning and Environment Linkages (PEL) Study

Corpus Christi Metropolitan Planning Organization
City of Corpus Christi

October 2016

CSJ: 0916-00-066

Background

The Corpus Christi Metropolitan Planning Organization (CCMPO), in cooperation with the City of Corpus Christi (CoCC), initiated the Regional Parkway Planning and Environmental Linkages (PEL) Study to further refine transportation needs and potential route alternatives for the Regional Parkway from within two of the seven segments of independent utility identified in the Regional Parkway Mobility Corridor (RPMC) Study (2013). The RPMC yielded Segments A-G. The PEL is focused on Segments A and B, as well as the future extension of Rodd Field Road from Yorktown Boulevard to the Regional Parkway. Segment A extends from the intersection of Park Road 22 (PR 22), on Padre Island to the intersection of Rodd Field Road. Segment B extends from the intersection with Rodd Field Road to the intersection of State Highway 286 (SH 286) (Crosstown Expressway).

There has been discussion going back to the mid-eighties among the CCMPO, COCC, Nueces and San Patricio Counties and other interested parties concerning the need for an alternate major transportation route within Nueces County, particularly on the south side of Corpus Christi. This alternate route would be designed to address the expanding housing, industrial and commercial developments in Nueces County and the resulting traffic congestion and safety issues, such as providing for an alternate hurricane evacuation route off Padre Island.

The PEL Study is a collaborative and integrated approach to identify mobility solutions. The PEL affords great opportunity for the CCMPO and CoCC to review and consider community, environmental, and economic issues early in the transportation planning process. In turn, the CCMPO and CoCC will use the information, analysis, and products developed during the PEL to inform future environmental reviews and decisions.

Study Purpose

The purpose of this technical memorandum is to describe the type and size (T&S) options studied and provide a recommendation for the proposed bridge structures. Its outline is as follows:

- Overall Project Limits and Proposed Construction Methodology
- Criteria used for Bridge T&S Options
- Bridge T&S Options Studied
- Other Bridge Types Considered but Not Studied
- Bridge Option Summary
- Bridge Recommendation
- Appendices
    - Appendix A – Typical Approach Span Structural Details
    - Appendix B – Example Main Span Structure Types

Overall Project Limits and Proposed Construction Methodology

The overall project limits for Segments A and B of the proposed Regional Parkway, as well as the future extension of Rodd Field Road, are shown in **Figure 1** below.

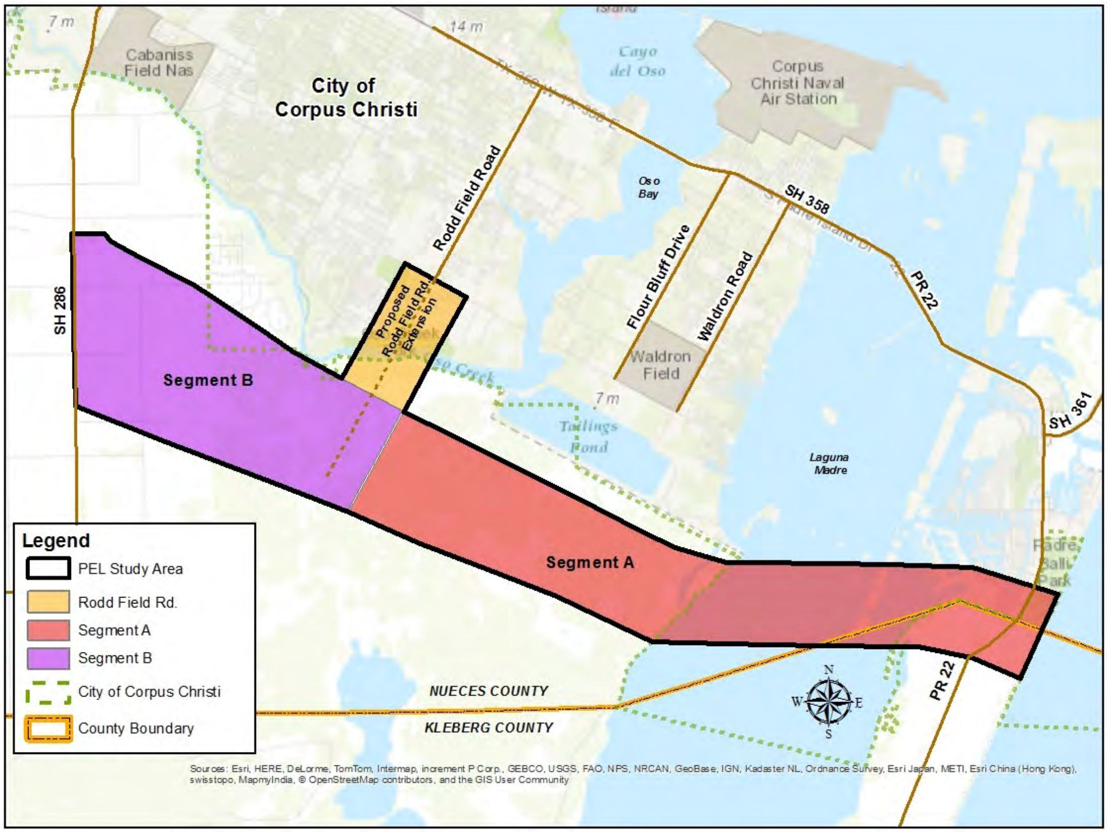


Figure 1

This Bridge Type Study focuses on the proposed crossing of the Laguna Madre on the eastern end of Segment A (shown above).

All bridge structures will be designed in accordance with the most recent applicable AASHTO Load Resistance Factor Design (LRFD) Bridge Design Specifications, TxDOT Bridge Project Development Manual, TxDOT Bridge Design Manual-LRFD, and TxDOT Bridge Railing Manual.

Construction methodology is anticipated to vary depending on the proximity of the construction activities relative to the navigable Gulf Intracoastal Waterway (GIWW) and sensitive aquatic habitats. To minimize disturbance to aquatic habitats, it is anticipated that construction will utilize a span by span, or “launched”, construction methodology from previously constructed portions of the proposed roadway/bridge.

A minimum 125-ft clear opening with a minimum of 73-ft vertical clearance over mean sea level must be maintained over the GIWW in accordance with the United States Coast Guard Bridge Clearance Guide. An opening of at least 200-ft is preferred to match other regional GIWW bridge structures such as the SH 332 bridge, otherwise known as Surfside, and the John F. Kennedy Memorial Causeway. The superstructure will need to be resistant to corrosion common to the coastal environment. Therefore the main span and adjacent approach spans are anticipated to utilize a balanced cantilever segmental construction.

Criteria used for Bridge T&S Options

Several bridge T&S options have been studied as part of this technical memorandum to recommend an optimum structure. Several factors or criteria were used to determine the recommended structure type for the causeway bridge, they are:

- Bridge Width
- Low Chord Elevation for Main Span of GIWW
- Bridge Bent Type
- Bridge Bent Footing Locations and Orientation
- Other Bridge Criteria

Bridge T&S Options Studied

The following tables lists the options studied on the following pages. They include descriptions with advantages and disadvantages, as well as estimated square foot construction costs for approach and main span structure types.

Examples of these superstructure types can be found in **Appendix A** for the approach spans and **Appendix B** for the main span.

Approach Spans

LIST OF BRIDGE T&S OPTIONS STUDIED – APPROACH SPANS	
OPTION	**DESCRIPTION**
1	Precast prestressed TX I-Girders w/ conventional multi-pile interior piers.
2	Precast prestressed U-beams w/ conventional multi-pile interior piers
3	Precast prestressed decked slab beams w/ conventional multi-pile interior piers

OPTION 1	
Bridge Description: TX I-Girders w/ conventional concrete interior piers	
ADVANTAGES	DISADVANTAGES
Cost competitive with U-Beams	More girders required than U-beams
Easier construction for wide range of roadway geometrics	Longer spans make “launching” construction from previous span difficult
ESTIMATED BRIDGE CONSTRUCTION COSTS	
Total Estimated Bridge Construction Cost =	$70/SF

OPTION 2	
Bridge Description: U-Beams w/ conventional concrete interior piers	
ADVANTAGES	DISADVANTAGES
More aesthetic than TX I-Girders	Heavier beams make “launching” more difficult
Lowest cost	Shorter spans than available with TX I-Girders
Fewer beams to erect	Construction more difficult than TX I-Girders
ESTIMATED BRIDGE CONSTRUCTION COSTS	
Total Estimated Bridge Construction Cost =	$65 / SF

OPTION 3		
Bridge Description: Decked slab beams w/ conventional concrete interior piers		
ADVANTAGES	DISADVANTAGES	
Faster construction through the use of asphaltic concrete overlay	Short span lengths requiring more interior piers and greater environmental impact	
Shallow superstructure depth	Most expensive option	
ESTIMATED BRIDGE CONSTRUCTION COSTS		
Total Estimated Bridge Construction Cost =		$190/SF

Main Span

LIST OF BRIDGE T&S OPTIONS STUDIED – MAIN SPAN	
OPTION	**DESCRIPTION**
1	Spliced precast concrete girders w/ aesthetic single column bents
2	Precast segmental concrete w/ aesthetic single column bents
3	Steel trapezoidal box girders w/ aesthetic single column bents
4	Extradosed precast segmental concrete w/ aesthetic single column bents

OPTION 1		
Bridge Description: Spliced Precast Concrete Girders w/ aesthetic columns		
ADVANTAGES	DISADVANTAGES	
Fabrication similar to common TX I-girders	Heavy sections / higher transportation cost	
Plant fabrication for high quality concrete	Stability of long sections during hauling and erection	
Minimal impact to ship / barge traffic on GIWW	Post-tension duct grouting critical to long term corrosion resistance	
Continuous girders provide the structural efficiency necessary for long spans	Requires large cranes on barges for erection	
Resistant to corrosion	Temporary shoring, strong-backs or pier brackets necessary if spliced within spans	
ESTIMATED BRIDGE CONSTRUCTION COSTS		
Total Estimated Bridge Construction Cost =		$170/SF

OPTION 2	
Bridge Description: Precast segmental concrete w/ aesthetic columns	
ADVANTAGES	DISADVANTAGES
Aesthetic	Space for setup of casting yard
Segments can be cast near construction site minimizing transportation cost	Gantry system required for construction
Minimal impact to ship / barge traffic on GIWW	Post-tension duct grouting critical to long term corrosion resistance
Structurally efficient. Capable of long spans	
Resistant to corrosion	
Plant fabrication for high quality concrete	
ESTIMATED BRIDGE CONSTRUCTION COSTS	
Total Estimated Bridge Construction Cost =	$150/SF

OPTION 3	
Bridge Description: Steel trapezoidal box girders w/ aesthetic columns	
ADVANTAGES	DISADVANTAGES
Aesthetic when combined with U-beams	Fabricated off site and barged to bridge location. Heavy sections lead to higher transportation cost
Structurally efficient allowing long spans	Requires large cranes on barges for field piece erection
Rapid erection of field pieces	Cast in place concrete slab slows completion
	Susceptible to corrosion even when painted
ESTIMATED BRIDGE CONSTRUCTION COSTS	
Total Estimated Bridge Construction Cost =	$150/SF

OPTION 4	
Bridge Description: Extradosed precast segmental concrete w/ aesthetic columns	
ADVANTAGES	DISADVANTAGES
Structurally efficient. Minimizes superstructure depth	Extradose cables susceptible to corrosion
Aesthetic	Gantry system for erection of segments
Segments can be cast near construction site minimizing transportation cost	End spans limited to 60%-80% of main span.
Minimal impacts to ship / barge traffic on GIWW	Extradose cables may require dampening system for wind loads
Plant fabrication for high quality concrete	Post-tension duct grouting critical to long term corrosion resistance
ESTIMATED BRIDGE CONSTRUCTION COSTS	
Total Estimated Bridge Construction Cost =	$250/SF

Other Bridge Types Considered but Not Studied

Other bridge types were initially considered for the approach and main spans on the Regional Parkway over the Laguna Madre but were quickly removed from the “short-list” for various reasons.

Approach Spans

- Precast Prestressed Concrete X-beams

The precast prestressed concrete x-beam system is similar in nature to the decked slab beams considered in Option 3. The X-beam system offers span lengths greater than the decked slab beams, but does not offer the precast deck system of the decked slab beams which would expedite construction. The X-beam system did not offer a great enough benefit in added span length to warrant further consideration.

- Steel Beams / Steel Plate Girders

Steel beams / plate girders and their associated bolted connections are very susceptible to corrosion in a coastal environment even when painted. It is anticipated that the long term maintenance costs would outweigh any benefits offered by this structure type to warrant further consideration.

Main Span

- Steel Truss

While steel truss bridges can provide the necessary clear span and aesthetics typically sought for highly visible structures such at this, they are also highly susceptible to corrosion in a coastal environment even when painted. It is anticipated that the long term maintenance costs would outweigh any benefits offered by this structure type to warrant further consideration.

- Steel Plate Girders

While steel plate girders can provide a cost effective solution for long spans, they typically are not aesthetic in nature. Highly visible structures such as this would warrant a level of aesthetic treatment greater than typically found on a plate girder structure. In addition, plate girders and their multitude of bolted connections are highly susceptible to corrosion in a coastal environment even when painted. It is anticipated that the long term maintenance costs would outweigh any benefits offered by this structure type to warrant further consideration.

Bridge Type Summary

The following tables summarize each the various bridge options available for the Regional Parkway structure over the Laguna Madre:

LIST OF T&S OPTIONS	
Option	**Description**
1	Approach Spans – TX I-Girders / Main Span – Spliced Precast Concrete Girders
2	Approach Spans – TX I-Girders / Main Span - Precast Segmental Concrete
3	Approach Spans – TX I-Girders / Main Span – Steel Trapezoidal Box Girders
4	Approach Spans – TX I-Girders / Main Span – Extradosed Precast Segmental Conc.
5	Approach Spans – Prestressed U-Beams / Main Span – Spliced Precast Concrete Girders
6	Approach Spans – Prestressed U-Beams / Main Span - Precast Segmental Concrete
7	Approach Spans – Prestressed U-Beams / Main Span – Steel Trapezoidal Box Girders
8	Approach Spans – Prestressed U-Beams / Main Span – Extradosed Precast Segmental Concrete
9	Approach Spans – Decked Slab Beams / Main Span – Spliced Precast Concrete Girders
10	Approach Spans – Decked Slab Beams / Main Span - Precast Segmental Concrete
11	Approach Spans – Decked Slab Beams / Main Span – Steel Trapezoidal Box Girders
12	Approach Spans – Decked Slab Beams / Main Span – Extradosed Precast Segmental Conc.

COMPARISON OF T&S OPTIONS – ADVANTAGES / DISADVANTAGES		
Option	**Primary Advantages**	**Primary Disadvantages**
1	Low Cost approaches / corrosion resistance	Temporary shoring, strong-backs or pier brackets necessary if spliced within spans
2	Low Cost / corrosion resistance	Need for a nearby casting yard
3	Low cost approach spans	Main span elements susceptible to corrosion / mixed aesthetics
4	Low cost approach spans	Main span extradose cables susceptible to corrosion
5	Low Cost approaches / corrosion resistance	Miss matched aesthetics / Temporary shoring requirements
6	Low cost / corrosion resistance / aesthetic	Need for a nearby casting yard
7	Low cost approach spans / aesthetic	Main span elements susceptible to corrosion
8	Low cost approach spans / aesthetic	Main span extradose cables susceptible to corrosion
9	corrosion resistance / minimal superstructure depth	Short approach spans / Temporary shoring requirements
10	corrosion resistance / minimal superstructure depth	Short approach spans. Need for a nearby casting yard.
11	corrosion resistance / minimal superstructure depth	Short approach spans / main span elements susceptible to corrosion / mixed aesthetics
12	corrosion resistance / minimal superstructure depth	Short approach spans / main span extradose cables susceptible to corrosion

Bridge Type Recommendation

HDR recommends Option #6 be continued to preliminary and final design based on the estimated construction cost, improved aesthetics, and the potential for impacts to aquatic habitat and shipping traffic. This option consists of precast, prestressed U-beams on the approach spans and precast segmental for the main spans. Option #6 provides the necessary GIWW horizontal and vertical clearance requirements and corrosion resistance sought in a coastal environment while providing a construction method that has the least impact to ship and barge traffic within the GIWW. This option also provides an aesthetic and cost effective solution for the proposed Regional Parkway and would allow the aesthetic U-beams to be incorporated into the other overpass structures located inland or on Padre Island, such as a future direct connector between PR 22 and SH 361, for a consistent theme.

As shown in the comparison tables on the previous page, Option #6 is the lowest magnitude cost option studied. This type of superstructure and substructure combination has been successfully implemented in other coastal environments and is common in Texas coastal regions of Texas and over the GIWW.

REGIONAL PARKWAY PEL STUDY

BRIDGE TYPE STUDY
TECHNICAL MEMORANDUM

APPENDIX A
TYPICAL APPROACH SPAN
STRUCTURAL DETAILS

FIGURE 1 - PRECAST PRESTRESSED CONCRETE TX I-GIRDERS

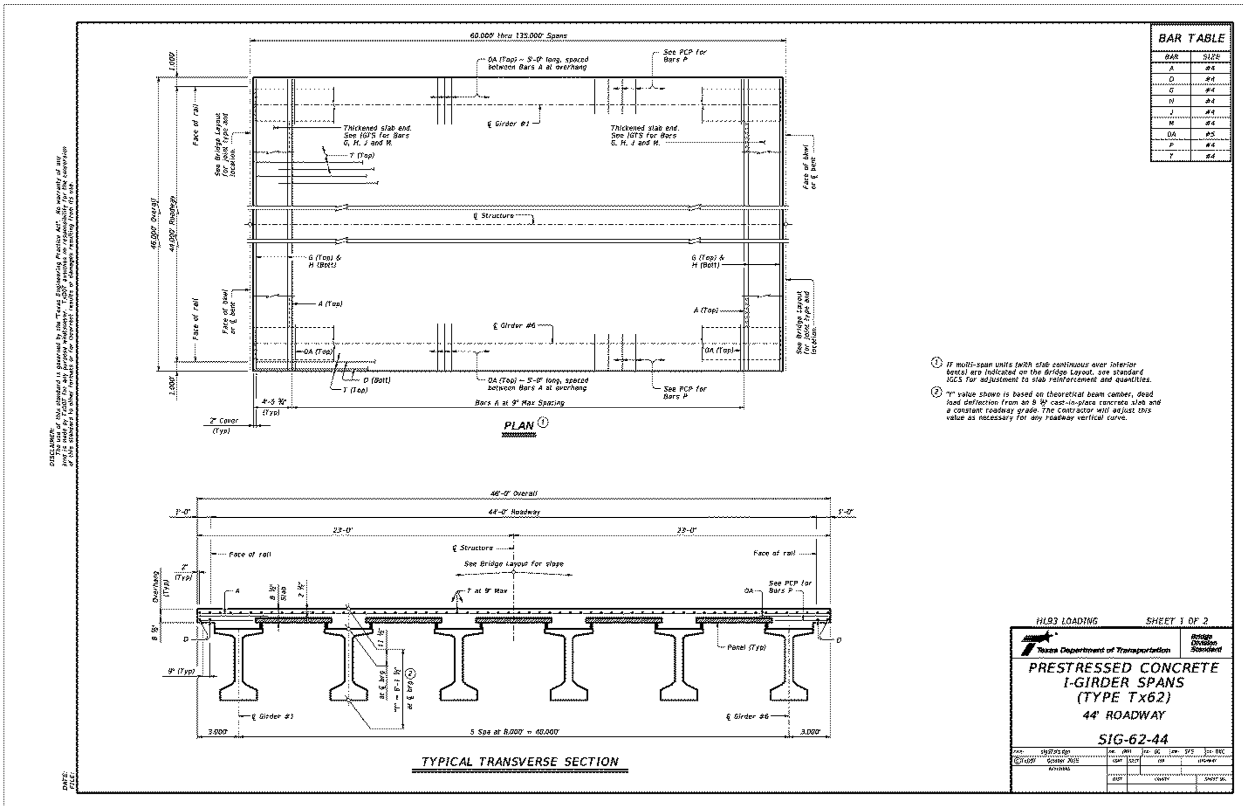


FIGURE 2 - PRECAST PRESTRESSED CONCRETE U-BEAMS

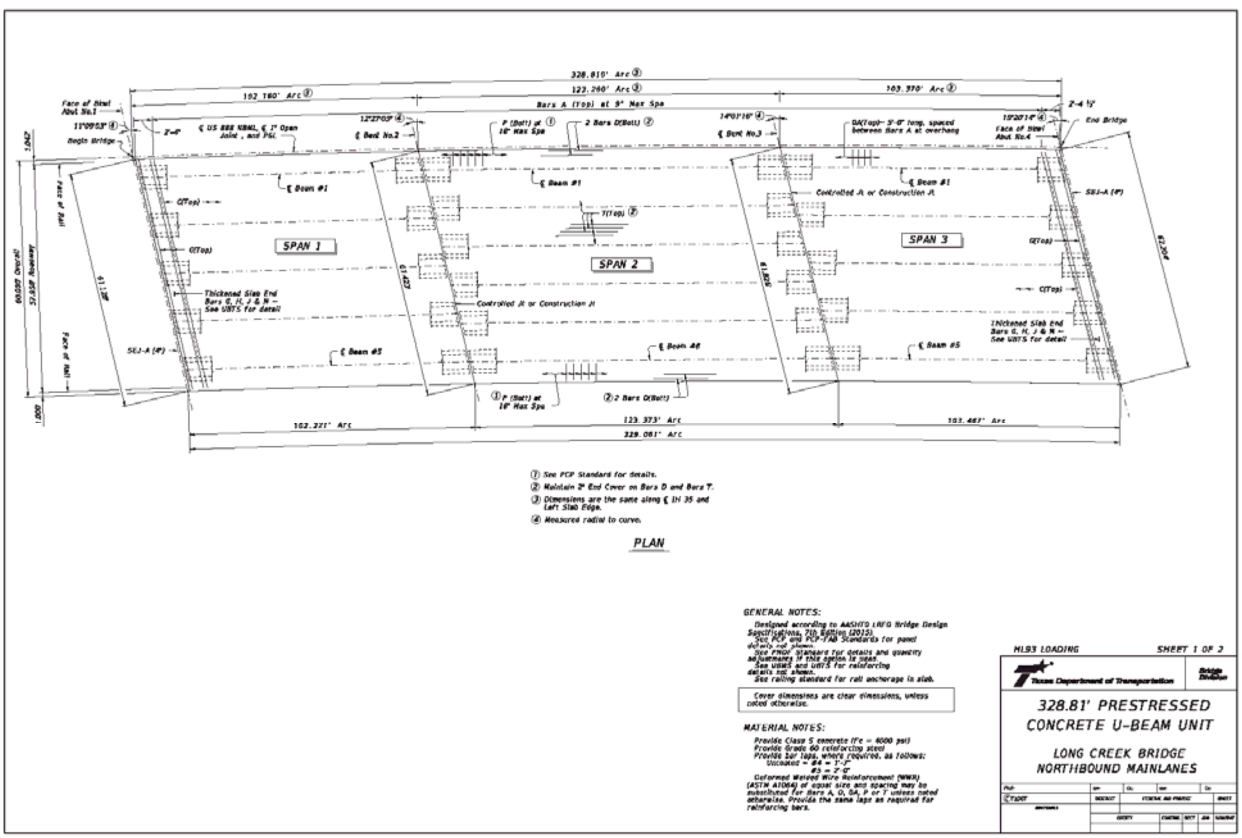


FIGURE 3 - PRECAST PRESTRESSED CONCRETE U-BEAMS (CON'T)

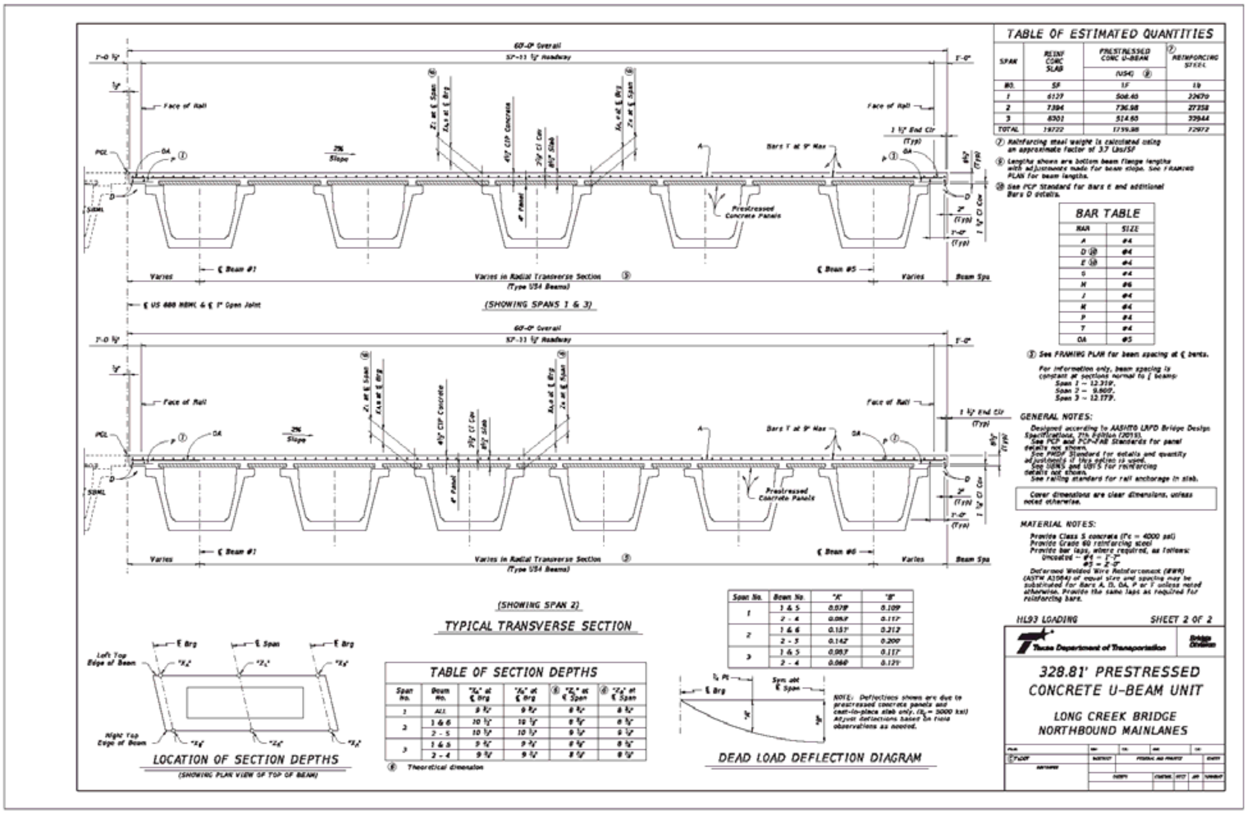
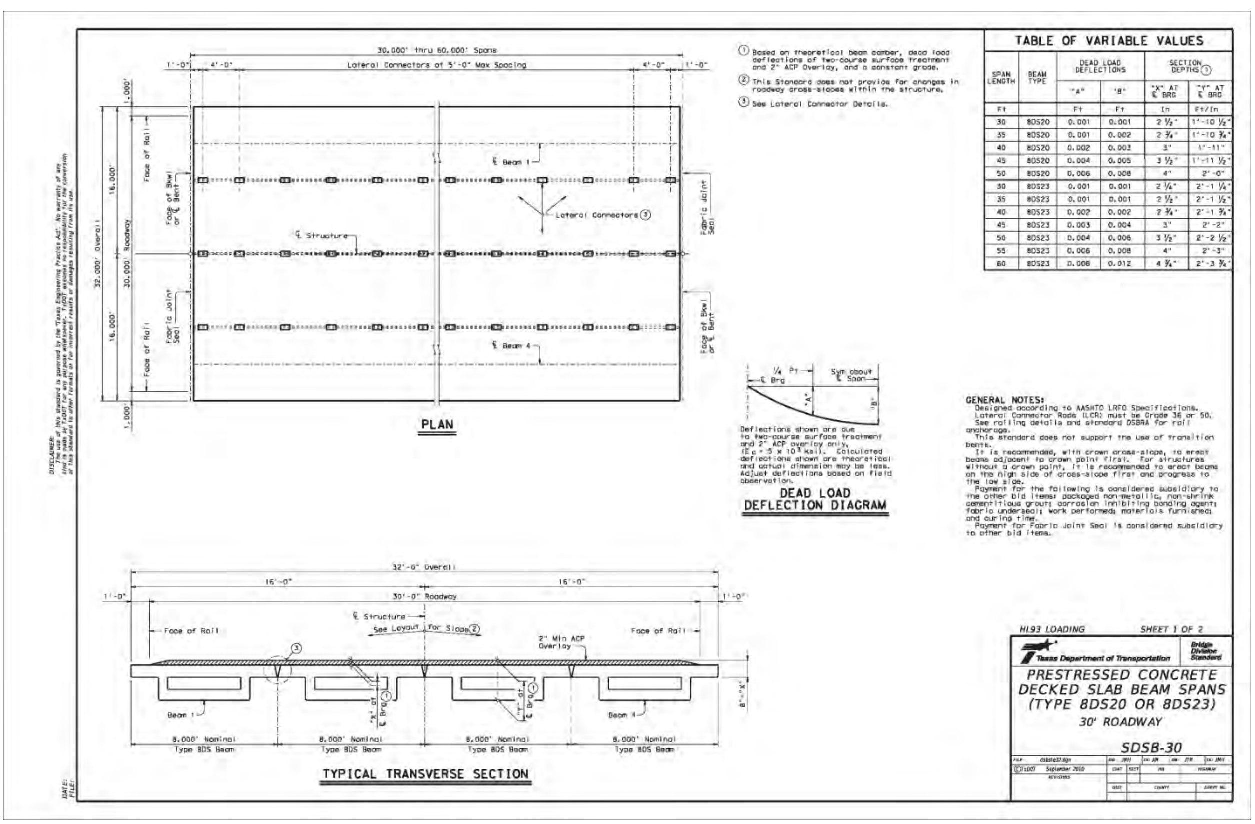


FIGURE 4 - PRECAST PRESTRESSED CONCRETE DECKED SLAB BEAMS



REGIONAL PARKWAY PEL STUDY

BRIDGE TYPE STUDY

TECHNICAL MEMORANDUM

APPENDIX B

EXAMPLE MAIN SPAN

STRUCTURE TYPES

FIGURE 1 - PRECAST PRESTRESSED SPLICED CONCRETE I-GIRDERS

FIGURE 2 - PRECAST PRESTRESSED SPLICED CONCRETE I-GIRDERS

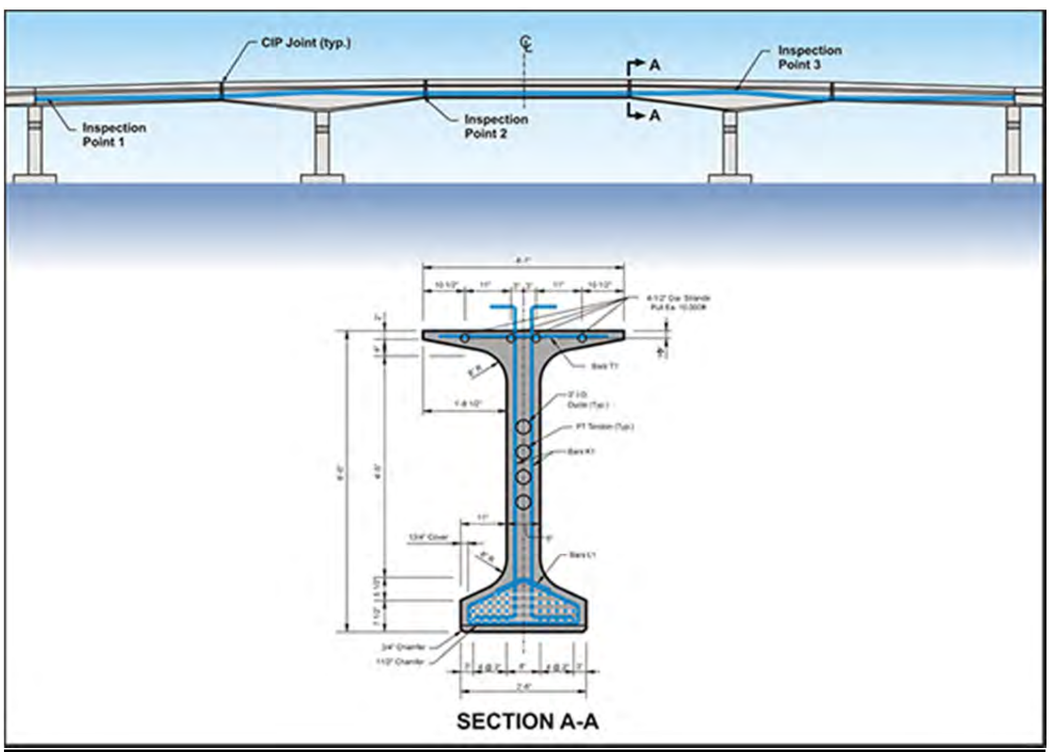


FIGURE 3 - PRECAST SEGMENTAL CONCRETE

FIGURE 4 - PRECAST SEGMENTAL CONCRETE

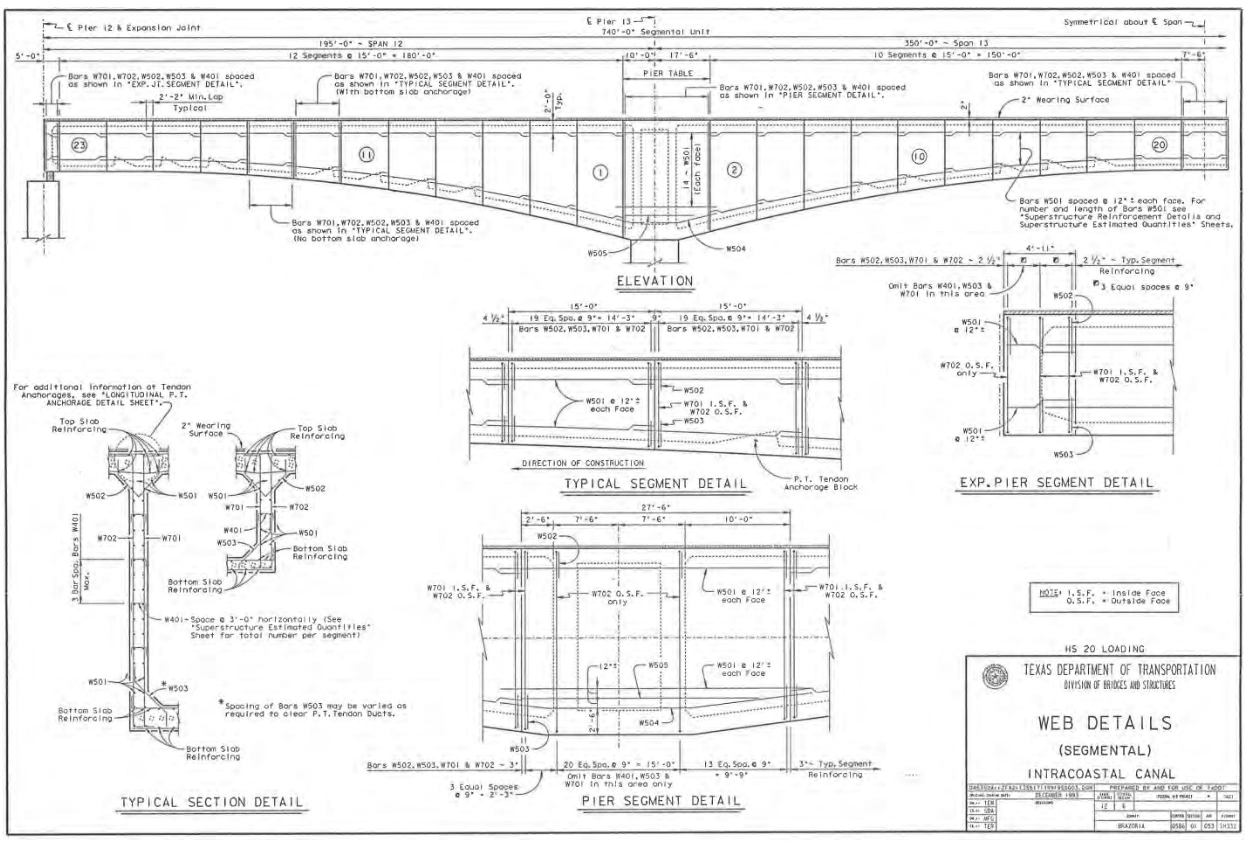


FIGURE 5 - TRAPEZOIDAL STEEL BOX GIRDERS

FIGURE 6 - TRAPEZOIDAL STEEL BOX GIRDERS

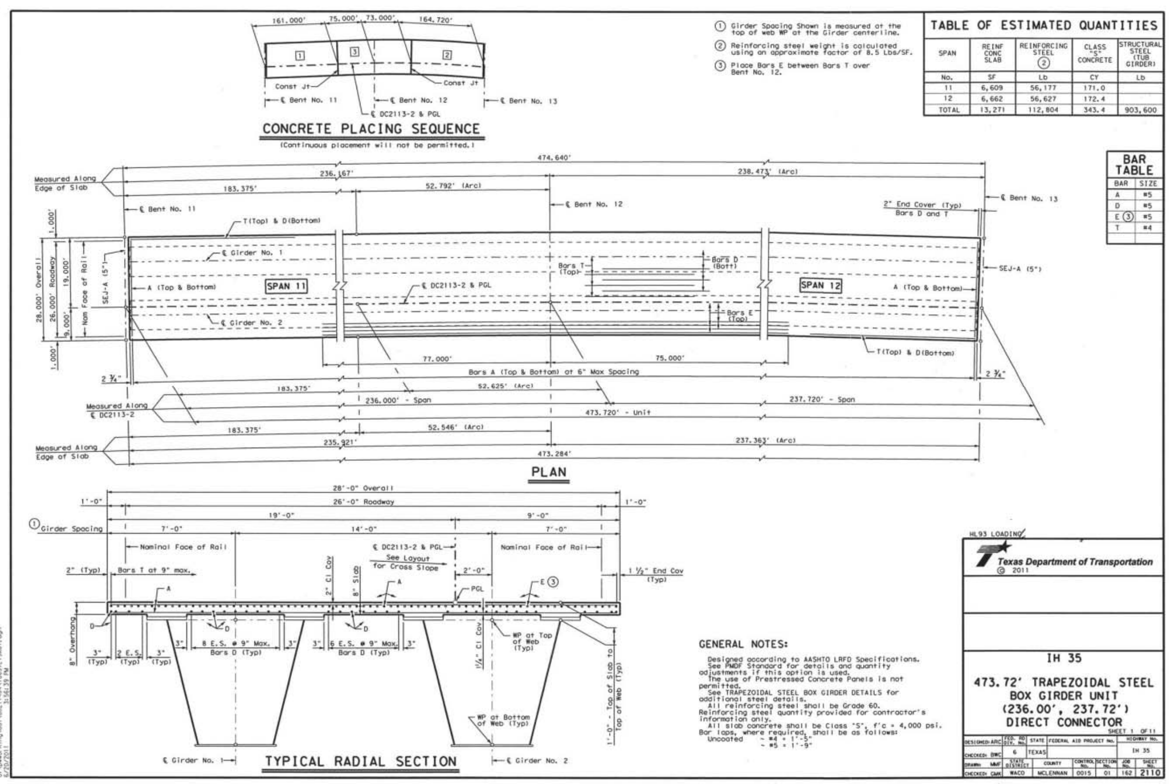
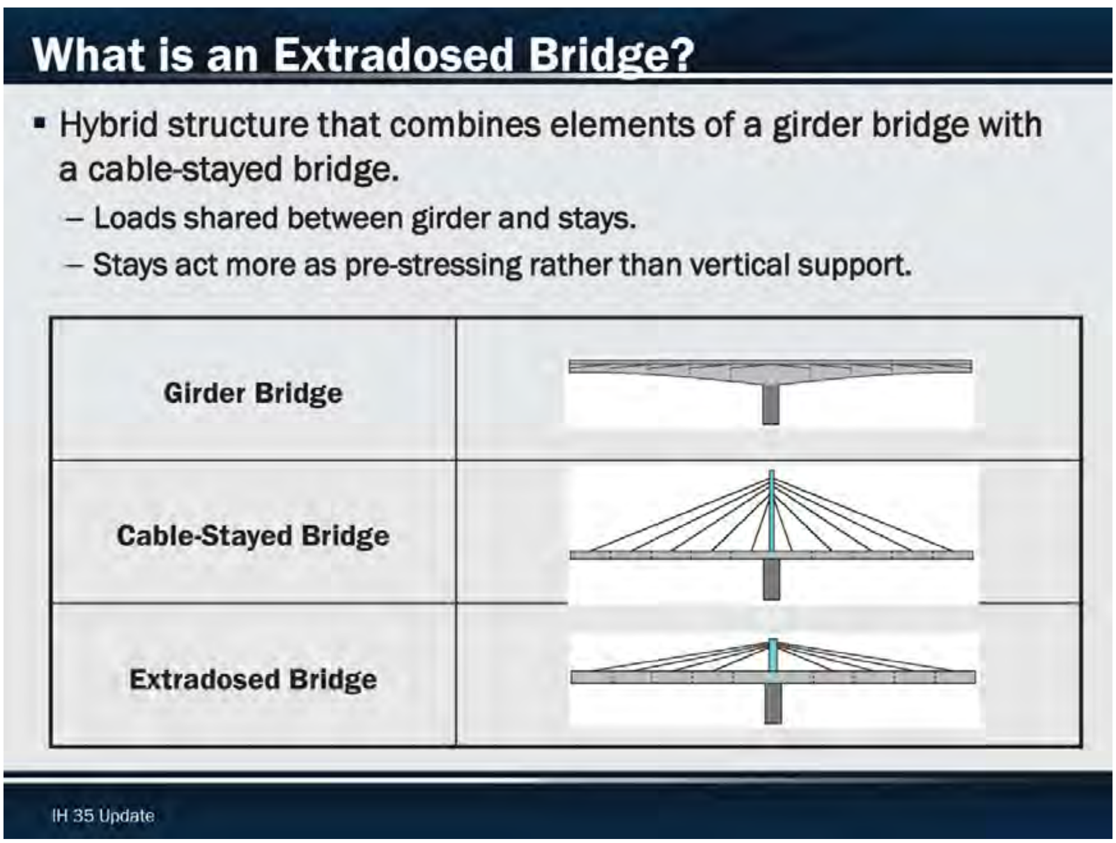
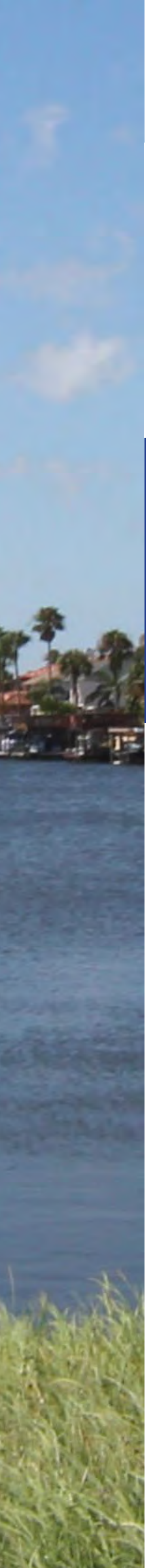


FIGURE 7 - EXTRADOSED PRECAST SEGMENTAL CONCRETE

FIGURE 8 - EXTRADOSED PRECAST SEGMENTAL CONCRETE





Appendix H

Exhibits, Design Summary Report, and Preliminary Cost Estimates

DESIGN SUMMARY REPORT

TECHNICAL MEMORANDUM

Regional Parkway - Planning and Environmental Linkages (PEL) Study

Corpus Christi Metropolitan Planning Organization

February, 2016

CSJ: 0916-00-066

Introduction

This technical memorandum will serve as a guide for planning and design of the Regional Parkway within the Corpus Christi MSA. Two segments of the Parkway are undergoing continued refinement in order to more clearly define right-of-way needs and to build community awareness and support. Segment A extends from Park Road (PR) 22 to the future Rodd Field Road extension and Segment B extends from the Rodd Field Road extension to SH 286 (Crosstown Expressway). The basic design criteria recommended for use in planning and design is referenced from the Texas Department of Transportation (TxDOT) Roadway Design Manual, dated October, 2014. The following outlines the major design elements to be considered and evaluated. The design summary report attached as *Exhibit A* outlines the proposed design parameters.

Functional Classification

The first step in the design process is to define the function that the Regional Parkway is to serve. The two major considerations in functionally classifying a roadway are mobility and access. Mobility and access are inversely related - that is, as access is increased, mobility is decreased. Roadways are functionally classified first as either urban, suburban, or rural. The current land uses in the area are rural. In the case of Regional Parkway - Segments A and B functionally should be classified as suburban due to the proximity of the project to urban growth and development on the south side of Corpus Christi and Padre Island. Suburban roadways have both urban and rural characteristics and serve as transitions between low speed urban streets and high speed rural highways. The hierarchy of the functional highway system within either the urban, suburban, or rural area consists of the following:

- *Principal arterial* - main movement (high mobility, limited access)
- *Minor arterial* - interconnects principal arterials (moderate mobility, limited access)
- *Collectors* - connects local roads to arterials (moderate mobility, moderate access)
- *Local roads and streets* - permits access to abutting land (high access, limited mobility)

Traffic Characteristics

Information on traffic characteristics is vital in selecting the appropriate geometric features of a roadway. Necessary traffic data includes traffic volume, traffic speed, and percentage of trucks or other large vehicles.

Traffic volume is an important basis for determining such elements as number and width of travel lanes, shoulder width, bike and pedestrian accommodations, traffic control, right-of-way (ROW) width, etc. Traffic volumes may be expressed in terms of average daily traffic (ADT) or design hourly volumes (DHV). These volumes may be used to calculate the service flow rate, which is typically used for evaluations of geometric design alternatives.

Traffic speed is influenced by traffic volume, roadway capacity, roadway geometry, weather, traffic control devices, posted speed limit, and individual driver preference. The influence, roadway geometry, is impacted by “design speed”. Design speed is a selected speed used to determine the various geometric design features of the roadway. Design elements for Regional

Parkway such as sight distance, vertical and horizontal alignment, lane and shoulder widths, roadside clearances, superelevation, etc., will be influenced by design speed.

Sight Distance

Sight distance is one of several principal elements of design common to all types of highways and streets. Consideration of sight distance is critical as CCMPO, City, and HDR plan for the Regional Parkway. This criterion will be instrumental as the selection of geometric elements is made to provide adequate sight distance. For this DSR, the following four types of sight distance are considered:

- *Stopping Sight Distance*
- *Decision Sight Distance*
- *Passing Sight Distance*
- *Intersection Sight Distance*

Horizontal Alignment

Horizontal alignment is they layout of a roadway path by utilizing straight lines and curves. In the design of horizontal alignment, it is necessary to establish the proper relation between design speed and horizontal curvature. The two basic elements of horizontal curves are “curve radius” and “superelevation”.

Vertical Alignment

Vertical alignment of a roadway is used to either deviate from or follow the existing terrain upon which it will be constructed. The two basic elements of vertical alignment are “grades” and “vertical curves”. Grades of a roadway have an impact on traffic speed. Travelling up a roadway grade (hill) may decrease a vehicles speed relative to the length of the grade. Travelling down a grade may have the opposite effect with an increase in vehicle speed. Vertical curves are utilized to provide a gradual change between traveling up and down roadway grades or vice-versa. Vertical curve design is based on meeting criteria for sight distance.

Cross Sectional Elements

In addition to horizontal and vertical alignment, there are cross sectional elements which impact the safety of a roadway. Some elements are within the footprint of the roadway, and other elements are considered part of the roadside. Roadside safety is influenced by the cross-sectional elements designed for the area between a roadway’s outside shoulder and the right-of-way limits. The following are common cross sectional elements considered during roadway design:

- *Pavement Cross Slope*
- *Side Slopes and Ditch Slopes*
- *Median Design*
- *Lane Widths*

- *Shoulder Widths*
- *Sidewalks and Pedestrian Elements*
- *Curb and Curb & Gutters*
- *Roadside Recovery Area*
- *Horizontal Clearance to Obstructions*
- *Transit Elements*
- *Bicycle Elements*
- *Driveway Placement*

Hydrology (Drainage)

Hydrology deals with estimating runoff magnitudes as the result of precipitation. Runoff can be considered in terms of peak discharge. Roadway drainage structures are designed to convey predetermined discharges in order to avoid significant flood hazards. Some examples of traditional drainage structures are:

- *Storm Drain Systems*
- *Culverts*
- *Bridges*

The magnitude of a peak discharge is a function of their expected frequency of occurrence, which in turn relates to the magnitude of the potential flood damage and hazard. The occurrence of a flood event is governed by chance. The chance of flooding is described by a statistical analysis of flooding history in the subject watershed or in similar watersheds. Because it is not economically feasible, nor necessarily desirable in terms of project footprint, to design a structure for the maximum possible magnitude of peak discharge, the designer must choose a design frequency appropriate for the roadway structures. The expected frequency for a given flood is the reciprocal of the probability or chance that the flood will be equaled or exceeded in a given year, thus yielding the following chart:

Frequency versus Probability	
Frequency (Years)	Probability (%)
2	50
5	20
10	10
25	4
50	2
100	1

In addition to traditional drainage structures, context sensitive solutions will be considered for the Regional Parkway corridor. The goal of context sensitive solutions is to leverage the natural drainage features within the corridor to minimize the quantity of drainage structures thereby achieving a balanced resilient design.

EXHIBIT A

ITEM №	DESCRIPTION	PAY UNIT	UNIT PRICE	A-1 QTY	A-1 COST	A-2 QTY	A-2 COST	A-3 QTY	A-3 COST
	CLEARING								
100-6001	PREPARING ROW	AC	$ 3,000	410.0	$ 1,230,000	400.0	$ 1,200,000	400.0	$ 1,200,000
	PAVEMENT SECTION								
260-2073	LIME TRT (SUBGRADE) (8")	SY	$ 8	397,430	$ 3,179,440	389,870	$ 3,118,960	345,410	$ 2,763,280
260-6002	LIME (HYDRATED LIME (SLURRY))	Ton	$ 130	7,150	$ 929,500	7,020	$ 912,600	6,220	$ 808,600
247-6041	FL BS (CMP IN PLC) (TYA GR1 - 2) (FNAL POS	CY	$ 69	86,850	$ 5,992,650	85,190	$ 5,878,110	75,480	$ 5,208,120
340-6034	D - GR HMA (SQ) TY - C PG64 - 22	Ton	$ 130	105,650	$ 13,734,500	103,640	$ 13,473,200	91,820	$ 11,936,600
	DRAINAGE								
	Rural Drainage	**LS**	**$ 1**	**298,076**	$ 298,076	**292,405**	$ 292,405	**259,061**	$ 259,061
	STRUCTURES								
	Bridge	SF	$ 160	2,254,660	$ 360,745,600	2,254,660	$ 360,745,600	2,418,780	$ 387,004,800
	CONCEPT COST SUBTOTAL				$386,110,000		$385,621,000		$409,180,000
	CONTINGENCIES (20%)*				$77,222,000		$77,124,200		$81,836,000
	CONCEPT COST TOTAL				**$463,332,000**		**$462,745,000**		**$491,016,000**
	CONCEPT COST PER MILE				**$47.2M**		**$47.6M**		**$52.3M**
	*includes engineering, env mitigation, utilities/ROW								

ITEM №	DESCRIPTION	A-4 QTY	A-4 COST	A-5 QTY	A-5 COST	A-6 QTY	A-6 COST	A-7 QTY	A-7 COST	A-8 QTY	A-8 COST
	CLEARING										
100-6001	PREPARING ROW	380.0	$ 1,140,000	380.0	$ 1,140,000	380.0	$ 1,140,000	410.0	$ 1,230,000	420.0	$ 1,260,000
	PAVEMENT SECTION										
260-2073	LIME TRT (SUBGRADE) (8")	347,920	$ 2,783,360	340,420	$ 2,723,360	353,010	$ 2,824,080	395,330	$ 3,162,640	409,530	$ 3,276,240
260-6002	LIME (HYDRATED LIME (SLURRY))	6,260	$ 813,800	6,130	$ 796,900	6,350	$ 825,500	7,120	$ 925,600	7,370	$ 958,100
247-6041	FL BS (CMP IN PLC) (TYA GR1 - 2) (FNAL POS	76,030	$ 5,246,070	74,390	$ 5,132,910	77,140	$ 5,322,660	86,390	$ 5,960,910	89,490	$ 6,174,810
340-6034	D - GR HMA (SQ) TY - C PG64 - 22	92,490	$ 12,023,700	90,500	$ 11,765,000	93,840	$ 12,199,200	105,090	$ 13,661,700	108,870	$ 14,153,100
	DRAINAGE										
	Rural Drainage	**260,938**	$ 260,938	**255,317**	$ 255,317	**264,756**	$ 264,756	**296,498**	$ 296,498	**307,148**	$ 307,148
	STRUCTURES										
	Bridge	2,211,420	$ 353,827,200	2,176,010	$ 348,161,600	2,124,200	$ 339,872,000	2,254,660	$ 360,745,600	2,285,410	$ 365,665,600
	CONCEPT COST SUBTOTAL		$376,095,000		$369,975,000		$362,448,000		$385,983,000		$391,795,000
	CONTINGENCIES (20%)*		$75,219,000		$73,995,000		$72,489,600		$77,196,600		$ 78,359,000
	CONCEPT COST TOTAL		**$451,314,000**		**$443,970,000**		**$434,938,000**		**$463,180,000**		**$470,154,000**
	CONCEPT COST PER MILE		**$49.9M**		**$50.0M**		**$48.6M**		**$42.4M**		**$46.8M**
	*includes engineering, env mitigation, utilities/ROW										

ITEM №	DESCRIPTION	B-1 QTY	B-1 COST	B-2 QTY	B-2 COST	B-3 QTY	B-3 COST	B-4 QTY	B-4 COST
	CLEARING								
100-6001	PREPARING ROW	200.0	$ 600,000	210.0	$ 630,000	190.0	$ 570,000	200.0	$ 600,000
	PAVEMENT SECTION								
260-2073	LIME TRT (SUBGRADE) (8")	235,070	$ 1,880,560	260,650	$ 2,085,200	238,610	$ 1,908,880	326,160	$ 2,609,280
260-6002	LIME (HYDRATED LIME (SLURRY))	4,230	$ 549,900	4,690	$ 609,700	4,290	$ 557,700	5,870	$ 763,100
247-6041	FL BS (CMP IN PLC) (TYA GR1 - 2) (FNAL POS	51,370	$ 3,544,530	56,960	$ 3,930,240	52,140	$ 3,597,660	71,270	$ 4,917,630
340-6034	D - GR HMA (SQ) TY - C PG64 - 22	62,490	$ 8,123,700	69,290	$ 9,007,700	63,430	$ 8,245,900	86,700	$ 11,271,000
	DRAINAGE								
	Rural Drainage	**176,304**	$ 176,304	**195,491**	$ 195,491	**178,957**	$ 178,957	**244,617**	$ 244,617
	STRUCTURES								
	Bridge	914,820	$ 146,371,200	684,260	$ 109,481,600	801,080	$ 128,172,800	94,950	$ 15,192,000
	CONCEPT COST SUBTOTAL		$161,246,000		$125,940,000		$143,232,000		$35,598,000
	CONTINGENCIES (20%)*		$ 32,249,200		$ 25,188,000		$ 28,646,400		$ 7,119,600
	CONCEPT COST TOTAL		**$193,495,000**		**$151,128,000**		**$171,878,000**		**$42,718,000**
	CONCEPT COST PER MILE		**$38.4M**		**$30.4M**		**$35.3M**		**$8.9M**
	*includes engineering, env mitigation, utilities/ROW								

ITEM №	DESCRIPTION	R-1 QTY	R-1 COST	R-2 QTY	R-2 COST	R-3 QTY	R-3 COST
	CLEARING						
100-6001	PREPARING ROW	50.0	$ 150,000	40.0	$ 120,000	40.0	$ 120,000
	PAVEMENT SECTION						
260-2073	LIME TRT (SUBGRADE) (8")	171,280	$ 1,370,240	146,880	$ 1,175,040	151,730	$ 1,213,840
260-6002	LIME (HYDRATED LIME (SLURRY))	3,080	$ 400,400	2,640	$ 343,200	2,730	$ 354,900
247-6041	FL BS (CMP IN PLC) (TYA GR1 - 2) (FNAL POS	37,430	$ 2,582,670	32,100	$ 2,214,900	33,160	$ 2,288,040
340-6034	D - GR HMA (SQ) TY - C PG64 - 22	45,530	$ 5,918,900	39,040	$ 5,075,200	40,330	$ 5,242,900
	DRAINAGE						
	Rural Drainage	**128,460**	$ 128,460	**110,157**	$ 110,157	**113,797**	$ 113,797
	STRUCTURES						
	Bridge	310,650	$ 49,704,000	370,760	$ 59,321,600	250,810	$ 40,129,600
	CONCEPT COST SUBTOTAL		$60,255,000		$68,360,000		$49,463,000
	CONTINGENCIES (20%)*		$12,051,000		$13,672,000		$ 9,892,600
	CONCEPT COST TOTAL		**$72,306,000**		**$82,032,000**		**$59,356,000**
	CONCEPT COST PER MILE		**$24.0M**		**$29.6M**		**$22.7M**
	*includes engineering, env mitigation, utilities/ROW						

Regional Parkway - PEL Study
Project:
Key No.

201-005A Clearing & Grubbing

ALTERNATIVE	Acres
ALT A-1	410.00
ALT A-2	**400.00**
ALT A-3	400.00
ALT A-4	**380.00**
ALT A-5	380.00
ALT A-6	**380.00**
ALT A-7	410.00
ALT A-8	**420.00**
ALT B-1	200.00
ALT B-2	210.00
ALT B-3	190.00
ALT B-4	200.00
ALT R-1	50.00
ALT R-2	40.00
ALT R-3	40.00

Regional Parkway - PEL Study

Project:
Key No.

MATERIAL	Material Depth (in)	Roadway Section Width (ft)	Unit Weight (pcf)	% Lime		
HMAC	5.00	116				
Aggregate Base	8.00	118				
Lime Treated Subgrade	8.00	120	100.00	0.06		

ALTERNATIVE	LT Subgr Area (SY)	End Area Report		LENGTH (FT)	End Area Report		Quantities (TON)	
		Ag Base (SF)	LT Subgr (SF)		Ag Base (CY)	LT Subgr (CY)	HMAC (TON)	Lime (TON)
A-1	397434.12	78.67	80	29807.559	86,847	88,319	105,651	7,154
A-2	389873.04	78.67	80	29240.478	85,194	86,638	103,641	7,018
A-3	345414.77	78.67	80	25906.108	75,480	76,759	91,823	6,217
A-4	347917.36	78.67	80	26093.802	76,026	77,315	92,488	6,263
A-5	340422.43	78.67	80	25531.682	74,389	75,649	90,496	6,128
A-6	353007.70	78.67	80	26475.577	77,139	78,446	93,841	6,354
A-7	395331.29	78.67	80	29649.847	86,387	87,851	105,092	7,116
A-8	409530.51	78.67	80	30714.788	89,490	91,007	108,867	7,372
B-1	235072.44	78.67	80	17630.433	51,368	52,238	62,490	4,231
B-2	260654.34	78.67	80	19549.075	56,958	57,923	69,291	4,692
B-3	238609.11	78.67	80	17895.683	52,141	53,024	63,430	4,295
B-4	326155.90	78.67	80	24461.693	71,271	72,479	86,703	5,871
R-1	171280.43	78.67	80	12846.033	37,428	38,062	45,532	3,083
R-2	146876.65	78.67	80	11015.749	32,095	32,639	39,045	2,644
R-3	151729.20	78.67	80	11379.690	33,156	33,718	40,335	2,731

Regional Parkway - PEL Study
Project:
Key No.

Rural 2-Lane @ 2000' spacing	Length (LF)	# of SET (EA)	Item No.	Unit Cost ($)	Total Cost	
36" RCP	70.00		464-6008	115	8050	
SET 6:1		2	467-6017	5500	11000	

Cost Per Foot 9.525
say $10/LF

ALTERNATIVE	LENGTH (FT)	Drainage Cost ($)
A-1	29807.56	298075.59
A-2	29240.48	292404.78
A-3	25906.11	259061.08
A-4	26093.80	260938.02
A-5	25531.68	255316.82
A-6	26475.58	264755.77
A-7	29649.85	296498.47
A-8	30714.79	307147.88
B-1	17630.43	176304.33
B-2	19549.08	195490.75
B-3	17895.68	178956.83
B-4	24461.69	244616.93
R-1	12846.03	128460.33
R-2	11015.75	110157.49
R-3	11379.69	113796.90

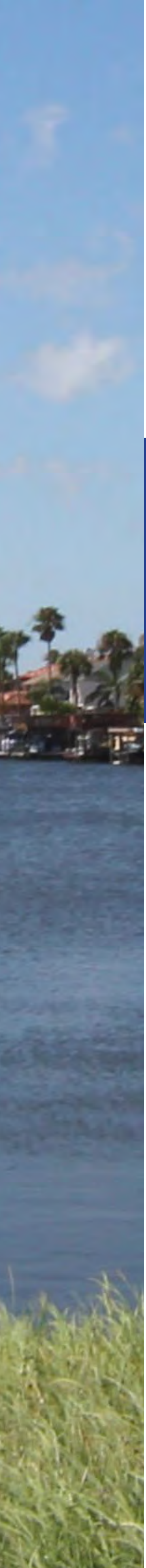
Regional Parkway - PEL Study

Project:
Key No.

BRIDGES

Alternative	LENGTH (FT)	WIDTH (FT)	AREA (SF)	UNIT $	COST $
A-1					
Bridge Structure		102	2,254,655	$ 160	**360,744,816**
Bridge Class Culvert		116		$ 160	**-**
TOTAL			2,254,655.10	$ 160	**360,744,816**
A-2					
Bridge Structure		102	2,254,655	$ 160	**360,744,816**
Bridge Class Culvert		116		$ 160	**-**
TOTAL			2,254,655.10	$ 160	**360,744,816**
A-3					
Bridge Structure		102	2,407,175	$ 160	**385,148,070**
Bridge Class Culvert		116	11,606	$ 160	**1,857,013**
TOTAL			2,418,781.77	$ 160	**387,005,084**
A-4					
Bridge Structure		102	2,199,811	$ 160	**351,969,797**
Bridge Class Culvert		116	11,606	$ 160	**1,857,013**
TOTAL			2,211,417.56	$ 160	**353,826,810**
A-5					
Bridge Structure		102	2,164,410	$ 160	**346,305,569**
Bridge Class Culvert		116	11,600	$ 160	**1,856,000**
TOTAL			2,176,009.80	$ 160	**348,161,569**
A-6					
Bridge Structure		102	2,101,061	$ 160	**336,169,696**
Bridge Class Culvert		116	23,143	$ 160	**3,702,844**
TOTAL			2,124,203.37	$ 160	**339,872,540**
A-7					
Bridge Structure		102	2,254,655	$ 160	**360,744,816**
Bridge Class Culvert		116		$ 160	**-**
TOTAL			2,254,655.10	$ 160	**360,744,816**
A-8					
Bridge Structure		102	2,262,268	$ 160	**361,962,905**
Bridge Class Culvert		116	23,143	$ 160	**3,702,844**

TOTAL		2,285,410.93	$	160	**365,665,749**
B-1					
Bridge Structure	102	903,219	$	160	**144,515,028**
Bridge Class Culvert	116	11,600	$	160	**1,856,000**
TOTAL		914,818.92	$	160	**146,371,028**
B-2					
Bridge Structure	102	684,261	$	160	**109,481,754**
Bridge Class Culvert	116		$	160	**-**
TOTAL		684,260.96	$	160	**109,481,754**
B-3					
Bridge Structure	102	801,082	$	160	**128,173,107**
Bridge Class Culvert	116		$	160	**-**
TOTAL		801,081.92	$	160	**128,173,107**
B-4					
Bridge Structure	102	94,954	$	160	**15,192,571**
Bridge Class Culvert	116		$	160	**-**
TOTAL		94,953.57	$	160	**15,192,571**
R-1					
Bridge Structure	102	310,646	$	160	**49,703,341**
Bridge Class Culvert	116		$	160	**-**
TOTAL		310,645.88	$	160	**49,703,341**
R-2					
Bridge Structure	102	370,757	$	160	**59,321,174**
Bridge Class Culvert	116		$	160	**-**
TOTAL		370,757.34	$	160	**59,321,174**
R-3					
Bridge Structure	102	239,206	$	160	**38,272,909**
Bridge Class Culvert	116	11,604	$	160	**1,856,646**
TOTAL		250,809.72	$	160	**40,129,555**



Appendix I

PEL Questionnaire

REGIONAL PARKWAY PEL STUDY

QUESTIONNAIRE

Corpus Christi Metropolitan Planning Organization
City of Corpus Christi

March 2017
CSJ: 0916-00-066

4401 Westgate Blvd.
Suite 400
Austin, Texas 78745

Olivarri and Associates, Inc., and RVE/LJA Engineering

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INTRODUCTION

The Federal Highway Administration (FHWA) states that the purpose of Planning and Environmental Linkage (PEL) Studies is to "conduct analysis and planning activities with resource agencies and the public in order to produce a transportation planning product that effectively serves the community's transportation needs. The results of the study may be used to inform a subsequent project-specific National Environmental Policy Act (NEPA) process". In order to effectively serve the community's transportation needs, a transportation planning product must address the following general problems:

- Inadequate roadway safety
- Growing congestion due to increased traffic
- Insufficient roadway capacity
- Limited accessibility/connectivity between existing and planned transportation modes
- Structural and functional roadway deficiencies

The PEL Questionnaire is intended to be used as a guide throughout the planning process. The questionnaire is designed to provide a history of decisions and relevant planning information made in the PEL planning phase and to facilitate the transition from planning to a National Environmental Policy Act (NEPA) analysis. When a PEL study is submitted to the FHWA for review the PEL questionnaire is included. The FHWA will then use the questionnaire to assist in determining if the study meets the requirements of 23 CFR §§ 450.212 or 450.318.

This PEL questionnaire will be included as a part of the Regional Parkway PEL Study. The Regional Parkway project location and PEL study area boundary are illustrated in **Figure 1**.

The PEL questions are shown in bold below and are followed by their answers.

1. Background:

a. Who is the sponsor of the PEL study? (State DOT, Local Agency, Other)

The Corpus Christi Metropolitan Planning Organization (CCMPO) is the sponsoring agency for the PEL study and has engaged representatives from the City of Corpus Christi (CoCC), Nueces County, and the Texas Department of Transportation (TxDOT) - Corpus Christi District to assist in coordinating the planning efforts.

b. What is the name of the PEL study document and other identifying project information (e.g. sub-account or STIP numbers, long-range plan, or transportation improvement program years)?

This study is referred to locally as the Regional Parkway Planning and Environmental Linkages (PEL) Study in Nueces County, Texas. The study control-section-job number for this project is 0916-00-066.

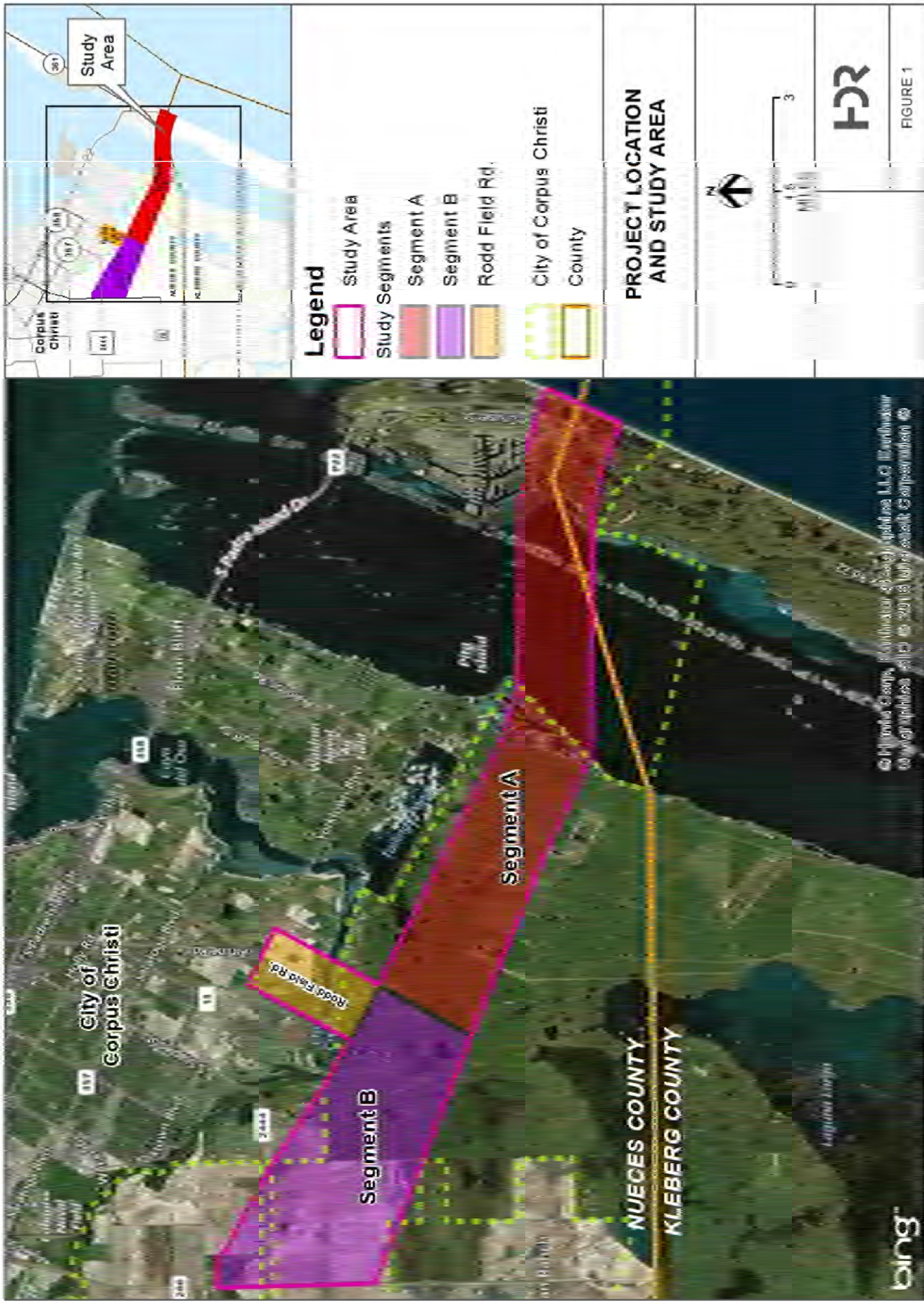


Figure 1. Project Location and Study Area

c. **Who was included on the study team (Name and title of agency representatives, consultants, etc.)?**

CCMPO representatives involved with the PEL include Jeff Pollack, AICP, Transportation Planning Director, and Dr. Raymond Chong, PE, PTOE, Traffic Engineer for the CoCC. In addition to HDR Engineering, Inc. as the prime provider, the consultant team includes Olivarri and Associates, Inc., which is responsible for public outreach and RVE/LJA Engineering, Inc. which is responsible for the surveying and aerial mapping.

d. Provide a description of the existing transportation facility within the corridor, including project limits, modes, functional classification, number of lanes, shoulder width, access control and type of surrounding environment (urban vs. rural, residential vs. commercial, etc.)

The study area is bounded on the east by Park Road 22 (PR 22) on North Padre Island and on the west by SH 286 (Crosstown Expressway). The study area and affected surrounding environment is generally undeveloped until it reaches Padre Island. The island represents most of the residential development within the study area. The proposed extension of Rodd Field Rd. is surrounded by a combination of residential, light commercial and industrial areas south of Yorktown Blvd.

Major roadways within Segment B include SH 286 which is a minor arterial two lane asphalt road with two foot shoulders, and FM 2444 which is similarly constructed. The intersection of these two roadways includes stop signs and a flashing light. Segment B area is primarily rural in nature but does include a very limited amount of residential construction which occurs south of the intersection of FM 2444 and Oso Creek. Additional Segment B roadways include minor arterial county roads which are two lane dirt or asphalt roadways with limited or no shoulders and residential streets.

The area for the proposed extension of Rodd Field Road contains two major collector streets, Yorktown Blvd. (CR 24) which is a four lane concrete roadway with four foot shoulders and sidewalks, and Rodd Field Rd. which is a two lane roadway with two foot shoulders. The intersection of these two roads includes stop signs but no signals. The surrounding area includes undeveloped, residential and commercial areas. The remaining roadways within the Rodd Field Road area include residential streets with two lanes, stop signs and limited curbing.

The Segment A mainland area contains no paved roadways, only unpaved roads utilized for ranching purposes. The portion of this segment which occurs on North Padre Island includes a developed urban area with commercial uses located primarily along Park Road 22. Major roadways within this area include Park Road 22 which is a minor arterial four lane asphalt roadway with a median and four foot shoulders, and Whitecap Blvd. which is similarly constructed. A signalized intersection occurs at the junction of these two roadways. Additional roadways within this portion of the study area include residential two lane streets with stop signs.

e. Provide a brief chronology of the planning activities (PEL study) including the year(s) the studies were completed.

The Regional Parkway PEL Study involves a review of previously prepared planning and development studies in an effort to maintain consistency among area goals and objectives and assist in evaluating strategies that meet them. The reviewed studies include the following documents:

<u>SOUTH LOOP TRANSPORTATION STUDY - OCTOBER 1999</u>

The *South Loop Transportation Study* was undertaken by the CCMPO and completed in October 1999. This report recognized the actual and projected growth in population and vehicular trips and the resulting development pressures affecting the south and northwest sections of the CoCC. The following key issues were central to the study:

- Increasing congestion on SH 358 and on arterials crossing SH 358;
- The role of SH 358 as the only major highway connecting various parts of the CoCC for people who live on the south side and work either downtown, at the Corpus Christi Naval Air Station, area refineries, or other major places of employment on the city's north side;
- Insufficient right-of-way for improving SH 358 or crossing arterials; and
- Emergency evacuation provisions.

Among the subsequent long-term recommendations were actions related to the development of Interstate Highway (IH) 69 in the study area and a recommendation for a second crossing of the Nueces River due to access, capacity and operational limitations of the existing IH 37 river crossing.

<u>REGIONAL PARKWAY MOBILITY CORRIDOR FEASIBILITY STUDY - JANUARY 2013</u>

The *Regional Parkway Mobility Corridor Feasibility Study* was collectively sponsored by the CCMPO, the CoCC, Nueces County, and San Patricio County and published in January 2013. The intent of this study was "to determine whether a new roadway is needed to alleviate congestion, provide an alternate route in portions of Nueces and San Patricio counties, and to plan for forecasted growth in the region. The study focused on the feasibility of what has become known as the Regional Parkway Mobility Corridor (RPMC)."

The purpose of the RPMC Feasibility Study was three-fold and was stated as:

- Reduce congestion and facilitate regional mobility, connectivity and system linkages;
- Facilitate potential economic and population growth and address safety issues; and,
- Provide an alternate hurricane evacuation route.

The study's preferred corridor alternative was subsequently divided into seven segments of independent utility which were designated as Segments A through G. Segment A originates at PR 22 on North Padre Island and Segment G terminates at IH 37, northwest of the CoCC in San Patricio County. Segment A extends from PR 22 northwest to just south of Rodd Field Road and Segment B continues from the terminus of Segment A to SH 286. These two segments as identified in the RPMC Feasibility Study are the subject of the Regional Parkway PEL Study. The feasibility study identified a broad corridor for the RPMC. It was anticipated that a project development process would follow that would identify a specific alignment within this corridor.

<u>CITY OF CORPUS CHRISTI COMPREHENSIVE PLAN CC 2035 - JULY 2015</u>

The July 2015 *Plan CC* draft provides direction for the development of the CoCC over the next twenty years. Plan CC describes a city poised to take advantage of a unique period in history to diversify the regional economy and build a predictable and sustainable platform for development. Plan CC describes itself as a plan “to guide the city to take advantage of the opportunities, invest in the future, and make choices that result in a higher quality of life and a more diversified economy.” The plan is built upon a vision statement and set of principles which will guide the growth and development of the city. As of the date of this questionnaire, the latest draft of the plan was revised August 3, 2016.

f. Are there recent, current, or near future planning studies or projects in the vicinity? What is the relationship of this project to those studies/projects?

The previously cited studies provide a look back and establish the historical thread of the development of the Regional Parkway. Equally important is a look ahead at other documents which serve to guide the planning context and influence the Regional Parkway PEL Study. These planning documents reflect the community vision and act as a pathway to realize that vision. It is the intent of the Regional Parkway PEL Study to align with the community vision and the goals and objectives of the CCMPO Metropolitan Transportation Plan (MTP) and the City of Corpus Christi’s Comprehensive Plan CC 2035.

2. Methodology used:

a. What was the scope of the PEL study and the reason for completing it?

The Regional Parkway Mobility Study which was completed in January 2013 identified seven segments of independent utility (SIU) within the proposed corridor. These segments were then evaluated to determine their prioritization of usage. Once it was concluded that a Regional Parkway route was feasible and merited if constructed in SIU, a project development process was anticipated to follow that would identify a specific alignment within selected segments. Examination of projected traffic volumes, reduction of travel time, and determination of the benefit/cost ratio for each SIU resulted in the selection of Segments A and B as the most suitable for further analysis.

The scope of the Regional Parkway PEL Study is to conduct analysis and planning activities for Segments A and B and an extension of Rodd Field Rd. in an effort to identify an appropriate alignment to be included in the City of Corpus Christi’s *Urban Transportation Plan*. The reason for completing this PEL study is to develop feasible alternatives appropriate for a subsequent project-specific NEPA process.

b. Did you use NEPA-like language? Why or why not?

NEPA-like language was used in developing various work products such as the Environmental Constraints Mapping, Purpose and Need Technical Memorandum, and the Alternatives Evaluation Technical Memorandum. Likewise, our public involvement efforts included multiple rounds of stakeholder and open-house meetings utilizing NEPA-like methodologies to define and evaluate alternatives. The study implemented the use of NEPA-like language in order to validate its processes and promote transparency with potentially affected interests.

c. What were the actual terms used and how did you define them? (Provide examples or list)

- *Study Area* – Refers to the general area of impact that may be reasonably expected as a result of implementing one or more alternatives. The Regional Parkway PEL Study Area occurs south of the main developed areas of the CoCC, and is bounded on the east by PR 22 on North Padre Island and on the west by SH 286.
- *Purpose and Need* -The purpose and need of the project establishes a basis for the development of a range of reasonable alternatives and assists with the identification and evaluation of alternatives and informs the eventual selection of a preferred alternative.
- *Strategies/Alternatives* – Several conceptual strategies were developed including a no-build option. The developed alternatives were conceptual in nature, and not project-level options.
- *Affected Environment* – The existing social, economic, and environmental conditions for the Regional Parkway PEL Study for the Corpus Christi region. The inventory and evaluation of the affected environment comprises the baseline information to be used in further project development.
- *Environmental Justice* – Executive Order (EO) 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations”, requires each Federal agency to “make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low-income populations.”
- *Minority Population* – For the purposes of this study, “minority” populations are defined as non-white populations including Black or African American; American Indian and Alaska Native; Asian; Native Hawaiian and other Pacific Islander; Some Other Race; Two or More Races; and Hispanic persons (who can be of any race).
- *Low-income population* – Persons whose median household income (according to the most recent American Community Survey data) is lower than the Department of Human Services poverty guideline for the most recent year.
- *LEP (Limited English Proficiency)* – The U.S. Department of Justice defines LEP individuals as those “who do not speak English as their primary language and who have a limited ability to read, write, speak, or understand English” as specified by FHWA and EO 13166.

- *Major Traffic Generators* – Facilities which generate large volumes of traffic on a daily basis.
- *Intermodal* –Multiple transportation modes with a high degree of connectivity and interchange between the modes. From a passenger perspective, transportation modes include car, bicycle, bus, train, and on foot. From a freight perspective, modes include rail, truck, airplane, and ship.
- Various other NEPA regulatory terms were used, including: Texas Surface Water Quality Standards (TSWQS); National Flood Insurance Program (NFIP); National Wetland Inventory (NWI); National Ambient Air Quality Standards (NAAQS); Phase I Environmental Site Assessment (ESA); Threatened and Endangered Species; Section 4(f) of the Department of Transportation Act; Section 6(f) of the Land and Water Conservation Act; Section 106 of the National Historic Preservation Act; Historic and Archeological Resources; and Prime Farmland.

d. How do you see these terms being used in NEPA documents?

The terms used in the Regional Parkway PEL Study are consistent with NEPA and environmental terminology and therefore could be seamlessly incorporated into future NEPA studies. This is based on the premise that the methodologies used to arrive at decisions such as the Purpose and Need statement, selection of the universe of alternatives, conceptual strategies evaluation methods, and conceptual solution evaluations were based on compilations of public comment and technical support similar to those typically used in the NEPA process.

e. What were the key steps and coordination points in the PEL decision-making process? Who were the decision-makers and who else participated in those key steps? For example, for the corridor vision, the decision was made by state DOT and the local agency, with buy-in from FHWA, the USACE, and USFWS and other resource/regulatory agencies.

Figure 2 demonstrates the key steps and coordination points of the Regional Parkway PEL decision-making process.

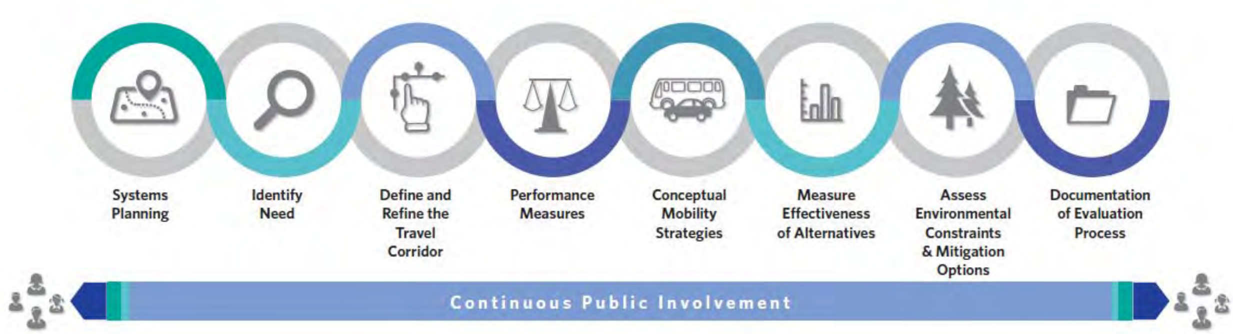


Figure 2. Regional Parkway PEL Process

The CCMPO and the CoCC are the ultimate decision makers for the Regional Parkway PEL Study with input and guidance from the project area stakeholders and input collected from elected officials.

f. How should the PEL information be presented in NEPA?

Technical memoranda produced in support of the Regional Parkway PEL Study are intended to be incorporated into future NEPA documents as appendices and/or by reference and cited accordingly. The environmental evaluation of alternatives based on remote data collection and Geographic Information Service (GIS) data layers will be available for future NEPA compliance efforts as baseline data for an environmental constraints analysis. Additionally, the Open House and Targeted Interview Summary Reports generated from the public engagement efforts of the Regional Parkway PEL Study will provide context for the public's involvement in defining mobility solutions within the Study Area. The Regional Parkway PEL Study information and evaluations will serve as a starting point for any more detailed, project-specific NEPA analyses.

3. Agency coordination:

a. Provide a synopsis of coordination with Federal, tribal, state and local environmental, regulatory and resource agencies. Describe their level of participation and how you coordinated with them.

The Regional Parkway PEL coordination effort with agencies included a series of individual status briefings. Presentations were made to several governmental entities and other local organizations with an interest in the project throughout the study period. Summary reports of presentations were also prepared. Below is a list of presentations and the dates they were made:

- Nueces County Beach Management Committee – July 27, 2016
- Nueces County Park Board – July 28, 2016
- US Fish and Wildlife Service – August 10, 2016
- Coastal Bend Bays and Estuaries – August 10, 2016
- Padre Island National Seashore – August 17, 2016

The status briefings included a general discussion of the goals and objectives for the PEL, evaluation criteria to consider in the alternatives analysis, and how to disseminate PEL to agencies and the public. At each briefing, participants were asked to view the study area maps and evaluation criteria matrix that included Engineering and Environmental criterion and identify environmental concerns and any additional environmentally sensitive areas or constraints for the study team to consider. Additional planned outreach may be scheduled upon completion of the PEL Study.

b. What transportation agencies (e.g. for adjacent jurisdictions) did you coordinate with or were involved during the PEL study?

The Nueces County Corpus Christi MPO and TxDOT - Corpus Christi District were involved in the coordination of the PEL study. Additionally, the study team conducted outreach with the Corpus Christi Regional Transit Authority, City of Port Aransas and Kleberg County. Before finalizing the PEL Study subsequent coordination will be considered with the US Coast Guard (USCG) regarding the planned crossing of the Laguna Madre and spanning of the Gulf Intracoastal Water Way (GIWW).

c. What steps will need to be taken with each agency during NEPA scoping?

- Impacts to wetlands and Waters of the U.S. will need to be coordinated with the U.S. Army Corps of Engineers (USCOE).
- If the selected alignment alternative passes through areas that have been designated as critical habitat for the Piping Plover and other species, USFWS coordination will be required. Any potential impact to sea grasses or Coastal Barrier Resources System areas will also have to be coordinated with the USFWS.
- Nueces County Parks will need to be consulted concerning alternatives that cross Padre Balli Park on North Padre Island.
- The Texas Historical Commission (THC) will need to be coordinated with for the use of lands within the boundary of the King Ranch for a section 4(f) consultation and potential impacts to other cultural resources.

4. Public coordination:

Provide a synopsis of your coordination efforts with the public and stakeholders.

A database of key stakeholders was developed for the project which included property owners within the segments, interested agencies, and public officials. This database was updated and maintained as the project progressed. The property owner list was then divided into three areas, the Southside area of Corpus Christi, Padre Island, and Rodd Field Rd.

The CCMPO website was updated with project information including the Regional Parkway Feasibility Study, the project summary handout, maps of the potential alternatives, and other materials. In addition, a one-page handout was created and updated throughout the project period to provide project information where needed. This handout included background information on the previous feasibility study and current project, an explanation of the PEL process, a project timeline, and maps of the project area. A comment form was also developed and made available to those who were interviewed and attendees at the presentations and landowner meetings. The comment form was designed to be mailed and included contact information intended to provide further project information, answer questions, or used to submit additional comments.

During the study 18 in-person interviews were conducted with more than 26 people (large land owners and developers within the project area, elected officials, etc.) to discuss the project and receive their feedback.

An open house public meeting was held on April 11, 2016 at the Botanical Gardens for landowners within the project area. Invitations were mailed to landowners of property between FM 2444 in the north and FM 70 in the south and between CR 47 in the west and CR 41 in the east, and along the proposed Rodd Field Rd. extension south of Yorktown Blvd. This meeting was attended by 9 people representing 5 properties. Project information boards and schematics for the project were displayed, and project team members were available to discuss the project and answer questions. Verbal comments were noted during the open house, and one written comment was received.

During the study period 19 in person interviews/meetings were conducted with 25 people (large land owners and developers within the project area, elected and appointed officials, group representatives, etc.) to discuss the PEL study and receive feedback from them. Summary reports of each interview were produced for internal tracking of key comments and for identification of issues.

Presentations were made to several governmental entities and other local organizations with an interest in the project throughout the Study period. Presentations made prior to June 7, 2016 were concept meetings to define issues with interested groups before the identified alternatives were available. Presentations held from June 7, 2016 onwards presented the various alternatives to be studied and discussed. Summary reports of presentations are included in the appendix. Below is a list of presentations and the dates the presentations were made:

Conceptual and Issue Definition Presentations

- Corpus Christi City Council – Fall, 2015 (initial discussion on project) – televised on public access
- Local Emergency Planning Commission (included Police, Fire and other public safety) – May 3, 2016

Identified Alternatives Presentations

- Corpus Christi Regional Economic Development - Investors – June 7, 2016
- Island Strategic Action Committee – June 7, 2016
- City of Port Aransas (City Manager) – June 7, 2016
- Island Moon Newspaper – June 7, 2016
- Convention & Visitors Bureau – June 8, 2016
- Thursday Morning Southside Property Owner Group – June 9, 2016
- Corpus Christi Board of Realtors – June 9, 2016
- Corpus Christi Chamber Infrastructure Committee – June 10, 2016
- City of Corpus Christi Chamber of Commerce Board – June 15, 2016
- MPO Technical Advisory Committee – June 17, 2016 (other periodic updates)
- Corpus Christi Transportation Advisory Committee – June 27, 2016
- Corpus Christi Regional Transportation Authority – July 6, 2016
- Padre Island Business Association Board – July 12, 2016
- Del Mar College Board of Regents – July 12, 2016
- City of Corpus Christi Planning Commission – July 13, 2016

- MPO Transportation Policy Committee – July 14, 2016 (other periodic updates)(televised on public access)
- Corpus Christi Regional Economic Development - Board – July 14, 2016
- Scott Cross (Nueces County Parks Director) and Jones Family – July 19, 2016
- Nueces County Beach Management Committee – July 27, 2016
- Nueces County Park Board – July 28, 2016
- US Fish and Wildlife Service – August 10, 2016
- Coastal Bend Bays and Estuaries – August 10, 2016
- Nueces County Commissioners Court – August 17, 2016 (televised on public access)
- Padre Island National Seashore – August 17, 2016
- Greater Corpus Christi Hospitality Association – September 7, 2016
- San Patricio County Commissioners Court – September 12, 2016

PEL Result Summary Presentations

Several additional presentations were given once the draft final PEL Study was made available on the Corpus Christi MPO website to provide the final results and recommendations of the Study. Notification on the availability of the draft Study was provided to anyone who attended the stakeholder interviews, presentations, landowner meeting. It was not possible to provide the draft Study to each attendee through email as the file size was very large. Additional presentations were given to:

- Corpus Christi Transportation Advisory Committee – February 27, 2017
- Corpus Christi City Council – February 28, 2017 - televised
- MPO Technical Advisory Committee – February 16, 2017
- MPO Transportation Policy Committee – March 2, 2017 - televised
- Nueces County Commissioners Court – February 15, 2017 - televised
- United Corpus Christi Chamber of Commerce Infrastructure Committee – February 17, 2017

The Kleberg County Judge was also contacted to provide the results of the study and determine availability for a briefing of the Kleberg County Commissioners Court, but no briefing was scheduled. In addition, a meeting was held with the District Engineer of the Corpus Christi District of TxDOT on March 2, 2017.

Presentations were given to elected bodies, including the Nueces County Commissioners Court, Del Mar College Board of Regents and the City Council of the CoCC. These presentations and the one given to the Corpus Christi Regional Transportation Authority were televised via public access television on a cable channel. There was also media coverage of the effort including local television news broadcast and newspaper stories.

Everyone contacted throughout the study period was encouraged to submit comments concerning the project via comment form, letter, or email. Comment forms were made available at each stakeholder interview, presentation, and public meeting, and project information materials included contact information for the submittal of comments. The public was encouraged to provide comments and feedback via comment form, letter, or email.

The census tracts involved in this study area are predominately Anglo and English speaking. Thus, bilingual materials were not developed for this project.

5. Purpose and Need for the PEL study:

a. What was the scope of the PEL study and the reason for completing it?

The scope of the Regional Parkway PEL Study is to conduct analysis and planning activities for Segments A and B and an extension of Rodd Field Rd. in an effort to identify an appropriate alignment to be included in the City of Corpus Christi's *Urban Transportation Plan*. The reason for completing this PEL study is to develop feasible alternatives appropriate for a subsequent project-specific NEPA process.

b. Provide the purpose and need statement, or the corridor vision and transportation goals and objectives to realize that vision.

The Regional Parkway PEL Purpose and Need Technical Memorandum presents this study's goals and objectives and establishes a pre-NEPA foundation for the purpose and need. A summary of this information is shown in Table 1. The purpose and need will guide our evaluation and comparison of mobility solutions within Segments A & B based upon language and processes commonly used for National Environmental Policy Act (NEPA) studies.

Table 1: Purpose and Need Summary	
Purpose of Regional Parkway PEL Study	Need for Regional Parkway PEL Study
• **Reduce Congestion and Facilitate Regional Mobility, Connectivity and System Linkages** • **Accommodate Potential Growth and Address Operational Safety Issues** • **Address Safety Issues and Provide Alternate Hurricane Evacuation Routes**	• Frequent congestion in the SH 358 (SPID) corridor and other major east-west routes • Lack of redundancy in the transportation network • Provide alternate routes for traffic to/from the south side of Corpus Christi and the Islands

c. What steps will need to be taken during the NEPA process to make this a project- level purpose and need statement?

To apply general purpose and need statements to specific projects in the NEPA phase, the appropriate principles will need to be communicated as they match the proposed mobility solution. For some projects, multiple components of the need may be addressed; however the purpose of each specific mobility solution must be clearly explained and tied back to the need. For example, traffic operations solutions have a purpose of reducing congestion and improving mobility throughout the roadway network while minimizing environmental impacts. In contrast, with a new location option that would expand the capacity and improve connectivity of the roadway system, a balance would be required between maximizing mobility and minimizing the environmental impacts. Each purpose and need statement for an environmental document heading to the NEPA phase needs to be a multi-point articulation of why the project would be effective in meeting the identified mobility needs. The purpose and need statement needs to be refined in order to anchor any project that proceeds into the NEPA process.

6. Range of alternatives:

Planning teams need to be cautious during the alternative screening process; alternative screening should focus on purpose and need/corridor vision, fatal flaw analysis, and possibly mode selection. This may help minimize problems during discussions with resource agencies. Alternatives that have fatal flaws or do not meet the purpose and need/corridor vision will not be considered reasonable alternatives, even if they reduce impacts to a particular resource. Detail the range of alternatives considered, screening criteria, and screening process, including:

a. What types of alternatives were looked at? (Provide a one or two sentence summary and reference document.)

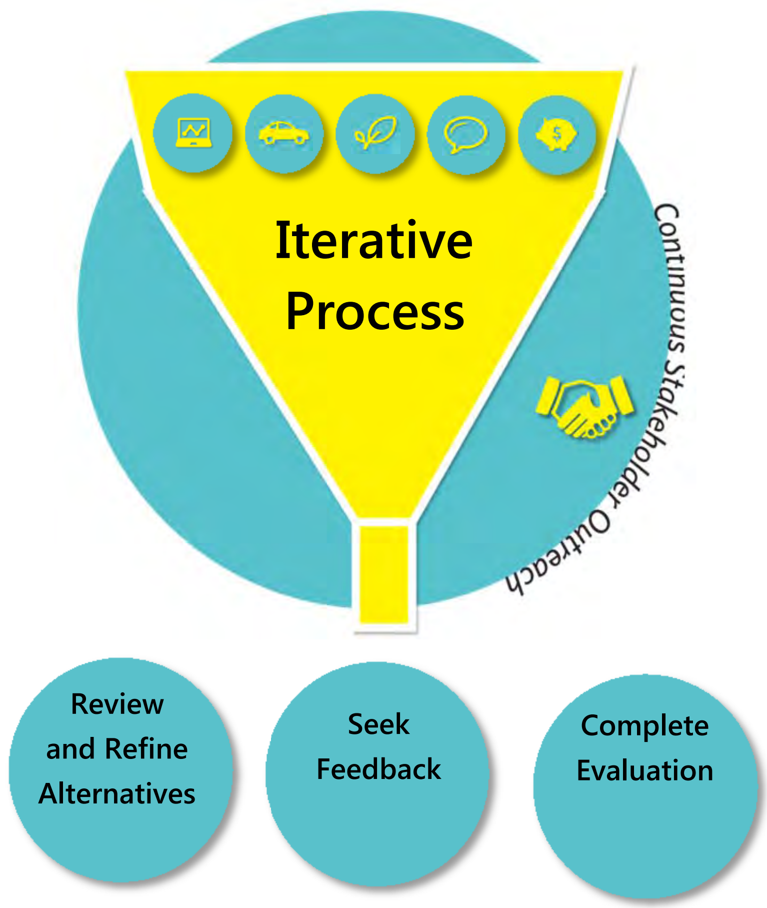
The Regional Parkway PEL Study utilized information from previous planning studies, current technical analyses, and input from the Technical Working Group (TWG workshop conducted April 6, 2016 consisted of representatives of CCMPO, COCC, and Nueces County), general public and other key stakeholders to develop the "universe of alternatives" or conceptual alternatives to be evaluated and eliminate those alternatives that did not meet the purpose and need of the study. The universe of conceptual alternatives was established for the PEL through identification of key characteristics and feedback from the TWG workshop and targeted stakeholder interviews. Each conceptual alternative was tested in terms of whether or not it met the purpose and need of the study.

b. How did you select the screening criteria and screening process?

The Regional Parkway PEL screening criteria and an iterative screening process were selected to focus on alternatives that best met the project's purpose and need. To promote a transparent evaluation process, the screening methodology and criteria were mutually agreed upon between the CCMPO, CoCC, and study team. A two-step screening process included an initial screening of the conceptual strategies. The screening criteria utilized in the initial analysis focused on broad evaluation factors directly related to the purpose and need of the study. The initial evaluation criteria included safety, mobility, environmental impacts, and economic development. These criteria were carefully chosen to provide a rough characterization and differentiation between: (1) those alternative concepts with a high probability of improving safety, improving mobility and travel time reliability, minimizing environmental impacts, providing cost efficiency, and garnering public support, and (2) those alternative concepts which will obviously not meet the purpose and need and thus should be eliminated from further study.

In the secondary screening phase, each of the fifteen (15) conceptual alternatives was evaluated based on engineering, considerations, environmental considerations and stakeholder input. Using these evaluation criteria, a separation of conceptual alternatives is normally expected at some threshold. Conceptual alternatives that score above the threshold may be carried forward to the next step in the project development process. The environmental analysis recognized that avoidance, minimization, and mitigation could take place in a subsequent NEPA phase, helping to reduce impacts. In addition, the No-Build alternative, which must be retained for comparison in any NEPA document, was carried through this phase in order to keep a consistent baseline for comparison. **Figure 3** summarizes the considerations utilized in the Regional Parkway PEL concept evaluation process.

Figure 3: Screening Process



c. For alternative(s) that were screened out, briefly summarize the reasons for eliminating the alternative(s). (During the initial screenings, this generally will focus on fatal flaws.)

Table 2 below provides a summary of the initial screening of the Regional Parkway PEL conceptual strategies. It should be noted the purpose of the initial screening process is to identify alternatives which have the potential to meet the purpose and need of the project. Additionally, the level of screening analysis performed during the initial phase is a high-level, pass/fail type analysis intended to assess whether an alternative meets purpose and need. During the initial evaluation all alternatives (other than the No-Build) met the purpose and need of the study. Therefore, eight (8) alternatives in Segment A, four (4) alternatives in Segment B and three (3) alternatives for the proposed future extension of Rodd Field Road were moved forward into the secondary evaluation.

Table 2: Initial Screening Matrix

	Evaluation Criteria				Meets	Comments
Conceptual Alternatives	Safety	Mobility	Environmental Impacts	Economic Development		
No Build	Fail	Fail	Fail	Fail	No	Required Baseline
A-1	Pass	Pass	Pass	Pass	Yes	
A-2	Pass	Pass	Pass	Pass	Yes	
A-3	Pass	Pass	Pass	Pass	Yes	
A-4	Pass	Pass	Pass	Pass	Yes	
A-5	Pass	Pass	Pass	Pass	Yes	
A-6	Pass	Pass	Pass	Pass	Yes	
A-7	Pass	Pass	Pass	Pass	Yes	
A-8	Pass	Pass	Pass	Pass	Yes	
B-1	Pass	Pass	Pass	Pass	Yes	
B-2	Pass	Pass	Pass	Pass	Yes	
B-3	Pass	Pass	Pass	Pass	Yes	
B-4	Pass	Pas	Pass	Pass	Yes	
R-1	Pass	Pass	Pass	Pass	Yes	
R-2	Pass	Pass	Pass	Pass	Yes	
R-3	Pass	Pass	Pass	Pass	Yes	

In the secondary evaluation, each of the alternatives was evaluated in greater detail considering engineering, environmental impacts, and stakeholder input/support.

d. Which alternatives should be brought forward into NEPA and why?

Based on the initial data collection and analysis, conceptual alternatives A-5, B-4, and R-3 represent alignments that are recommended to be further evaluated during the NEPA process. These alternatives were determined to provide the best means to avoid, minimize, and mitigate environmental impacts.

e. Did the public, stakeholders, and agencies have an opportunity to comment during this process?

Yes, through stakeholder interviews, the open house meeting, the multiple public presentations, meetings with groups, the website and media coverage, the public, stakeholders and agencies were offered opportunities to suggest ideas and make comments regarding the process and the conceptual alternatives.

f. Were there unresolved issues with the public, stakeholders, and/or agencies?

No unresolved issues regarding the planning level of detail transpired. Comments were received from certain entities regarding alternatives that would impact their property that will need to be taken into consideration during future environmental studies. Additional coordination and consideration will need to be given to any alternatives with potential to impact Padre Balli Park, a Nueces County Coastal Park located on North Padre Island, and the Vista Del Mar tract on North Padre Island. Project issues and any other impacts will be appropriately addressed in a project specific NEPA process that allows designers and environmental specialists to avoid, minimize, and mitigate impacts.

7. Planning assumptions and analytical methods:

a. What is the forecast year used in the PEL study?

The forecast year used in the Regional Parkway PEL study is 2035.

b. What method was used for forecasting traffic volumes?

A review of the TxDOT historical traffic counts (2010-2014) along the SH 358/PR 22 corridor indicated a four percent annual growth rate. This factor was then applied to the most recent traffic data sources from previous years to obtain the 2015 traffic volumes. 24-hour count data was used to determine the K Factors (the proportion of average annual daily traffic (AADT) occurring in an hour) and D-Factors (directional distribution factor) along eastbound (EB) and westbound (WB) directions during the peak hours.

c. Are the planning assumptions and the corridor vision/purpose and need statement consistent with each other and with the long-range transportation plan? Are the assumptions still valid?

The Corpus Christi long range transportation plan outlines area improvements that include many of the same characteristics as those evaluated in the PEL study. These include reducing congestion, improving safety, and providing improved facilities that expand the areas economic opportunities, support the maintenance of attainment status for air quality, and increase the value of transportation assets.

The Regional Parkway PEL study is designed to conduct analyses and planning activities with resource agencies and the public in order to produce a transportation planning product that can be incorporated into the City of Corpus Christi's Urban Transportation Plan of Mobility CC.

d. What were the future year policy and/or data assumptions used in the transportation planning process related to land use, economic development, transportation costs, and network expansion?

To forecast traffic on the existing and proposed roads, the 2006 and 2040 CCMPO TransCAD travel demand models (TDM) were used as the base models for the study area. The HDR study team used linear interpolation of the 2006 base model and 2040 TDM Origin-Destination (OD) travel time matrices data to obtain the OD travel time matrix for year 2035. The roadway networks for year 2040 and 2035 were assumed to be the same for this analysis. The resulting 24-hour link volume obtained following this step was considered to be the 2035 No Build traffic volume.

An analysis to determine the Level of Service (LOS) of the mainlanes and intersections for existing conditions was also performed for the project. Segments of the SH 358 mainlanes were analyzed in Highway Capacity Software (HCS) to provide an overview of operations along the corridor. Existing and forecasted year (2035) peak hour intersection turning movement volumes and segment volumes were determined. In addition signalized and unsignalized intersections along SH 358, Yorktown Blvd, and PR 22 were analyzed in Synchro to evaluate the intersection operations along the study corridor.

8. Environmental resources (wetlands, cultural, etc.) reviewed.

a. In the PEL study, at what level of detail was the resource reviewed and what was the method of review?

A summary of each resource and the methods of review are presented below.

- **Land use:** Land uses in the study area were identified using GIS layers obtained from Nueces County Appraisal District (2012, 2013) for land use by parcel. Plans and policies adopted by local governments and other entities were also collected and summarized, including CCMPO documents, TxDOT Corpus Christi District Transportation Improvement Program listings, Nueces County, and plans developed by the CoCC.
- **Socioeconomics:** Demographic and socioeconomic data were obtained from the 2010 U.S. Census and the 2007-2011 American Community Survey, including employment trends, general population counts, and data identifying the presence of minorities, low-income households, and individuals with limited English proficiency (LEP). Data was collected and analyzed for the study area as well as the City of Corpus Christi, Nueces and Kleberg counties, and the state of Texas.
- **Neighborhood and Community Resources:** Based on the results of the land use mapping and a desktop analysis of maps and aerial photographs, key community resources were identified within the study area, including hospitals, schools and universities, places of worship, military land, libraries and museums, and neighborhoods.
- **Visual and Aesthetic Qualities:** Relevant visual resource guidelines included in planning documents for the CoCC and the Corpus Christi District of TxDOT were studied

and summarized. The Study Area was divided into two segments (A & B) and the existing characteristics were described to establish a visual context for each area.

- **Existing Transportation Infrastructure:** The existing transportation infrastructure and future plans for transportation improvements within the study area were identified, and include SH 286, FM 2444, FM 70 and PR 22. Major roadway, rail, transit, and intermodal transportation modes located within and around the study area were described, and major traffic generators were identified. Future projected traffic volumes including level of service were presented.
- **Surface Water:** Water resources, including surface waters, potential wetland areas, and floodplains were identified within the study area. Sources for water resources included the National Hydrography Dataset and the U.S. Geological Survey for surface waters, the USFWS National Wetland Inventory (NWI) for wetlands, and the Federal Emergency Management Agency (FEMA) for floodplains. The Texas Commission on Environmental Quality (TCEQ)'s 2014 Section 303(d) list was also analyzed to determine if any project area stream segments are listed as impaired.
- **Groundwater:** Sources of groundwater within the study area were identified and mapped, based on data from the Texas Water Development Board (TWDB). The regulatory environment regarding groundwater was also analyzed as it pertains to the project area.
- **Air Quality:** An overview of air quality regulations relating to transportation projects was provided, including the Clean Air Act.
- **Traffic Noise:** The FWHA's Noise Abatement Criteria were presented, as well as the conditions under which a traffic noise analysis would be required for a proposed transportation project.
- **Hazardous Materials:** A regulatory database report was produced for the study area in January 2016. This report included information from state, tribal, and federal databases and identified potential hazardous materials sites within the search radii established in the ASTM E1527-13 standards. Some sources normally reviewed for reports were not acquired due to the planning-level nature of the study.
- **Threatened and Endangered Species:** The state and federal regulations pertaining to threatened and endangered species were presented. County lists of threatened and endangered species maintained by USFWS and Texas Parks and Wildlife Department (TPWD) were consulted in order to determine which species could potentially occur in the study area and if critical habitat has been designated for any species identified within the study area. Information received from the TPWD's Texas Natural Diversity Database (TXNDD) was reviewed in order to determine if any occurrences of listed or rare animal or plant species have been recorded within the study area.
- **Seagrass Areas:** The Upper Laguna Madre area within the study area includes submerged seagrass meadows which play critical roles in the coastal environment. Monitoring studies, agency concerns and protection strategies, and maps showing the location of seagrass beds in the Upper Laguna Madre were reviewed for the PEL study.
- **Coastal Barrier Resources:** USFWS Coastal Barrier Resource database shapefiles where utilized to determine the location of both System units and Otherwise Protected Areas which occur within the project area. The Coastal Barrier Resources Act and its

amendments prohibit most new federal expenditures that tend to encourage development or modification of designated coastal barrier areas within the defined John H. Chafee Coastal Barrier Resource System (CBRS).

- **Natural Areas and Preserves:** The natural areas and preserves within the study area were identified. Sources consulted included the Natural Resources Conservation Service (NRCS), TXNDD, USACE, National Park Service (NPS), and CoCC. An overview of regulations protecting these types of properties, including Section 4(f) and Section 6(f), and Texas Parks and Wildlife Code Chapter 26, was also provided.
- **Parklands and Recreation Areas:** Designated parks and recreation areas within the study area were identified utilizing city, county, state and federal sources, including the U.S. Department of the Interior's database of properties having received grants from the Land and Water Conservation Fund (LWCF).
- **Historical and Cultural Resources:** Previously identified historic and archeological sites were identified within the study area, using information obtained from the THC, as well as information requested from the Texas Archeological Research Laboratory (TARL). Previously identified sites included those listed on the National Register of Historic Places (NRHP), recorded historic-age cemeteries, National Historic Landmarks, Recorded Texas Historic Landmarks (RTHLs), State Antiquities Landmarks, and Official Texas Historic Markers . A historic context for the study area was prepared and relevant regulations were presented, including Section 106 of the National Historic Preservation Act and the Antiquities Code of Texas.
- **Utilities:** Existing public utility infrastructure, including petroleum, gas, water and wastewater pipelines were identified with the study area using GIS shapefiles provided by the CoCC. Oil and gas wells, and pipelines and their associated facilities were identified using GIS data provided by the Texas Railroad Commission (RRC). A preliminary database of utility operators with facilities within the study area was also developed.
- **Mines and Quarries:** Mines and quarries within the study area were identified using data obtained from the USGS National Minerals Information Center. Locations were mapped using GIS software.
- **Prime Farmland:** Data for each of the soil units occurring within the study area was collected from NRCS, including its classification as prime farmland. The acreage of each soil unit within the study area was then quantified.

b. Is this resource present in the area and what is the existing environmental condition for this resource?

- **Land use:** The land use category representing the largest share of the study area was undeveloped which included approximately 48% of the area, followed by agricultural row crops with approximately 20%.
- **Socioeconomics:** Approximately 43.7 percent of the population in the study area was identified as minority. The highest percentage of minority persons reside within the Rodd Field Rd. area which is the most developed. The total minority population exceeded 50 percent in three of the seven study area census block groups in 2010. No study area

census block groups had a 2009-2013 ACS median household income for a family of four of less than or equal to the 2016 Department of Human Health and Services Poverty Guideline ($24,300). Approximately 1.9 percent of the study area population 5 years and older spoke English “less than well.”

- **Neighborhood and Community Resources:** The study area does not include any hospitals, schools and universities, places of worship, military land, libraries or museums. Segment A contains the Sea Pines Subdivision on North Padre Island, Segment B includes the King Estates neighborhood on its northwest margin, and the Rodd Field Rd. area encompasses the Royal Creek Estates, and Rancho Vista Neighborhoods.
- **Visual and Aesthetic Qualities:** Segment A and B primarily include rural areas with limited urban development, with the exception of the Segment A areas on North Padre Island. However the Rodd Field Rd. corridor includes a significant amount of urban development north of Oso Creek. Given the primarily rural setting of the study area and its minor topographic differences, existing views within populated areas include limited variation with the exception of those with a waterfront view located on North Padre Island.
- **Existing Transportation Infrastructure:** The roadway system within the Corpus Christi area contains several major roadways including U.S. Highway (US) 77, SH 44, SH 358, SH 286, and PR 22. The study area is located in what is currently primarily a rural/agricultural area which presently includes no major traffic generators. Local bus service only extends to a small portion of the Rodd Field Road corridor. In addition no freight or passenger rail networks and no airport facilities are located in or in close proximity to the study area.
- **Surface Water:** The study area is located within the Nueces-Rio Grande Coastal Basin and includes three watersheds, the North Laguna Madre, South Corpus Christi Bay and North Laguna Madre Watershed. Oso Creek and two of its tributaries occur within the study area. According to TCEQ’s 2014 Section 303(d) list, the portion of Oso Creek located within the study area is listed as impaired for high bacteria levels. Approximately 3,388 acres, or 20.2 percent of the study area, is located within a floodplain as identified by the National Flood Hazard Layer acquired from FEMA. Approximately 4,664 acres of wetland features are mapped by NWI in the study area.
- **Groundwater:** The Gulf Coast Aquifer occurs within portions of the study area including the western two-thirds of Segment A, the eastern one-half of Segment B, and the Rodd Field Rd. corridor. The study area is located within Groundwater Management Area 16; however the CoCC occurs within the Corpus Christi Aquifer Storage and Recovery District which regulates its ground water use. The TWDB reveals a total of five water wells within the study area all of which belong to the King Ranch.
- **Air Quality:** Currently, the Corpus Christi area is classified as being “Unclassifiable/Attainment” for all criteria pollutants except the O3 (0.070 ppm [2015 standard]) for which the designation is “Pending” and the 1-hour SO2 criteria for which the designation is “Governor’s Recommendation: Attainment”. Ozone and other pollutants are being closely monitored within the area. Fifteen air quality monitoring stations are located in the Corpus Christi area with three of these stations meeting data

quality assurance standards set by the EPA. No recent ozone values recorded by these stations exceed the NAAQS limit for ozone (75 ppb).

- **Traffic Noise:** Traffic noise analyses are only required for projects that are on new location, add capacity to a roadway, substantially alter the horizontal alignment of a roadway, or substantially alter the vertical alignment of a roadway. If these conditions apply, then a traffic noise analysis would be completed during the project-level NEPA study in accordance with TxDOT's (FHWA-approved) *Guidelines for Analysis and Abatement of Roadway Traffic Noise*.
- **Hazardous Materials:** A total of 23 sites were identified within ASTM radii from the study area. No site surveys, review of historical sources, or interviews were completed for this project, and this document does not constitute a Phase I Environmental Site Assessment. Once an alignment(s) has been selected through a future NEPA process, future hazardous materials studies would be warranted.
- **Threatened and Endangered Species:** Three birds, one fish, five mammals, three reptiles, and three plants are federally listed as endangered and may be present within the study area counties. In addition two birds and two reptiles are federally listed as threatened within this area. The USFWS has issued a final critical habitat designation for the Piping Plover (*Charadrius melodus*) which includes several critical habitat units in Nueces and Kleberg counties, two of which are located on North Padre Island within the study area. The Texas Natural Diversity Database (NDD) reported that two listed species had documented occurrences within the study area, the piping plover, a federal and state threatened species, and south Texas ambrosia (*Ambrosia cheiranthifolia*), a federally and state listed endangered plant species.
- **Seagrass Areas:** The study area includes the crossing of the Upper Laguna Madre with a bridge. There are approximately 216,000 acres of seagrass on the Texas coast and an estimated 26.4 % occurs in the Upper Laguna Madre. Seagrass coverage within the Upper Laguna Madre was reported to be high in March 2016, particularly from JFK Causeway south to Baffin Bay.
- **Coastal Barrier Resources:** The study area includes both System units and Otherwise Protected Areas (OPAs) within the area of Segment A located on Padre Island. The OPA located at the northeastern terminus of Segment A includes Padre Balli Park, a Nueces County Coastal Park. The southern portion of this segment includes a System unit and an OPA area associated with land recently purchased by Nueces County and the Padre Island National Seashore.
- **Natural Areas and Preserves:** Although no preserves occur within the study area, the natural areas found along Oso Creek are included in the CoCC future plans for the Oso Creek-Oso Bay Greenbelt, Parks and Trails System.
- **Parklands and Recreational Areas:** There are three parks which occur within the study area, Padre Balli Park on North Padre Island, and Bill Witt Park and Oso Creek Park within the Rodd Field Rd. corridor. None of these parks received LWCF grants.
- **Historical and Cultural Resources:** Within the study area, there is one NRHP-listed District, which includes the King Ranch which would be subject to Section 4(f) of the U.S. Department of Transportation Act of 1966. In addition there are two NRHP-listed archaeological sites which are located adjacent to the study area along Oso Creek.

Thirteen previously-recorded archaeological sites were also identified within the study area of which four are eligible for NRHP listing. However the majority of the study area has not been subjected to a thorough archeological investigation. No RTHLs, cemeteries, or inventoried historic structures are recorded within the study area.

- **Utilities:** Utilities available to the portion of the study area that occurs within the CoCC are relatively inclusive; however the undeveloped areas include limited utility infrastructure. The CoCC water system provides water to the portions of the study area within the Rodd Field Rd. corridor, North Padre Island and an area located west of Oso Creek near FM 2444. The CoCC also provides wastewater service lines within the CoCC limits with the exception of the area west of Oso Creek near FM 2444. Natural gas services are provided within the CoCC limits of the study area. Larger 138kv transmission lines occur within the central portion of Segment A and the Rodd Field Rd. study area, and adjacent to the northeastern boundary of Segments A and B.
- **Mines and Quarries:** No mines or quarries occur within the study area.
- **Prime Farmland:** The study area includes approximately 4,434 acres designated as prime farmland.

c. What are the issues that need to be considered during NEPA, including potential resource impacts and potential mitigation requirements (if known)?

Recognizing that detailed analysis will be required during the NEPA phase, existing conditions were compared to mobility solutions to identify potential issues to be further addressed during NEPA and environmental regulatory processes that may be triggered and require future compliance. Existing data have been gathered and will be used for quantitative assessments in terms of known constraints; qualitative measures include the potential challenges associated with regulatory compliance in the NEPA phase. Multiple levels of GIS and publically available web data representing potential project constraints were collected for the study area. These data were then used to analyze the proposed alternatives. Based on this preliminary examination, potential resource impacts and potential mitigation requirements may occur for the following resources.

- Visual and Aesthetic Qualities: Modification of existing views within the waterfront area of North Padre Island.
- Surface Water: Potential impacts to wetland, floodplain and 303(d) listed stream segments.
- Hazardous Materials: Numerous recorded hazardous material sites associated with the Rodd Field Rd. area.
- Threatened and Endangered Species: Potential impacts to listed species or designated critical habitat for the Piping Plover.
- Seagrass Areas: Potential impacts to seagrass areas resulting from construction and operation of the bridge from the mainland to North Padre Island.
- Coastal Barrier Resources: Potential impacts to coastal barrier areas on North Padre Island.

- Parklands and Recreational Areas: Potential impacts to Padre Balli Park on North Padre Island and Oso Creek Park.
- Historical and Cultural Resources: Crossing of King Ranch which is subject to a Section 4(f) action.
- Utilities: Crossing of petroleum and gas pipelines, and 13kv transmission lines.
- Prime Farmland: Existing prime farmland soil areas changed from agricultural to transportation use.

Subsequently, it is anticipated that the issues considered in NEPA will reflect those associated with the selected alternative.

d. How will the planning data provided need to be supplemented during NEPA?

The Affected Environment and Environmental Consequences Technical Memorandum contains detailed, current information from remote resources for various components of the human environment, natural environment, and cultural resources. For NEPA compliance, these data form a solid backdrop for future work but may need to be confirmed or supplemented to ensure the data are current and detailed enough for NEPA compliance purposes. In many cases, a quick verification of the most recent version of the data should suffice and the data can then be carried into the NEPA documentation. The categories discussed in the *Affected Environment and Environmental Consequences Technical Memorandum* are listed below along with brief notes examining any additional work anticipated in the NEPA phase.

- **Land Use and Planning:** In the NEPA phase, because land uses are constantly changing, current land use information would need to be obtained and verified with field visits. In addition, the most current area planning studies would need to be reviewed for their currency and applicability to projects pursued under NEPA.
- **Socioeconomic Factors:** The demographic data of the study area would be updated to reflect the most recent census and American Community Survey information. Field investigations would be required in order to fully assess the neighborhoods, potential travel patterns, community facilities and other factors included in the Community Impact Analysis component of NEPA.
- **Neighborhoods and Community Resources:** Current coordination with community groups would be needed during the public involvement phase of the project in order to ensure meaningful public participation during the NEPA process. This coordination would utilize current socioeconomic data. In addition, a detailed discussion concerning travel patterns and access would need to occur during the NEPA phase.
- **Visual and Aesthetic Qualities:** A current survey of the project area would need to be performed during NEPA development to verify existing visual or aesthetic qualities within the selected alternative. In addition, coordination would occur with residents and businesses potentially affected by the project.
- **Existing Transportation Infrastructure:** Existing information was collected for the *Affected Environment and Environmental Consequences Technical Memorandum*. Because the city's transportation infrastructure, including transit, is continually evolving

this information should be checked for any necessary updates at the time a project is advanced into project development under NEPA.

- **Surface Water:** Existing water features identified within the *Affected Environment and Environmental Consequences Technical Memorandum* are not anticipated to change. However, U. S. jurisdictional determinations and delineations of Waters of the U.S. would be performed and the most recent TCEQ 303(d) list would be reviewed to determine the current status of any project-area stream segments. This would enable the permit requirements under Section 404 of the Clean Water Act to be determined.
- **Groundwater:** Groundwater resources are not expected to change before the NEPA compliance phase, but area water well data would be updated. In addition this section would be reviewed in relation to a current hazardous materials database search for any potential groundwater contamination issues.
- **Air Quality/Air Emissions:** The current attainment status for the Corpus Christi area would continue to be monitored. Quantitative air quality analysis may be required for the mobility improvement strategies proposed within the Regional Parkway PEL.
- **Traffic Noise:** Existing and projected traffic data and detailed design files would be obtained in order to conduct noise modeling as necessary for compliance purposes for any alignments progressing to the NEPA compliance phase. Potential receiver locations would need to be determined and traffic noise impacts would need to be modeled for any alternative requiring a traffic noise analysis.
- **Hazardous Materials:** A database search conducted for the *Affected Environment and Environmental Consequences Technical Memorandum* will serve as a starting point for the potential risk for encountering hazardous materials during construction for alignments that advance to NEPA analysis. However, because these databases are continually updated, an up-to-date database search would be needed for the NEPA phase. Field investigations would be required to identify any sites not listed in the database searches. A risk assessment would then be performed to characterize existing sites as including a high, medium, or low potential risk before project construction.
- **Threatened and Endangered Species:** Current federal and state county lists for these species plus updated NDD information would be required for any proposed alternative. Threatened and endangered species issues are anticipated to occur within the limits of the Regional Parkway PEL project area due to the documented occurrence of two listed species and presence of designated critical habitat within the project area. A field visit would be made by qualified biologists to determine the potential for affecting threatened and endangered species or their habitats. NEPA compliance under these conditions requires the development of a Biological Evaluation document.
- **Seagrass Areas:** A review of current surveys of seagrass areas within the project area should be completed. Coordination with the USFWS would be necessary prior to any construction activities.
- **Coastal Barrier Resources:** Current maps of areas included in the Coastal Barrier Resource Act should be reviewed for the project area to verify the location of these areas. The use of government funding for projects which occur within CBRA areas is not permitted.

- **Natural Areas and Preserves:** In the NEPA phase, data searches and field surveys should confirm that no new natural areas or preserves have been established within the project area, especially those associated with creeks or tributaries.
- **Parklands and Recreational Resources:** As the City of Corpus Christi continues to develop its parks program, especially along Oso Creek, newly identified publicly-owned recreational resources could occur within the study area prior to the NEPA process. Determination of any new parklands or recreational resources within the project area should occur.
- **Historic and Cultural Resources:** A review of the data collected for the *Affected Environment and Environmental Consequences Technical Memorandum* would occur in addition to updates from the THC website and TARL. Coordination with THC staff and the King Ranch would occur during the NEPA phase of the project to ensure collaboration and compliance for the project. Surveys have not been conducted for archeological or historic resources. The potential need for these surveys would be determined in the NEPA phase.
- **Utilities and Transmission Lines:** In the urban Regional Parkway PEL study area, utility lines and transmission lines primarily occur within the CoCC boundary. Potential impacts should be avoided when possible and would be coordinated with the environmental impact analysis effort, especially with regard to archeological, historic, and visual resources.
- **Mines and Quarries:** Although no mines or quarries currently occur within the study area, it would be determined if any new ones occur before the NEPA phase.
- **Prime Farmland:** Prime farmlands have the potential to affect the Regional Parkway project if federal monies are used for any portion of the project. The development of the project has the potential to limit the use of prime farmlands that are crossed by the selected alignment.

Various mobility options were assessed with respect to the environmental constraints categories listed above, based on data obtained using GIS. These data would need to be field verified and impacts assessed with regard to more detailed design information that would be available in the NEPA project development phase. Currently the existing data allows the various alternatives to be compared to each other to ascertain relative potential impacts.

9. List environmental resources you are aware of that were not reviewed in the PEL study and why. Indicate whether or not they will need to be reviewed in NEPA and explain why.

The Regional Parkway PEL study included a comprehensive set of environmental resource categories and constraints analysis. No additional environmental resources were identified within the study area.

10. Were cumulative impacts considered in the PEL study? If yes, provide the information or reference where the analysis can be found.

Cumulative impacts were not considered in the Regional Parkway PEL Study. The level of schematic design and project details necessary to adequately assess cumulative impacts of the proposed alternatives are not available at the PEL level of analysis and are more appropriately studied in NEPA. Project-level analysis would conform to current TxDOT guidance, drawing upon the methodologies established in reports by the National Cooperative Highway Research Program, the American Association of State Highway and Transportation Officials (AASHTO), and other sources, and would be in compliance with the regulations for implementing NEPA established by the Council on Environmental Quality.

11. Describe any mitigation strategies discussed at the planning level that should be analyzed during NEPA.

According to FHWA's Planning and Environment Linkages Program: *A Guide to Measuring Progress in Linking Transportation Planning and Environmental Analysis*, mitigation activities should be considered on a broader scale than only at the project development level: "This offers agencies the opportunity to identify activities that have the greatest potential to protect, restore, and enhance the environmental factors affected by the plan."

The Council on Environmental Quality (CEQ) regulations (40 CFR 1508.20) defines mitigation as:

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impact by replacing or providing substitute resources or environments.

The Regional Parkway PEL study is consistent with these mitigation concepts. Typically, from an environmental perspective, the emphasis should be on avoidance of impacts where possible, which is most effective during the individual project development phase. In addition to avoidance, minimization and then mitigation are measures taken in that order to ensure that any infrastructure development minimizes impacts on the human and natural environment where possible. If avoidance and minimization are investigated and impacts would still occur, mitigation may be required. The PEL process emphasizes the opportunity to consider mitigation more holistically and proactively. Although the mitigation requirements to ensure regulatory compliance for a particular project may not be specifically defined until the NEPA phase is near completion, some key concepts can be articulated at the PEL phase to ensure continued discussion into and through the NEPA phase.

12. What needs to be done during NEPA to make information from the PEL study available to the agencies and the public? Are there PEL study products which can be used or provided to agencies or the public during the NEPA scoping process?

The Regional Parkway PEL Study will inform the NEPA phase of the project, and its findings will be incorporated into the NEPA document and into the Administrative Record. The Regional Parkway PEL Study will be made available to the public and to stakeholder groups. During NEPA, it is strongly suggested to utilize the TxDOT website as a resource for information to agencies and the public. The search criteria on this site should be easy to remember and the public information should presented in an easy to understand format. It would be beneficial to utilize this interactive website since NEPA provides many more opportunities for input and feedback. The database developed for the PEL Study which includes email and mailing addresses should be utilized to inform previously interested parties of the NEPA project effort. Mailing addresses and a radial (within ¼ to 1 mile of the corridor) mail-out may be needed for NEPA to ensure environmental justice populations have the opportunity to participate in meaningful public involvement. PEL study products that can be used include the public meeting summaries, stakeholder and agency meeting/workshop summaries, technical memos, and evaluation matrices.

13. Are there any other issues a future project team should be aware of?
Examples: Controversy, utility problems, access or ROW issues, encroachments into ROW, problematic land owners and/or groups, contact information for stakeholders, special or unique resources in the area, etc.

The Regional Parkway PEL alternatives have not been fully designed and therefore definite answers to questions regarding utilities, access or ROW issues cannot be addressed. Project impacts to the CBRA areas or to existing parks could result in the exclusion of federal funding for the project. In addition, consideration will need to be given to any alternatives with potential to impact the Vista Del Mar tract on North Padre Island.

Regional Parkway PEL Study Team

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