

TABLE OF CONTENTS

1.0 NEED AND PURPOSE FOR THE PROPOSED PROJECT	1-1
1.1 PROJECT INITIATION AND SCOPING.....	1-1
1.2 TRANSPORTATION PLANNING AND FUNDING	1-3
1.3 NEED FOR THE PROPOSED PROJECT	1-3
1.3.1 Maintaining the Long-Term Operation of a US 181 Crossing of the Corpus Christi Ship Channel	1-3
1.3.2 Safety Risks Caused by Design Deficiencies	1-5
1.4 PURPOSE OF THE PROPOSED PROJECT	1-7
1.5 PROJECT OBJECTIVES.....	1-7
1.5.1 Provide the Transportation Infrastructure to Support Economic Opportunities in the Area.....	1-8
1.5.2 Consider the Connectivity of US 181 to the Local Roadway System and Address its Effect on Adjacent Neighborhoods.....	1-8
2.0 ALTERNATIVES.....	2-1
2.1 PROCESS USED TO DEVELOP AND EVALUATE ALTERNATIVES.....	2-1
2.1.1 Development of Alternatives	2-1
2.1.2 Screening Criteria.....	2-2
2.1.3 Measures of Effectiveness.....	2-2
2.2 DESCRIPTION OF PRELIMINARY ALTERNATIVES	2-4
2.2.1 Blue Alternative	2-4
2.2.2 Green Alternative	2-4
2.2.3 Red Alternative.....	2-4
2.2.4 Orange Alternative.....	2-4
2.2.5 Tunnel Alternative	2-5
2.2.6 West Alternative.....	2-5
2.2.7 Transportation System Management	2-5
2.2.8 No Build Alternative.....	2-5
2.3 ALTERNATIVES SCREENING SUMMARY.....	2-5
2.3.1 Evaluation With Respect to Project Need and Purpose.....	2-6
2.3.1.1 Maximize the Long-term Highway Operability of the US 181 Crossing of the Corpus Christi Ship Channel	2-6
2.3.1.2 Improve Safety for the Traveling Public, Including During Hurricane Evacuations.....	2-7
2.3.2 Summary of the Screening Results	2-9
2.4 RANGE OF REASONABLE ALTERNATIVES.....	2-10
2.4.1 Description of the Reasonable Build Alternatives	2-10
2.4.1.1 Green Alternative	2-10
2.4.1.2 Red Alternative.....	2-11
2.4.1.3 Orange Alternative	2-12
2.4.1.4 West Alternative.....	2-13
2.4.1.5 Recommended Alternative	2-14
2.4.2 Engineering Considerations.....	2-14
2.4.2.1 National and State Highway Design Standards	2-14
2.4.2.2 Bicycle and Pedestrian Accommodations	2-15
2.4.2.3 Bridge Height – Navigational Air-Draft Clearance	2-15
2.4.2.4 Level of Service.....	2-16

2.4.2.5	Connectivity of US 181 to the Local Roadway System.....	2-16
2.4.3	Design Comparison Summary	2-17
2.5	EVALUATION OF THE DEGREE TO WHICH THE ALTERNATIVES MEET THE NEED AND PURPOSE AND OBJECTIVES	2-18
2.6	IMPACT COMPARISON SUMMARY BY ALTERNATIVE.....	2-19
2.7	SUMMARY OF THE LEAST OVERALL HARM ANALYSIS.....	2-27
2.7.1	Factors Related to Section 4(f)	2-28
2.7.1.1	Ability to Mitigate Adverse Section 4(f) Impacts.....	2-28
2.7.1.2	Severity of Harm After Mitigation	2-29
2.7.1.3	Relative Significance of the Property.....	2-29
2.7.1.4	Views of Officials with Jurisdiction	2-29
2.7.2	Factors Not Related to Section 4(f).....	2-30
2.7.2.1	Degree to Which Alternatives Meet Need and Purpose and Objectives.....	2-30
2.7.2.2	Magnitude of Adverse Impacts After Mitigation.....	2-30
2.7.2.3	Comparison of Cost	2-30
2.8	IDENTIFICATION OF THE RECOMMENDED ALTERNATIVE	2-30
2.9	SUMMARY OF CHANGES TO THE RECOMMENDED ALTERNATIVE	2-32
3.0	AFFECTED ENVIRONMENT	3-1
3.1	LAND USE.....	3-1
3.1.1	History and Development Trends.....	3-1
3.1.2	Current Land Use Patterns	3-2
3.1.3	Local Land Use Plans and Policies.....	3-3
3.1.3.1	City of Corpus Christi	3-3
3.1.3.2	City of Portland.....	3-7
3.1.3.3	Corpus Christi Metropolitan Planning Organization.....	3-8
3.2	MODES OF TRANSPORTATION.....	3-10
3.2.1	Highways and Streets.....	3-10
3.2.2	Bicycle and Pedestrian Facilities	3-10
3.2.3	Transit	3-11
3.2.4	Ports and Waterways.....	3-13
3.2.4.1	Port of Corpus Christi.....	3-13
3.2.4.2	Corpus Christi Bay and Ship Channel.....	3-14
3.2.4.3	Gulf Intracoastal Waterway	3-14
3.2.4.4	Nueces Bay.....	3-14
3.2.5	Railroads.....	3-14
3.3	PUBLIC SERVICES AND UTILITIES.....	3-16
3.3.1	City and County Services	3-16
3.3.1.1	City of Corpus Christi Services.....	3-16
3.3.1.2	HUD Properties.....	3-17
3.3.1.3	Nueces County Services	3-17
3.3.1.4	City of Portland Services	3-17
3.3.1.5	San Patricio County Services	3-18
3.3.2	Utilities	3-18
3.3.2.1	Residential Utilities.....	3-18
3.3.2.2	Stormwater	3-20
3.4	ECONOMIC AND EMPLOYMENT CONDITIONS.....	3-21
3.4.1	Regional Economy.....	3-21
3.4.2	Employment	3-22

3.4.3	Commuting Patterns	3-24
3.4.4	Study Area Business Activity	3-25
3.4.4.1	Military Sector	3-26
3.4.4.2	Medical and Health Industry	3-26
3.4.4.3	Port of Corpus Christi and Port Industries	3-27
3.5	COMMUNITY DEMOGRAPHICS AND ENVIRONMENTAL JUSTICE	3-28
3.5.1	Study Area Characteristics	3-28
3.5.1.1	Regional Population Trends and Projections	3-28
3.5.1.2	Study Area Demographic Characteristics.....	3-30
3.5.1.3	Environmental Justice.....	3-33
3.5.1.4	Community Health Trends	3-39
3.5.1.5	Children’s Health	3-43
3.5.2	Proposed Project Area Community Facilities and Resources.....	3-46
3.5.2.1	Parks and Recreational Facilities	3-46
3.5.2.2	Public Schools.....	3-48
3.5.2.3	Health Care Facilities	3-50
3.5.3	Project Area Community Characteristics	3-51
3.5.3.1	North Beach	3-51
3.5.3.2	South Central.....	3-56
3.5.3.3	Northside	3-63
3.5.3.4	Westside	3-70
3.5.3.5	Refinery Row	3-76
3.5.3.6	Portland	3-80
3.6	AIR QUALITY.....	3-82
3.6.1	Air Quality Standards and Regulatory Setting	3-82
3.6.2	Local Monitoring Data.....	3-84
3.6.3	Regional Air Quality and Attainment Status.....	3-85
3.6.4	Mobile Source Air Toxics	3-85
3.7	TRAFFIC NOISE	3-87
3.7.1	Traffic Noise Regulations.....	3-87
3.7.2	Existing Noise Levels	3-89
3.8	WATER RESOURCES.....	3-90
3.8.1	Surface Water Resources	3-90
3.8.1.1	Regional Water Resource Issues and Trends	3-91
3.8.1.2	Nueces River and Delta.....	3-99
3.8.1.3	Nueces Bay.....	3-99
3.8.1.4	Corpus Christi Bay.....	3-101
3.8.1.5	Corpus Christi Inner Harbor	3-102
3.8.2	Groundwater Availability and Quality.....	3-103
3.8.2.1	Coastal Bend Region	3-103
3.8.2.2	Water Wells.....	3-103
3.8.3	Texas Pollutant Discharge Elimination System.....	3-104
3.8.4	River and Harbors Act of 1899 and the General Bridge Act of 1946	3-105
3.8.5	Coastal Zone Management Program	3-106
3.8.6	Coastal Barrier Resources Act	3-107
3.8.7	State-owned Submerged Lands.....	3-107
3.9	FLOODPLAINS.....	3-107
3.9.1	Regulatory Overview.....	3-107

3.9.2	Floodplain Areas	3-108
3.10	WETLANDS AND WATERS OF THE U.S.....	3-108
3.10.1	Regulatory Overview.....	3-109
3.10.1.1	Executive Order 11990	3-109
3.10.1.2	Section 404 of the Clean Water Act.....	3-109
3.10.2	Determination of Jurisdictional Areas.....	3-110
3.10.2.1	Tidal Waters of the U.S.	3-111
3.10.2.2	Tidal Fringe Wetlands	3-111
3.10.2.3	Tidally-Influenced Drainage Features	3-111
3.10.3	Section 401 Water Quality Certification	3-112
3.11	SOILS AND GEOLOGY.....	3-112
3.11.1	Physiography	3-112
3.11.2	Area Geology	3-112
3.11.3	Area Soil Types.....	3-113
3.11.4	Important Farmland.....	3-113
3.12	VEGETATION AND WILDLIFE	3-114
3.12.1	Vegetation	3-114
3.12.1.1	Regional Vegetation.....	3-114
3.12.1.2	Project Area Vegetation.....	3-114
3.12.2	Wildlife	3-117
3.12.2.1	Biotic Provinces	3-117
3.12.2.2	Area Wildlife.....	3-117
3.13	THREATENED AND ENDANGERED SPECIES.....	3-118
3.13.1	Regulatory Overview.....	3-118
3.13.1.1	Federal – U.S. Fish and Wildlife Service Regulatory Oversight	3-118
3.13.1.2	State – Texas Parks and Wildlife Department Regulatory Oversight	3-118
3.13.2	Potential Occurrences in Nueces and San Patricio Counties	3-118
3.13.2.1	Federally Listed Species	3-126
3.13.2.2	State-listed Species.....	3-130
3.13.3	Natural Diversity Database Information	3-131
3.13.4	Essential Fish Habitat	3-133
3.13.5	Migratory Bird Treaty Act.....	3-135
3.13.6	Fish and Wildlife Coordination Act of 1958.....	3-136
3.13.7	Marine Mammal Protection Act.....	3-136
3.13.8	Executive Order 13112 on Invasive Species.....	3-137
3.13.9	Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds.....	3-137
3.14	CULTURAL RESOURCES.....	3-137
3.14.1	Archeological Resources	3-138
3.14.2	Historic Resources	3-139
3.15	SECTION 4(F)	3-141
3.15.1	Section 4(f) Laws and Regulations	3-141
3.15.2	Description of Section 4(f) Properties.....	3-141
3.15.2.1	Publicly Owned Parks and Recreational Facilities	3-141
3.15.2.2	Wildlife and Waterfowl Refuge Lands	3-143
3.15.2.3	Historic Sites of National, State or Local Significance.....	3-143
3.16	HAZARDOUS MATERIALS.....	3-145
3.16.1	Sites of Potential Contamination Search.....	3-145

3.16.1.1	Review of Existing and Previous Land Use	3-146
3.16.2	Review of Regulatory Agency Databases and Files.....	3-148
3.16.3	Superfund Site	3-170
3.16.4	Oil/Gas Well and Pipeline Sites	3-171
3.16.5	Other Sites of Concern	3-172
3.16.5.1	Lead-based Paint	3-172
3.16.5.2	D.N. Leathers II.....	3-172
3.16.5.3	Hillcrest Community Environmental Investigation Area.....	3-173
3.16.5.4	Petroleum ASTs	3-173
3.16.5.5	Dredge Material Placement Area 1	3-174
3.16.5.6	Culberson Ditch	3-174
3.16.5.7	Former Regional Transportation Authority Yard.....	3-175
3.17	VISUAL AND AESTHETIC RESOURCES	3-175
3.17.1	Visual Character.....	3-175
3.17.2	Visual Quality.....	3-177
3.17.3	Viewer Exposure	3-181
3.17.4	Viewer Sensitivity	3-182
4.0	ENVIRONMENTAL CONSEQUENCES	4-1
4.1	LAND USE IMPACTS.....	4-2
4.1.1	Land Use Impacts Related to Right of Way Acquisition	4-2
4.1.1.1	Impacts of the Build Alternatives	4-2
4.1.1.2	Green Alternative	4-3
4.1.1.3	Red Alternative.....	4-3
4.1.1.4	Orange Alternative	4-4
4.1.1.5	West Alternative.....	4-4
4.1.1.6	Impacts of the No Build Alternative	4-5
4.1.1.7	Impacts of the Recommended Alternative	4-5
4.1.2	Consistency and Compatibility with Local Land Uses	4-5
4.1.2.1	City of Corpus Christi Integrated Community Sustainability Plan	4-5
4.1.2.2	City of Corpus Christi Urban Transportation Plan	4-6
4.1.2.3	City of Corpus Christi Future Land Use Plan.....	4-7
4.1.2.4	City of Corpus Christi Strategic Parks and Recreation Master Plan.....	4-12
4.1.2.5	City of Portland Comprehensive Plan	4-12
4.1.2.6	Corpus Christi MPO – 2010-2035 MTP	4-13
4.1.2.7	Corpus Christi MPO – Bicycle and Pedestrian Plan	4-13
4.1.3	Summary of Land Use Impacts	4-14
4.2	IMPACTS RELATING TO MODES OF TRANSPORTATION	4-16
4.2.1	Highways and Streets.....	4-16
4.2.1.1	Impacts of the Build Alternatives	4-18
4.2.1.2	Impacts of the No Build Alternative	4-18
4.2.1.3	Impacts of the Recommended Alternative	4-19
4.2.2	Bicycle and Pedestrian Facilities.....	4-19
4.2.2.1	Impacts of the Build Alternatives	4-19
4.2.2.2	Impacts of the No Build Alternative	4-19
4.2.2.3	Impacts of the Recommended Alternative	4-20
4.2.3	Transit	4-20
4.2.3.1	Impacts of the Build Alternatives	4-20
4.2.3.2	Impacts of the No Build Alternative	4-21

4.2.3.3	Impacts of the Recommended Alternative	4-21
4.2.4	Ports and Waterways	4-22
4.2.4.1	Impacts of the Build Alternatives	4-22
4.2.4.2	Impacts of the No Build Alternative	4-24
4.2.4.3	Impacts of the Recommended Alternative	4-24
4.2.5	Railroads.....	4-24
4.2.5.1	Impacts of the Build Alternatives	4-24
4.2.5.2	Impacts of the No Build Alternative	4-25
4.2.5.3	Impacts of the Recommended Alternative	4-25
4.3	IMPACTS TO PUBLIC SERVICES AND UTILITIES.....	4-25
4.3.1	Impacts of the Build Alternatives	4-26
4.3.1.1	Impacts to City and County Services.....	4-26
4.3.1.2	Impacts to Public and Private Utilities	4-28
4.3.2	Impacts of the No Build Alternative.....	4-28
4.3.3	Impacts of the Recommended Alternative	4-28
4.4	DISPLACEMENTS	4-28
4.4.1	Residential Displacements	4-28
4.4.1.1	Impacts of the Build Alternatives	4-30
4.4.1.2	Impacts of the No Build Alternative	4-33
4.4.1.3	Impacts of the Recommended Alternative	4-33
4.4.2	Business Displacements	4-34
4.4.2.1	Impacts of the Build Alternatives	4-34
4.4.2.2	Impacts of the No Build Alternative	4-38
4.4.2.3	Impacts of the Recommended Alternative	4-38
4.4.3	Other Displacements	4-39
4.5	ECONOMIC AND EMPLOYMENT IMPACTS	4-40
4.5.1	Economic Impacts Related to Roadway Improvements and Alignment Location.....	4-40
4.5.1.1	Impacts of the Build Alternatives	4-40
4.5.1.2	Impacts of the No Build Alternative	4-43
4.5.1.3	Impacts of the Recommended Alternative	4-43
4.5.2	Economic Impacts Related to Business Displacements and Employment Opportunities	4-43
4.5.2.1	Impacts of the Build Alternatives	4-43
4.5.2.2	Impacts of the No Build Alternative	4-49
4.5.2.3	Impacts of the Recommended Alternative	4-49
4.5.3	Economic Impacts Related to Changes in Access	4-49
4.5.3.1	Impacts of the Build Alternatives	4-49
4.5.3.2	Impacts of the No Build Alternative	4-53
4.5.3.3	Impacts of the Recommended Alternative	4-53
4.5.4	Economic Impacts Related to Major Employers.....	4-53
4.5.4.1	Impacts of the Build Alternatives	4-53
4.5.4.2	Impacts of the No Build Alternative	4-54
4.5.4.3	Impacts of the Recommended Alternative	4-54
4.5.5	Economic Impacts Related to Tax Revenues and Public Expenditures.....	4-54
4.5.5.1	Impacts of the Build Alternatives	4-54
4.5.5.2	Impacts of the No Build Alternative	4-55
4.5.5.3	Impacts of the Recommended Alternative	4-56
4.5.6	Regional Economic Impacts from Construction	4-56

4.5.6.1	Impacts of the Build Alternatives	4-56
4.5.6.2	Impacts of the No Build Alternative	4-56
4.5.6.3	Impacts of the Recommended Alternative	4-57
4.6	COMMUNITY IMPACTS.....	4-57
4.6.1	North Beach.....	4-58
4.6.1.1	Displacement Impacts.....	4-58
4.6.1.2	Mobility and Access Impacts	4-59
4.6.1.3	Physical Impacts	4-61
4.6.1.4	Social and Psychological Impacts	4-62
4.6.1.5	Impacts to Public Services.....	4-64
4.6.2	South Central.....	4-66
4.6.2.1	Displacement Impacts.....	4-66
4.6.2.2	Mobility and Access Impacts.....	4-68
4.6.2.3	Physical Impacts	4-71
4.6.2.4	Social and Psychological Impacts	4-71
4.6.2.5	Impacts to Public Services.....	4-73
4.6.3	Northside.....	4-75
4.6.3.1	Displacement Impacts.....	4-75
4.6.3.2	Mobility and Access Impacts.....	4-77
4.6.3.3	Physical Impacts	4-80
4.6.3.4	Social and Psychological Impacts	4-82
4.6.3.5	Impacts to Public Services.....	4-87
4.6.4	Westside.....	4-90
4.6.4.1	Displacement Impacts.....	4-90
4.6.4.2	Mobility and Access Impacts.....	4-91
4.6.4.3	Physical Impacts	4-92
4.6.4.4	Social and Psychological Impacts	4-93
4.6.4.5	Impacts to Public Services.....	4-94
4.6.5	Refinery Row	4-96
4.6.6	Portland.....	4-97
4.7	ENVIRONMENTAL JUSTICE	4-98
4.7.1	Minority Populations and Low Income Populations	4-98
4.7.2	Coordination, Access to Information and Participation.....	4-98
4.7.3	Impacts of the Build Alternatives	4-100
4.7.3.1	Displacements and Relocation Impacts	4-100
4.7.3.2	Economic and Employment Impacts	4-101
4.7.3.3	Community Cohesion and Accessibility	4-103
4.7.3.4	Air Quality Impacts	4-105
4.7.3.5	Traffic Noise Impacts	4-105
4.7.3.6	Water Quality Impacts.....	4-105
4.7.3.7	Hazardous Materials Impacts.....	4-105
4.7.3.8	Visual and Aesthetic Impacts	4-106
4.7.3.9	Safety	4-106
4.7.3.10	Construction Impacts.....	4-107
4.7.3.11	Summary of Impacts.....	4-107
4.7.4	Impacts of the No Build Alternative.....	4-108
4.7.5	Impacts of the Recommended Alternative	4-108
4.7.6	Measures to Avoid, Minimize and Mitigate Adverse Effects	4-108

4.7.6.1	Avoidance and Minimization Measures	4-109
4.7.6.2	Mitigation Measures.....	4-110
4.7.7	Summary and Conclusion.....	4-116
4.7.7.1	Substantial Need for the Project Based on the Overall Public Interest.....	4-117
4.7.7.2	Adverse Impacts of the Other Alternatives.....	4-117
4.8	CHILDREN’S HEALTH.....	4-118
4.8.1	Impacts of the Build Alternatives	4-118
4.8.1.1	Traffic Noise	4-119
4.8.1.2	Air Quality	4-119
4.8.1.3	Physical or Chemical Exposures.....	4-120
4.8.1.4	Water Quality.....	4-120
4.8.1.5	Changes in Access.....	4-121
4.8.1.6	Parks and Recreational Facilities	4-121
4.8.2	Impacts of the No Build Alternative.....	4-121
4.8.3	Impacts of the Recommended Alternative	4-122
4.9	AIR QUALITY IMPACTS.....	4-122
4.9.1	Conformity.....	4-122
4.9.2	Impacts of the Build Alternatives	4-122
4.9.2.1	Carbon Monoxide Air Quality Analysis	4-122
4.9.2.2	Mobile Source Air Toxics (MSAT)	4-124
4.9.2.3	Construction-Related Air Emissions	4-130
4.9.3	Impacts of the No Build Alternative.....	4-130
4.10	TRAFFIC NOISE IMPACTS	4-130
4.10.1	Impacts of the Build Alternatives	4-131
4.10.2	Predicted Noise Impact Contours.....	4-140
4.10.3	Evaluation of Noise Abatement Measures.....	4-141
4.10.3.1	Green Alternative Barrier Analysis	4-142
4.10.3.2	Recommended Alternative Barrier Analysis	4-149
4.10.3.3	Orange Alternative Barrier Analysis	4-155
4.10.3.4	West Alternative Barrier Analysis.....	4-160
4.10.3.5	Barrier Summary for Build Alternatives.....	4-165
4.10.4	Construction Noise Impacts	4-167
4.10.5	Summary	4-167
4.10.6	Impacts of the Recommended Alternative	4-168
4.11	WATER RESOURCES IMPACTS.....	4-170
4.11.1	Potential Impacts to Water Supply and Availability	4-170
4.11.2	Potential Impacts on Impaired Surface Waters - Compliance with Clean Water Act Section 303(d)	4-171
4.11.2.1	Impacts of the Build Alternatives	4-171
4.11.2.2	Impacts of the No Build Alternative	4-175
4.11.2.3	Impacts of the Recommended Alternative	4-176
4.11.2.4	Summary of Impacts to Impaired Surface Waters	4-176
4.11.3	Potential Impacts of Stormwater Runoff - Compliance with Clean Water Act Section 402	4-177
4.11.4	Potential Impacts to Ground Water.....	4-178
4.11.5	Texas Coastal Management Program	4-178
4.11.6	General Bridge Act and Rivers and Harbors Act	4-179
4.12	FLOODPLAIN IMPACTS	4-180

4.12.1	Impacts of the Build Alternatives	4-180
4.12.2	Impacts of the No Build Alternative.....	4-182
4.12.3	Impacts of the Recommended Alternative	4-182
4.13	IMPACTS TO WETLANDS AND WATERS OF THE U.S.....	4-182
4.13.1	Impacts of the Build Alternatives	4-182
4.13.1.1	Clean Water Act Section 404.....	4-184
4.13.1.2	Clean Water Act Section 401.....	4-186
4.13.1.3	Executive Order 11990 Protection of Wetlands.....	4-187
4.13.2	Impacts of the No Build Alternative.....	4-187
4.13.3	Impacts of the Recommended Alternative	4-187
4.14	FARMLAND IMPACTS	4-188
4.14.1	Impacts of the Build Alternatives	4-188
4.14.2	Impacts of the No Build Alternative.....	4-189
4.14.3	Impacts of the Recommended Alternative	4-189
4.15	VEGETATION IMPACTS	4-189
4.15.1	Impacts of the Build Alternatives	4-189
4.15.1.1	TxDOT/TPWD MOU/MOA Documentation.....	4-192
4.15.1.2	Executive Order 13112 on Invasive Species.....	4-195
4.15.1.3	Executive Memorandum on Beneficial Landscaping.....	4-195
4.15.2	Impacts of the No Build Alternative.....	4-195
4.15.3	Impacts of the Recommended Alternative	4-195
4.16	WILDLIFE IMPACTS INCLUDING THREATENED AND ENDANGERED SPECIES.....	4-196
4.16.1	Impacts of the Build Alternatives	4-196
4.16.1.1	Impacts to Wildlife Habitat	4-196
4.16.1.2	Threatened and Endangered Species	4-198
4.16.1.3	Essential Fish Habitat.....	4-205
4.16.1.4	Migratory Bird Treaty Act	4-206
4.16.1.5	Fish and Wildlife Coordination Act.....	4-207
4.16.1.6	Marine Mammal Protection Act.....	4-207
4.16.2	Impacts of the No Build Alternative.....	4-207
4.16.3	Impacts of the Recommended Alternative	4-208
4.16.3.1	Threatened and Endangered Species	4-208
4.16.3.2	Essential Fish Habitat.....	4-208
4.16.3.3	Migratory Bird Treaty Act	4-209
4.16.3.4	Fish and Wildlife Coordination Act.....	4-209
4.16.3.5	Marine Mammal Protection Act.....	4-209
4.17	CULTURAL RESOURCES.....	4-209
4.17.1	Archeological Resources	4-209
4.17.1.1	Impacts of the Build Alternatives	4-209
4.17.1.2	Impacts of the No Build Alternative	4-210
4.17.1.3	Impacts of the Recommended Alternative	4-210
4.17.1.4	Section 106 Consultation: Archeological Resources.....	4-210
4.17.2	Historic Resources	4-211
4.17.2.1	Impacts of the Build Alternatives	4-211
4.17.2.2	Impacts of the No Build Alternative	4-212
4.17.2.3	Impacts of the Recommended Alternative	4-213
4.17.2.4	Section 106 Consultation: Historic Resources.....	4-213
4.17.2.5	Mitigation for Historic Resources.....	4-213

4.18 SECTION 4(F)	4-214
4.18.1 Impacts of the Build Alternatives	4-214
4.18.2 Impacts of the No Build Alternative.....	4-214
4.18.3 Impacts of the Recommended Alternative	4-214
4.19 HAZARDOUS MATERIALS.....	4-215
4.19.1 Impacts of the Build Alternatives	4-216
4.19.1.1 Oil/Gas Well and Pipeline Sites	4-225
4.19.1.2 Construction.....	4-226
4.19.1.3 Asbestos-Containing Materials and Lead-Based Paint	4-226
4.19.1.4 Petroleum Storage Tanks.....	4-227
4.19.1.5 Soil and Groundwater Disturbance Volumes	4-227
4.19.2 Impacts of the No Build Alternative.....	4-227
4.19.3 Impacts of the Recommended Alternative	4-227
4.20 IMPACTS TO VISUAL AND AESTHETIC RESOURCES	4-230
4.20.1 Impacts of the Build Alternatives	4-231
4.20.2 Impacts of the No Build Alternative.....	4-239
4.20.3 Impacts of the Recommended Alternative	4-240
4.20.4 Summary of Visual and Aesthetic Impacts.....	4-240
4.21 ENERGY REQUIREMENTS.....	4-240
4.21.1 Impacts of the Build Alternatives	4-240
4.21.1.1 Short-Term Requirements	4-240
4.21.1.2 Long-Term Requirements	4-241
4.21.2 Impacts of the No Build Alternative.....	4-241
4.21.3 Impacts of the Recommended Alternative	4-241
4.21.4 Potential Conservation Measures.....	4-241
4.21.4.1 Short-Term Conservation Measures.....	4-241
4.21.4.2 Long-Term Conservation Measures.....	4-242
4.22 CONSTRUCTION IMPACTS	4-242
4.22.1 Transportation Impacts—Construction Phase	4-242
4.22.1.1 Green Alternative	4-243
4.22.1.2 Red Alternative.....	4-243
4.22.1.3 Orange Alternative	4-243
4.22.1.4 West Alternative.....	4-243
4.22.1.5 Recommended Alternative	4-244
4.22.2 Navigation Impacts—Construction Phase.....	4-244
4.22.3 Air Quality Impacts—Construction Phase	4-244
4.22.4 Noise Impacts—Construction Phase.....	4-245
4.22.5 Water Quality Impacts—Construction Phase.....	4-245
4.22.5.1 Potential Impacts of Construction Over the Upland Confined Placement Area.....	4-245
4.22.6 Natural Resources Impacts—Construction Phase	4-246
4.23 RELATIONSHIP OF LOCAL SHORT-TERM USES VS. LONG-TERM PRODUCTIVITY	4-247
4.24 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES	4-248
4.24.1 Impacts of the Build Alternatives	4-248
4.24.1.1 Land Use.....	4-248
4.24.1.2 Waters of the U.S., including Wetlands.....	4-248
4.24.1.3 Wildlife Habitat	4-248
4.24.1.4 Cultural Resources.....	4-249

4.24.1.5	Other Considerations.....	4-249
4.24.2	Impacts of the No Build Alternative.....	4-249
4.24.3	Impacts of the Recommended Alternative	4-250
5.0	FINAL SECTION 4(F) EVALUATION	5-1
5.1	INTRODUCTION.....	5-1
5.1.1	Background and Need and Purpose Overview	5-2
5.1.2	Summary of 4(f) Exceptions Relevant to This Project.....	5-2
5.2	DESCRIPTION OF SECTION 4(F) PROPERTIES	5-3
5.2.1	Public Parks and Recreation Areas	5-4
5.2.1.1	T.C. Ayers Park.....	5-4
5.2.1.2	Lovenskiold Park.....	5-5
5.2.1.3	Oveal Williams Senior Center.....	5-7
5.2.2	Wildlife and Waterfowl Refuge Properties	5-7
5.2.3	Historic Sites.....	5-8
5.2.3.1	Corpus Christi Harbor Bridge System	5-8
5.2.3.2	San Antonio, Uvalde, and Gulf Railroad Depot (1101 North Tanchua Street)	5-14
5.3	POTENTIAL USE OF SECTION 4(F) PROPERTIES	5-15
5.3.1	Potential 4(f) Uses by the Build Alternatives.....	5-15
5.3.1.1	Public Parks and Recreation Areas	5-15
5.3.1.2	Wildlife and Waterfowl Refuge Lands	5-17
5.3.1.3	Historic Sites.....	5-17
5.3.2	Potential 4(f) Uses by the No-Build Alternative	5-17
5.4	AVOIDANCE ALTERNATIVES.....	5-18
5.4.1	History of Design Refinements	5-18
5.4.2	Macro-Scale Analysis	5-20
5.4.2.1	Historic Bridge Team Analysis	5-20
5.4.2.2	Analysis of Alternatives to the Use of the Harbor Bridge System	5-21
5.4.2.3	Conclusion of Macro-Scale Analysis	5-28
5.4.3	Micro-scale Analysis.....	5-29
5.4.3.1	Public Parks and Recreation Areas	5-29
5.4.3.2	Rincon Channel Wetlands Interpretive Overlook.....	5-31
5.4.4	Conclusion: Results of the Prudent and Feasible Analysis	5-32
5.5	MEASURES TO MINIMIZE HARM.....	5-32
5.5.1	Public Parks and Recreation Areas	5-33
5.5.1.1	T.C. Ayers Park.....	5-33
5.5.1.2	Lovenskiold Park.....	5-34
5.5.1.3	Oveal Williams Senior Center.....	5-35
5.5.2	Wildlife and Waterfowl Refuges—Rincon Channel Wetlands Interpretive Overlook.....	5-35
5.5.2.1	Design Modifications	5-35
5.5.2.2	Replacement of Function and Conceptual Mitigation.....	5-35
5.5.3	Historic Sites	5-35
5.5.3.1	Harbor Bridge System	5-35
5.5.3.2	SAU&G Depot	5-36
5.6	IDENTIFICATION OF THE ALTERNATIVE WITH THE LEAST OVERALL HARM.....	5-36
5.6.1	Purpose of the Least Overall Harm Analysis	5-36
5.6.2	Assessment of Least Overall Harm	5-37
5.6.2.1	Ability to Mitigate Adverse Impacts to Section 4(f) Properties.....	5-37

5.6.2.2	Relative Severity of Harm After Mitigation.....	5-38
5.6.2.3	Relative Significance of Each Property.....	5-41
5.6.2.4	Views of Officials with Jurisdiction.....	5-43
5.6.2.5	Degree to Which the Alternative Meets the Need and Purpose.....	5-44
5.6.2.6	Magnitude of Adverse Impacts to Non-Section 4(f) Resources After Mitigation.....	5-48
5.6.2.7	Construction Cost Comparison.....	5-57
5.6.3	Summary of Least Overall Harm Analysis.....	5-57
5.7	COMMENTS AND COORDINATION.....	5-59
6.0	INDIRECT EFFECTS.....	6-1
6.1	SCOPING.....	6-2
6.1.1	Determining the Appropriate Methods and Level of Effort.....	6-2
6.1.2	Study Area Boundaries.....	6-3
6.1.3	Timeframe for Indirect Effects Analysis.....	6-4
6.1.4	Planning/Collaborative Judgment Process.....	6-4
6.1.4.1	Individual Land Use Panel Responses.....	6-5
6.1.4.2	Collaboration of Land Use Panel Viewpoints.....	6-7
6.2	IDENTIFICATION OF STUDY AREA GOALS AND TRENDS.....	6-8
6.2.1	Study Area Plans and Goals.....	6-8
6.2.1.1	Corpus Christi MPO’s Metropolitan Transportation Plan 2010-2035.....	6-8
6.2.1.2	City of Corpus Christi’s Integrated Community Sustainability Plan.....	6-9
6.2.1.3	City of Corpus Christi’s Urban Transportation Plan.....	6-9
6.2.1.4	City of Corpus Christi’s Future Land Use Plan.....	6-10
6.2.1.5	City of Corpus Christi’s Strategic Parks and Recreation Master Plan.....	6-10
6.2.1.6	City of Portland’s Comprehensive Plan.....	6-11
6.2.1.7	Port of Corpus Christi’s Rail Master Plan.....	6-11
6.2.1.8	Port of Corpus Christi’s Strategic Plan 2014–2020.....	6-11
6.2.2	Study Area Trends.....	6-12
6.2.2.1	Population Trends.....	6-13
6.2.2.2	Employment Trends.....	6-13
6.2.2.3	Development Trends.....	6-14
6.3	INVENTORY OF NOTABLE FEATURES.....	6-15
6.4	IDENTIFICATION OF IMPACT-CAUSING ACTIVITIES.....	6-16
6.4.1	Modification of Regime—including Land Use, Vegetation, and Hydrology.....	6-16
6.4.2	Land Transformation and Construction.....	6-17
6.4.3	Resource Extraction, Processing, and Storage.....	6-17
6.4.4	Land Alteration, Erosion Control, and Fill.....	6-17
6.4.5	Resource Renewal.....	6-18
6.4.6	Changes in Traffic Patterns, Access Alteration and Travel Times.....	6-18
6.5	IDENTIFICATION OF POTENTIALLY SUBSTANTIAL EFFECTS FOR ANALYSIS.....	6-18
6.5.1	Encroachment-Alteration Effects.....	6-18
6.5.1.1	Socioeconomic Effects.....	6-19
6.5.1.2	Ecological Resources.....	6-23
6.5.2	Induced Growth Effects.....	6-25
6.5.2.1	Residential and Commercial Development.....	6-26
6.5.2.2	Industrial and Port-Related Development.....	6-30
6.5.3	Effects Related to Induced Growth.....	6-33
6.5.4	Screening for Further Analysis.....	6-33
6.6	ANALYSIS OF INDIRECT EFFECTS AND EVALUATION OF RESULTS.....	6-33

6.6.1	Encroachment-Alteration Effects	6-33
6.6.1.1	Economic Effects of Changes in Travel Patterns and Access	6-33
6.6.1.2	Effects to Community Cohesion.....	6-38
6.6.2	Evaluation of Analysis Results	6-42
6.7	ASSESSMENT OF CONSEQUENCES AND CONSIDERATION OF MITIGATION.....	6-43
6.7.1	Mitigation of Effects to Employment.....	6-44
6.7.2	Mitigation of Effects to Communities.....	6-44
7.0	CUMULATIVE EFFECTS	7-1
7.1	IDENTIFY RESOURCES TO CONSIDER IN THE ANALYSIS.....	7-1
7.2	DEFINITION OF STUDY AREA AND TIMEFRAME FOR EACH AFFECTED RESOURCE	7-7
7.2.1	Air Quality RSA.....	7-7
7.2.2	Water RSA	7-7
7.2.3	Coastal RSA.....	7-8
7.2.4	Community RSA	7-8
7.2.5	Economic RSA	7-9
7.3	DEFINITION OF CURRENT STATUS/VIABILITY AND HISTORICAL CONTEXT OF EACH RESOURCE.....	7-9
7.3.1	Air Quality.....	7-9
7.3.1.1	Ozone.....	7-9
7.3.1.2	Mobile Source Air Toxics.....	7-10
7.3.2	Water Resources.....	7-16
7.3.2.1	Water Availability	7-16
7.3.2.2	Surface Water Quality.....	7-18
7.3.3	Coastal Resources.....	7-22
7.3.3.1	Wildlife Species of Concern.....	7-22
7.3.3.2	Habitat Conditions.....	7-23
7.3.4	Community Resources	7-24
7.3.4.1	Community Cohesion.....	7-24
7.3.4.2	Community Health.....	7-26
7.3.5	Economy.....	7-28
7.3.5.1	Overview of the Corpus Christi MSA	7-28
7.3.5.2	Tourism Industry	7-29
7.3.5.3	Port of Corpus Christi.....	7-30
7.4	IDENTIFICATION OF DIRECT AND INDIRECT IMPACTS THAT MAY CONTRIBUTE TO A CUMULATIVE IMPACT	7-35
7.5	IDENTIFICATION OF OTHER PAST, PRESENT AND REASONABLY FORESEEABLE FUTURE ACTIONS THAT MAY AFFECT RESOURCES	7-36
7.5.1	Channel Improvement Project	7-41
7.5.2	Joe Fulton International Trade Corridor	7-43
7.5.3	Nueces River Rail Yard	7-43
7.5.4	Naval Station Ingleside.....	7-44
7.5.5	La Quinta Trade Gateway Terminal	7-44
7.5.6	SEA District	7-44
7.6	ASSESS POTENTIAL CUMULATIVE EFFECTS TO EACH RESOURCE	7-45
7.6.1	Air Quality.....	7-46
7.6.1.1	Potential Contributions to Regional MSAT Concentrations from the Roadway Network	7-46
7.6.1.2	Potential Contributions from Other Non-Roadway Sources.....	7-47

7.6.1.3	Summary of Potential Cumulative Effects on Air Quality	7-57
7.6.1.4	Potential Effects of the Proposed Project Related to Greenhouse Gases	7-61
7.6.2	Water Resources.....	7-64
7.6.2.1	Sources of Potential Cumulative Effects to Water Resources.....	7-64
7.6.2.2	Potential Cumulative Effects to Water Resources.....	7-67
7.6.2.3	Summary of Cumulative Effects to Water Resources.....	7-70
7.6.3	Coastal Resources	7-70
7.6.3.1	Changes in Water Quality	7-70
7.6.3.2	Impacts to Vegetation	7-73
7.6.4	Community Resources	7-74
7.6.4.1	Community Cohesion.....	7-75
7.6.4.2	Community Health.....	7-79
7.6.5	Economic Resources	7-79
7.6.5.1	Contribution of the Proposed Project to a Cumulative Effect on the Regional Economy	7-79
7.6.5.2	Economic Effects of the Port of Corpus Christi	7-81
7.6.5.3	Integrated Community Sustainability Plan Initiatives	7-83
7.7	REPORT THE RESULTS.....	7-83
7.8	ASSESS AND DISCUSS MITIGATION ISSUES FOR ALL ADVERSE EFFECTS	7-86
7.8.1	Rules and Regulations for Controlling Air Emissions	7-86
7.8.1.1	Efforts to Control Eagle Ford Shale-Related Air Emissions	7-87
7.8.1.2	Efforts to Control Maritime Emissions.....	7-88
7.8.1.3	Efforts to Control Refinery Emissions	7-88
7.8.2	Mitigation of Potential Cumulative Effects to Water Resources	7-89
7.8.3	Mitigation of Potential Cumulative Effects to Coastal Resources	7-89
7.8.4	Mitigation of Potential Cumulative Effects to Community Resources	7-90
7.8.5	Mitigation of Potential Cumulative Effects to the Economy.....	7-90
8.0	PUBLIC INVOLVEMENT	8-1
8.1	NOTICE OF INTENT	8-1
8.2	PROJECT COORDINATION.....	8-2
8.2.1	Scoping Process	8-2
8.2.1.1	Public Scoping Meetings	8-5
8.2.1.2	Agency Scoping Meetings	8-7
8.2.2	Agency Coordination.....	8-8
8.2.2.1	Cooperating Agency Coordination	8-8
8.2.2.2	Resource Agency Coordination	8-9
8.2.3	Citizens Advisory Committee and Technical Advisory Committee.....	8-9
8.2.3.1	CAC Meetings	8-11
8.2.3.2	TAC Meetings	8-14
8.2.4	Neighborhood Meetings	8-17
8.2.5	Stakeholder Meetings	8-19
8.2.6	Public Meeting.....	8-21
8.2.7	Public Hearing.....	8-22
8.2.8	Newsletters	8-22
8.2.9	Project Website	8-22
8.3	NOTICE OF AVAILABILITY	8-23
9.0	ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (INCLUDING MITIGATION).....	9-1
9.1	DESIGN COORDINATION REQUIREMENTS.....	9-1

9.2	DISPLACEMENTS	9-1
9.3	ENVIRONMENTAL JUSTICE	9-2
9.3.1	Livability Enhancements.....	9-2
9.3.2	Historic Preservation.....	9-4
9.3.3	Workforce Support	9-4
9.3.4	Aesthetic Enhancements.....	9-6
9.4	CHILDREN’S HEALTH.....	9-6
9.5	AIR QUALITY IMPACTS.....	9-7
9.6	TRAFFIC NOISE IMPACTS	9-7
9.7	WATER RESOURCES IMPACTS.....	9-7
9.8	WETLANDS AND WATERS OF THE U.S.....	9-9
9.9	VEGETATION IMPACTS	9-10
9.10	WILDLIFE IMPACTS INCLUDING THREATENED AND ENDANGERED SPECIES.....	9-10
9.10.1	Threatened and Endangered Species	9-10
9.10.2	Essential Fish Habitat	9-12
9.10.3	Migratory Bird Treaty Act.....	9-12
9.10.4	Marine Mammal Protection Act.....	9-12
9.11	CULTURAL RESOURCES.....	9-13
9.11.1	Archeological Resources	9-13
9.11.2	Historic Resources	9-13
9.12	SECTION 4(F).....	9-13
9.13	HAZARDOUS MATERIALS.....	9-15
9.14	ENERGY REQUIREMENTS.....	9-17
9.15	CONSTRUCTION IMPACTS	9-17

REFERENCES

LIST OF PREPARERS

LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THE FINAL EIS HAVE BEEN SENT

LIST OF TABLES

Table 2.1-1	Measures of Effectiveness.....	2-3
Table 2.4-1	Design Comparison Summary.....	2-18
Table 2.6-1	Summary of Impact Comparison by Alternative—Draft EIS.....	2-21
Table 2.6-2	Summary of Changes in Impact Comparison by Alternative—Final EIS.....	2-25
Table 2.7-1	Summary of Least Overall Harm Analysis.....	2-27
Table 2.8-1	Alternative Comparison Summary	2-31
Table 2.9-1	Differences in Impacts between the Red Alternative (Draft EIS version) and the Recommended Alternative.....	2-32
Table 3.4-1	First Quarter 2013 Employment by Industry	3-21
Table 3.4-2	2012 Location Quotients	3-22
Table 3.4-3	Corpus Christi MSA Employment and Unemployment Trends, 2003-2013	3-22
Table 3.4-4	City of Corpus Christi Employment and Unemployment Trends, 2003-2012	3-23
Table 3.4-5	2010 Jobs Counts by Places Where Workers are Employed: Corpus Christi.....	3-24
Table 3.4-6	2010 Jobs Counts by Places Where Workers Live: Corpus Christi	3-24
Table 3.4-7	2011 Means of Transportation to Work For Workers 16 Years And Over	3-25
Table 3.4-8	2010 Travel Time To Work For Workers 16 Years And Over	3-25
Table 3.4-9	2011 Corpus Christi MSA Major Employers.....	3-26

Table 3.5-1	Regional Population Trends, 1970-2010	3-29
Table 3.5-2	Population Projections, 2010-2040.....	3-30
Table 3.5-3	Study Area 2010 Race and Ethnicity Characteristics.....	3-30
Table 3.5-4	Study Area 2011 Income Characteristics.....	3-31
Table 3.5-5	Study Area 2010 Age Distribution.....	3-31
Table 3.5-6	Study Area 2011 Employment Status.....	3-32
Table 3.5-7	Study Area 2011 Housing Characteristics.....	3-32
Table 3.5-8	City of Corpus Christi 2011Housing Characteristics	3-33
Table 3.5-9	Study Area 2011 Income Characteristics.....	3-34
Table 3.5-10	2010 Minority Populations	3-35
Table 3.5-11	2011 Limited English Proficiency	3-38
Table 3.5-12	County Health Rankings, 2012.....	3-39
Table 3.5-13	Children in Poverty 2011	3-43
Table 3.5-14	Percent of Children in Poverty by Age	3-44
Table 3.5-15	Children with Risk Factors	3-44
Table 3.6-1	National Ambient Air Quality Standards	3-83
Table 3.6-2	Nearest Active Ozone Air Monitoring Stations.....	3-85
Table 3.6-3	Local Air Monitoring Stations Ozone Data Summary 8-Hour Maximum Concentration (ppm).....	3-85
Table 3.6-4	Projected National MSAT Emission Trends 2010-2050 for Vehicles Operating on Roadways Using EPA's MOVES2010b Model.....	3-87
Table 3.7-1	FHWA Noise Abatement Criteria	3-88
Table 3.7-2	Existing Ambient Noise Levels	3-90
Table 3.8-1	Texas Water Quality Assessment Results for Potentially Affected Water Bodies (1992–2012).....	3-93
Table 3.13-1	Rare, Threatened and Endangered Species of Potential Occurrence in Nueces and San Patricio Counties, Texas	3-119
Table 3.13-2	Texas Parks and Wildlife Department Natural Diversity Database Search Results	3-132
Table 3.13-3	Essential Fish Habitat in the Vicinity of the Proposed Project.....	3-133
Table 3.13-4	Avian Species Identified During July and September 2012 and March 2013 Biological Field Visits	3-135
Table 3.14-1	NRHP Eligible or Listed Resources in the APE.....	3-140
Table 3.16-1	Historical Topographic Map Review	3-146
Table 3.16-2	Aerial Photograph Review	3-146
Table 3.16-3	Sanborn Fire Insurance Map Review.....	3-147
Table 3.16-4	Federal Regulatory Database Search	3-150
Table 3.16-5	State/Local Regulatory Database Search	3-151
Table 3.16-6	Federal Regulatory Database Search Red Alternative	3-154
Table 3.16-7	State/Local Regulatory Database Search Red Alternative.....	3-157
Table 3.16-8	Federal Regulatory Database Search Green, Orange, and West Alternatives.....	3-159
Table 3.16-9	State/Local Regulatory Database Search Green, Orange, and West Alternatives.....	3-163
Table 3.16-10	Oil and Gas Wells within Proposed Alternative Rights of Way.....	3-172
Table 3.17-1	Anticipated Viewer Response to Landscape Changes.....	3-184
Table 4.1-1	Proposed Land Use Conversions by Build Alternative (in acres)	4-2
Table 4.1-2	Proposed Land Use Conversions by the Recommended Alternative (in acres).....	4-5
Table 4.2-1	Changes in Entrance and Exit Ramps by Alternative.....	4-16
Table 4.4-1	Residential Displacements - Green Alternative	4-30
Table 4.4-2	Residential Displacements - Red Alternative.....	4-31

Table 4.4-3	Residential Displacements - Orange Alternative	4-32
Table 4.4-4	Residential Displacements - West Alternative.....	4-33
Table 4.4-5	Residential Displacements - Recommended Alternative	4-34
Table 4.4-6	Business Displacements - Green Alternative.....	4-35
Table 4.4-7	Business Displacements - Red Alternative	4-36
Table 4.4-8	Business Displacements - Orange Alternative	4-37
Table 4.4-9	Business Displacements - West Alternative	4-38
Table 4.4-10	Business Displacements - Recommended Alternative	4-39
Table 4.4-11	Other Displacements.....	4-40
Table 4.5-1	Employment Effects Related to Business Displacements - Green Alternative	4-44
Table 4.5-2	Employment Effects Related to Business Displacements - Red Alternative.....	4-46
Table 4.5-3	Employment Effects Related to Business Displacements - Orange Alternative	4-47
Table 4.5-4	Employment Effects Related to Business Displacements - West Alternative.....	4-49
Table 4.5-5	Modeled Differences in Travel Time by Alternative	4-51
Table 4.5-6	Estimated Annual Loss of Tax Revenue by Alternative	4-55
Table 4.5-7	Preliminary Cost Estimates by Alternative (2013\$)	4-55
Table 4.5-8	Estimated Annual Loss of Tax Revenue by the Recommended Alternative.....	4-56
Table 4.5-9	Direct Economic Effects of the Recommended Alternatives.....	4-56
Table 4.6-1	Summary of Community Impacts: North Beach	4-65
Table 4.6-2	Summary of Community Impacts: South Central	4-74
Table 4.6-3	Summary of Community Impacts: Northside	4-88
Table 4.6-4	Summary of Community Impacts: Westside	4-95
Table 4.7-1	Residential Displacements in Minority or Low-Income Areas by Alternative	4-101
Table 4.9-1	Maximum Carbon Monoxide Concentrations	4-123
Table 4.9-2	MSAT Emissions by Alternative (Tons/Year).....	4-126
Table 4.10-1	Existing and Predicted Traffic Noise Levels (dBA Leq)	4-132
Table 4.10-2	Summary of Future (2035) Traffic Noise Impacts	4-139
Table 4.10-3	Year 2035 Predicted Noise Impact Contours.....	4-140
Table 4.10-4	Green Alternative Noise Barrier Proposal	4-148
Table 4.10-5	Recommended Alternative Noise Barrier Proposal	4-155
Table 4.10-6	Orange Alternative Noise Barrier Proposal	4-160
Table 4.10-7	West Alternative Noise Barrier Proposal.....	4-165
Table 4.10-8	Barrier Proposal Summary for Build Alternatives.....	4-166
Table 4.10-9	Summary of Future (2035) Traffic Noise Impacts	4-169
Table 4.10-10	Year 2035 Predicted Noise Impact Contours - Recommended Alternative vs. Red Alternative	4-169
Table 4.10-11	Barrier Proposal Summary – Recommended Alternative vs. Red Alternative.....	4-169
Table 4.11-1	Right of Way Draining to Receiving Waters by Alternative	4-172
Table 4.11-2	Right of Way Draining to Nueces Bay by Alternative.....	4-173
Table 4.11-3	Right of Way Draining to Corpus Christi Bay by Alternative.....	4-173
Table 4.11-4	Right of Way Draining to the Inner Harbor by Alternative.....	4-175
Table 4.12-1	Floodplain Encroachments by Alternative	4-180
Table 4.13-1	Temporary and Permanent Impacts to Waters of the U.S. by Build Alternative.....	4-183
Table 4.13-2	Temporary and Permanent Impacts to Waters of the U.S. by the Preferred Alternative	4-188
Table 4.15-1	Vegetation Impacts by Build Alternative.....	4-190
Table 4.15-2	Temporary vs. Permanent Vegetation by Build Alternative.....	4-190
Table 4.15-3	Vegetation Impacts by the Recommended Alternatives vs. Red Alternative.....	4-195

Table 4.15-4	Temporary vs. Permanent Vegetation Impacts by the Recommended Alternative.....	4-196
Table 4.16-1	Wildlife Habitat Impacts by Build Alternative (acres).....	4-197
Table 4.16-2	Impacts to Rare, Threatened and Endangered Species of Potential Occurrence in Nueces and San Patricio Counties, Texas	4-198
Table 4.16-3	Potential Impacts to Essential Fish Habitat (EFH)	4-206
Table 4.16-4	Temporary vs. Permanent Wildlife Habitat Impacts by the Recommended Alternative (acres).....	4-208
Table 4.16-5	Potential Impacts to Essential Fish Habitat (EFH) for the Recommended Alternative	4-208
Table 4.17-1	Determination of Effect for NRHP-Eligible Historic Resources in the APE.....	4-212
Table 4.18-1	Use of Section 4(f) Property by Build Alternative	4-214
Table 4.19-1	Regulated Hazardous Materials Sites	4-217
Table 4.19-2	Preliminary Estimate of Soil and Groundwater Volumes to be Disturbed during Construction	4-228
Table 5.2-1	Summary of Section 4(f) Properties Used by the Proposed Project	5-3
Table 5.6-1	Relative Severity of Harm to Section 4(f) Properties After Mitigation.....	5-39
Table 5.6-2	Adverse Impacts to Non-Section 4(f) Properties	5-50
Table 5.6-3	Summary of Least Overall Harm Analysis.....	5-57
Table 6.1-1	Collaborative Judgment Land Use Panel Participants.....	6-4
Table 6.5-1	Indirect and Induced Economic Effects of the Proposed Build Alternatives.....	6-21
Table 6.5-2	Indirect and Induced Employment Effects of the Proposed Build Alternatives	6-22
Table 6.5-3	Potentially Substantial Indirect Effects	6-35
Table 6.6-1	Summary of Indirect Effects Analysis by Proposed Build Alternative.....	6-42
Table 7.1-1	Determination of Resources Included in Cumulative Effects Analysis.....	7-3
Table 7.2-1	Resource Study Area for Each Resource Considered in the Analysis.....	7-7
Table 7.3-1	Ambient Concentrations of MSATs in the Project Area from 2005 NATA Modeling.....	7-11
Table 7.3-2	Ambient Concentrations of Benzene and 1,3 Butadiene at Three TCEQ Air Monitoring Stations in the Project Area, showing Average Annual Concentrations and 1-hour Maximum Concentrations for 2006, 2010, 2011 and 2012.....	7-12
Table 7.3-3	Apportionment among Source Categories for Benzene and 1,3 Butadiene Emissions Inventories Used in Corpus Christi Air Toxics Modeling Studies	7-14
Table 7.5-1	Current and Proposed Transportation and Development Projects	7-37
Table 7.5-2	Port of Corpus Christi Vessel Forecast With Channel Deepening for 2030.....	7-42
Table 7.6-1	Summary of Distribution of Calls by Vessel Type at the Port of Corpus Christi.....	7-49
Table 7.6-2	Summary of Criteria Pollutants Emissions from Ocean-Going Vessels and Barges at the Port of Corpus Christi in Tons per Year (2006–2009)	7-49
Table 7.6-3	Commercial Marine Vehicle Emissions in Nueces and San Patricio Counties in Tons.....	7-51
Table 7.6-4	Projected Emissions Trends for Locomotives (in Tons per Year) for Nueces in San Patricio Counties for the Years 2000, 2010, and 2018	7-55
Table 7.6-5	Selected Annual Source Emissions in Nueces and San Patricio Counties in Tons per Year (2011)	7-57
Table 7.6-6	National Emissions Estimates for Common Pollutants and their Precursors.....	7-58
Table 7.6-7	Direct, Indirect, and Induced Economic Effects of the Proposed Build Alternatives.....	7-80
Table 7.6-8	Direct, Indirect, and Induced Employment Effects of the Proposed Build Alternatives.....	7-80

Table 7.7-1	Summary of Cumulative Effects.....	7-84
Table 7.8-1	Estimated Emissions Reductions from the Final Tier 3 Standards in Annual Short Tons.....	7-87
Table 8.2-1	Participating and Cooperating Agencies	8-3
Table 8.2-2	Neighborhood Meetings	8-18
Table 8.2-3	Neighborhood Open Houses – 2014	8-19
Table 8.2-4	Stakeholder Meetings	8-20
Table 9.6-1	Noise Barrier Proposal.....	9-7

LIST OF ILLUSTRATIONS

Illustration 3.6-1	Projected National MSAT Emissions Trends 2010-2050 for Vehicles Operating on Roadways Using EPA’s MOVES2010b Model	3-86
Illustration 3.17-1	Industrial/refinery uses bordering I-37.....	3-176
Illustration 3.17-2	Looking northwest from McCaughan Park in downtown Corpus Christi.....	3-176
Illustration 3.17-3	Looking northwest from the T-heads.	3-177
Illustration 3.17-4	View of the Harbor Bridge from just north of the Texas State Aquarium	3-178
Illustration 3.17-5	View of the Municipal Marina.	3-179
Illustration 3.17-6	Looking west over the ship channel from the Harbor Bridge.	3-179
Illustration 3.17-7	Homes on Van Loan Avenue with CITGO refinery visible in background.	3-180
Illustration 3.17-8	Looking northwest from the intersection of Craig Street and Shoreline Boulevard.	3-180
Illustration 3.17-9	1959 view of construction of I-37 and US 181 looking east.....	3-181
Illustration 3.17-10	View of the Harbor Bridge from the Bay, looking west.	3-182
Illustration 3.17-11	View of the Art Museum of South Texas (left) and the Harbor Bridge from the Corpus Christi Bay, looking west.....	3-183
Illustration 3.17-12	Harbor Bridge with LED lights	3-184
Illustration 4.9-1	Projected Changes in MSAT Emissions by Project Scenario Over Time	4-126
Illustration 4.9-2	Total MSAT Emissions and Vehicle Miles Traveled By Alternative	4-127
Illustration 4.20-1	Rendering of proposed Red Alternative in the vicinity of T.C. Ayers Park.....	4-233
Illustration 4.20-2	Rendering of proposed Red Alternative from the L-Head	4-234
Illustration 4.20-3	Rendering of proposed Orange Alternative from the Northside community	4-236
Illustration 4.20-4	Rendering of proposed Orange Alternative from the L-Head	4-237
Illustration 4.20-5	Rendering of proposed West Alternative from the Hillcrest neighborhood.....	4-238
Illustration 5.2-1	T.C. Ayers Park Born Learning trail sign.....	5-4
Illustration 5.2-2	T.C. Ayers Park playground equipment.....	5-5
Illustration 5.2-3	Lovenskiold Park sign	5-6
Illustration 5.2-4	Lovenskiold Park swing set.....	5-6
Illustration 5.2-5	Rincon Channel Wetland Interpretive Overlook.....	5-7
Illustration 5.2-6	Elevation of Corpus Christi Harbor Bridge, from 2010 rehabilitation project.	5-9
Illustration 5.2-7	Elevation of Harbor Bridge truss spans, from 2010 rehabilitation project.	5-9
Illustration 5.2-8	US 181 over Burleson Street.....	5-10
Illustration 5.2-9	US 181 Northbound Freeway Connector Bridge over US 181.....	5-11
Illustration 5.2-10	US 181 Southbound Bridge over Belden Street.....	5-11
Illustration 5.2-11	US 181 Southbound off-ramp Bridge over Spur 544.	5-12
Illustration 5.2-12	US 181 Northbound on-ramp Bridge over Spur 544.....	5-13
Illustration 5.2-13	US 181 Northbound Bridge over Spur 544.	5-14

Illustration 5.2-14	SAU&G Depot	5-15
Illustration 7.3-1	Annual Average Benzene Concentrations at TCEQ and CCAP Air Toxics Monitoring Sites in Corpus Christi, Texas, 1998-2012.....	7-13
Illustration 7.3-2	Port of Corpus Christi Cargo Tonnage Reports by Commodity, 2004–2013	7-33
Illustration 7.6-1	NOx and VOC Emissions and VMT Trends for Nueces County	7-53
Illustration 7.6-2	CO Emissions and VMT Trends for Nueces County.....	7-53
Illustration 7.6-3	PM _{2.5} Emissions and VMT Trends for Nueces County.....	7-53
Illustration 7.6-1	SO ₂ Emissions and VMT Trends for Nueces County.....	7-54
Illustration 7.6-5	Comparison of Growth Areas and Emissions (1980–2012).....	7-58

LIST OF APPENDICES

Appendix A Figures

Figure 1.0-1	Project Location Map
Figure 2.1-1	Preliminary Build Alternatives Under Consideration
Figure 2.3-1	Reasonable Alternatives Under Consideration
Figure 2.4-1	Green Alternative
Figure 2.4-2	Red Alternative
Figure 2.4-3	Orange Alternative
Figure 2.4-4	West Alternative
Figure 2.4-5	Recommended Alternative
Figure 2.8-1	Alternatives Screening Matrix
Figure 3.5-1	Community Study Areas
Figure 3.5-2	2011 Low Income Populations
Figure 3.5-3	2010 Minority Populations
Figure 3.5-4	Project Area Community Boundaries
Figure 3.5-5	North Beach Community
Figure 3.5-6	South Central Community
Figure 3.5-7	Northside Community
Figure 3.5-8	Westside Community
Figure 3.5-9	Refinery Row Community
Figure 3.5-10	Portland Community
Figure 3.6-1	Air Quality Monitoring Stations
Figure 3.8-1	Project Area Water Features
Figure 3.8-2	Major and Minor Aquifers
Figure 3.8-3	Coastal Management Program Boundary
Figure 3.8-4	Coastal Barrier Resources Units
Figure 3.8-5	Submerged Lands
Figure 3.9-1	FEMA Floodplains
Figure 3.10-1	Potential Wetlands and Waters of the U.S.
Figure 3.10-2	Sensitive Environmental Features Including Waters of the U.S. – Index
Figure 3.10-3	Sensitive Environmental Features Including Waters of the U.S. – 1
Figure 3.10-4	Sensitive Environmental Features Including Waters of the U.S. – 2
Figure 3.10-5	Sensitive Environmental Features Including Waters of the U.S. – 3
Figure 3.11-1	Geologic Formations
Figure 3.11-2	Soil Types
Figure 3.12-1	Vegetational Regions of Texas

Figure 3.12-2	Regional Vegetation Types
Figure 3.12-3	Project Area Vegetation
Figure 3.12-4	Project Area Vegetation Rincon Channel Area Detail
Figure 3.12-5	Biotic Provinces of Texas
Figure 3.13-1	Essential Fish Habitat
Figure 3.16-1	Hazardous Materials Sites Green Alternative
Figure 3.16-2	Hazardous Materials Sites Red Alternative
Figure 3.16-3	Hazardous Materials Sites Orange Alternative
Figure 3.16-4	Hazardous Materials Sites West Alternative
Figure 3.16-5	Hazardous Materials Sites Recommended Alternative
Figure 3.16-6	Pipelines and Oil & Gas Wells
Figure 3.17-1	Project Area Elevations
Figure 3.17-2	Proposed Green Alignment Viewshed Map
Figure 3.17-3	Proposed Red Alignment Viewshed Map
Figure 3.17-4	Proposed Orange Alignment Viewshed Map
Figure 3.17-5	Proposed West Alignment Viewshed Map
Figure 4.2-1	Existing Ramp Diagram
Figure 4.2-2	Green Alternative Ramp Diagram
Figure 4.2-3	Red Alternative Ramp Diagram
Figure 4.2-4	Orange Alternative Ramp Diagram
Figure 4.2-5	West Alternative Ramp Diagram
Figure 4.11-1	Project Area Drainage Basins
Figure 4.13-1	Sensitive Environmental Features
Figure 5.2-1	Section 4(f) Properties Requiring Use
Figure 5.3-1	Detail of Use of T.C. Ayers Park Red Alternative
Figure 5.3-2	Detail of Use of T.C. Ayers Park Orange Alternative
Figure 5.3-3	Detail of Use of Lovenskiold Park Green Alternative
Figure 5.3-4	Detail of Use of Lovenskiold Park Red Alternative
Figure 5.3-5	Detail of Use of Lovenskiold Park Orange Alternative
Figure 5.3-6	Detail of Use of Oveal Williams Senior Center Orange Alternative
Figure 5.3-7	Detail of Use of Rincon Channel Wetlands Interpretive Overlook West Alternative
Figure 5.3-8	Detail of Use of SAU&G Depot Green Alternative
Figure 5.4-1	Constraints at T.C. Ayers Park Red Alternative
Figure 5.4-2	Constraints at T.C. Ayers Park Orange Alternative
Figure 6.1-1	Area of Influence
Figure 6.2-1	Future Land Use Map
Figure 6.5-1	Critical Habitat for the Piping Plover within the AOI
Figure 7.2-1	Air Quality RSA
Figure 7.2-2	Water RSA
Figure 7.2-3	Coastal RSA
Figure 7.2-4	Community RSA
Figure 7.2-5	Economic RSA
Figure 7.3-1	2000 Census Geography
Figure 7.5-1	Existing and Proposed Transportation and Development Projects
Figure 7.5-2	Existing and Proposed Transportation and Development Projects
Figure 7.5-3	Existing and Proposed Transportation and Development Projects
Appendix B	Agency Coordination
Appendix C	Transportation Planning Documents

Appendix D	Typical Sections
Appendix E	Land Use Plates
Appendix F	Community Questionnaire
Appendix G	Supplemental Water Quality Information
Appendix H	Displacements Plates
Appendix I	Traffic Noise Plates
Appendix J	Land Use Panel Questionnaire and Responses
Appendix K	Public Involvement Materials
Appendix L	TxDOT Right of Way Acquisition and Relocation Assistance