



Impact Criteria

The Technical Environmental Studies (TES) were completed to provide state-of-the-art projections of environmental impacts for the five Build Alternatives. The studies involved exhaustive surveys, modeling and simulation, delineations and extensive record research to insure that a comprehensive approach be brought to the design, construction and mitigation decisions of this project. The TES were initiated to provide technical analyses for projected impacts. These analyses identified and quantified distinguishing characteristics of the five Build Alternatives and the No-Build Alternative. The Summary of TES Findings, Impacts and Benefits Matrix is a summary of this exhaustive process.

The No-Build Alternative proposes no changes to the existing interchange. Impacts to the project area will be evaluated in the same way as the other proposed alternatives, with the assessment of current conditions projected to the design year serving as the impact assessment for the No-Build Alternative. The No-Build Alternative serves as the benchmark to measure the costs and benefits of each Build Alternative evaluated. The No-Build Alternative assumes all bridge decks to be replaced due to their age and resurfacing of all roadways and ramps every ten years in order to be maintained properly until the Year 2030.

The Alternative Comparison Matrix distinguishes the technical/social interrelationship between the five Build Alternatives, plus the No-Build. The following criteria were developed to serve as the basis for decisions regarding technical/social comparisons.

Engineering Criteria

Meets Purpose and Need - The purpose of this project is to improve traffic safety, reduce traffic congestion and meet driver's expectations by improving the direct connection of the I-295 mainline and the interchange of I-295/I-76/Route 42. All of the Build Alternatives meet the purpose and need while the No-Build does not.

The metrics are yes or no.

Temporary Construction Impacts - Temporary construction impacts include increased noise, dust, vibrations, encroachment and inconvenience to residents during construction. Local residents and community facilities will be impacted due to construction activities taking place that will increase noise levels, create dust, cause vibration, encroach upon their properties through temporary easements and cause visual impacts. Existing noise walls may have to be removed for short durations while new ones are constructed. Revised access into the [Willow Place and/or Hickory Place] homes will be required. Construction activities are required on lands and community facilities (New St. Mary's Cemetery, the Annunciation Church, Bellmawr Elementary School and the Bellmawr Baseball fields). The No-Build Alternative assumes all maintenance work will be

performed within the existing right-of-way, require no new excavation or structures and be of significantly shorter duration than any of the Build Alternatives.

The metrics for temporary construction impacts are:

- ◆ Low: Impacts caused by routine maintenance and potential upgrades which will result in local noise and dust and inconvenience of short duration (less than a few months).
- ◆ Medium: Noise, dust, vibration and/or visual impacts and inconvenience to neighboring properties for several years.
- ◆ High: Considerable noise, dust, vibrations, visible impacts, inconvenience to neighboring properties for several years.

Maintenance and Protection of Traffic - A preliminary maintenance and protection of traffic (MPT) scheme has been developed for each alternative. Each alternative will require reduction of lane widths, the elimination or narrowing of shoulders, numerous traffic shifts, a temporary bypass roadway on Browning Road which impacts parking at the Annunciation Church and staging of the other local road bridges. It can be expected that traffic will slow through the construction zone for each alternative, however, the delays will not divert a significant amount of traffic off the freeway onto local roads (<50 vehicles per hour). The one exception is when the existing I-76 southbound (SB) to I-295 SB ramp is closed and a weave condition will exist on new Ramp F which will also be carrying I-295 SB and I-295 SB to Route 42 SB traffic. The overall construction schedule is also a governing factor. The No-Build Alternative assumes resurfacing operations will be performed at night over relatively short durations with multiple lane closures with only minimal disruption to traffic. In addition, it assumes at least one lane of traffic will be maintained on the two lane ramps during bridge deck reconstruction, which will cause traffic diversions onto local roads for short durations.

The metrics for MPT are:

- ◆ Low: Minimal traffic is diverted off the mainline due to construction.
- ◆ Medium: Traffic diversions off the mainline due to the SB weave are 12 months or less and/or overall construction duration is less than 6 years.
- ◆ High: Traffic diversion off the mainline due to the SB weave is greater than 12 months and/or overall construction duration is 6 years or more.

Security - With homeland security issues being much more significant over the last 5 years, the security of each of the alternatives has been evaluated. Incidents which can impact multiple facilities are of greatest concern. There is also concern for alternatives that are elevated and are in close proximity to residential properties and/or community facilities. Types of preventative measures (such as hardening) will be considered for each of the Build Alternatives. The No-Build Alternative assumes no preventive measures will take place on existing facilities.

The metrics for security are:

- ◆ Low: Potential breach of security results in minor facility damage with a short recovery time to repair.
- ◆ Medium: Potential breach of security results in significant facility damage with an extended duration for repair.
- ◆ High: Potential breach in security results in multiple extreme failures of facilities with an extended duration for repair.

Design Criteria (Substandard Elements) - Each alternative has been designed for compliance with applicable design standards (NJDOT-Design Manual and AASHTO 2001 – A Policy on Geometric Design of Highways and Streets). The number of substandard design elements have been identified, as well as, items in the design that may not be standard (i.e. shoulder transition, shoulder width greater than 12 feet; no superelevation on local roads, acceleration lane length per AASHTO), but, that do not require design exceptions. The No-Build Alternative assumes there will be no geometric improvements to the interchange through the Year 2030.

The metrics for design criteria are:

- ◆ Low: Mainline I-295 is accommodated with a direct connection with 55 mph posted speed, and interchange ramps are designed for a 40 mph posted speed. The substandard design elements are primarily limited to existing bridges and/or facilities at the limits of the project (i.e. Market Street, railroad bridge).
- ◆ Medium: Some geometric improvements are made to the interchange with some increase in posted speeds; however, there are still a number of substandard design exceptions or other substandard conditions throughout the project limits.
- ◆ High: Mainline I-295 is not accommodated with a direct connection and the northbound (NB) weave with Route 42 and the use of Al-Jo's curve for I-295 SB still exist. There are no changes in posted speed. Numerous substandard design elements and conditions are present for both the roadway, ramps and bridges within the interchange, as well as for bridges or facilities at the limit of the project.

Cost to Build - Costs to build were developed for each alternative based upon a review of 2005 bid prices for projects in New Jersey, bid prices of recent large transportation projects in New Jersey and input from contractors and suppliers along with other recognized sources to develop unit prices for non-standard items. Prices were then adjusted to reflect construction staging, difficulty of construction, night time work, etc. Tunnel and depressed road section costs were compared to actual costs from the Boston Artery Tunnel project, and adjusted accordingly. Costs to build include contingencies of 15% to 20% depending upon the construction operations. Costs to build were then escalated to the anticipated construction midpoint, but were capped at 20% maximum. These costs assume there will be no natural disasters or other unexpected events which

will drastically alter material and/or labor costs. An allowance for construction change orders was calculated. Design and Construction Engineering costs have both been assumed to be 10% of the cost to build. Cost to Build includes cost to design, construction inspection costs and right-of-way costs.

The metric is the estimated Cost to Build.

Construction Duration - Construction durations were developed for each alternative based on preliminary MPT schemes. Durations of large complex items (bridges, walls, tunnel, pump station, etc.) were estimated to develop a critical path schedule. Opportunities for acceleration and the split into various construction contracts will be investigated once an alternative is selected. The No-Build Alternative would have no construction duration.

The metric for construction duration is the estimated duration of the project.

Maintenance and Operations - This includes routine maintenance (i.e. bridge/structural inspections, replacing damaged guide rail, replacing luminaries and cleaning drainage facilities) to more significant maintenance work, such as replacement of bridge decks and resurfacing. Operation costs include electrical costs for lighting, ITS facilities, pump stations, special police and fire training by the local municipality, etc.

Evaluation factors include the following over the life-cycle of the project:

- ◆ Need to operate and maintain pump stations.
- ◆ Amount of major rehabilitation work (i.e. redecking) on bridges.
- ◆ Amount of structure (bridges and walls) to be maintained.
- ◆ Maintenance & operation associated with the tunnel interior, drainage system, electrical system, ventilation system, lighting system and control system.

The No-Build Alternative assumes the replacement of all bridge decks, the cleaning and painting of structural steel and the resurfacing of all roadways and ramps every ten years, as well as the routine maintenance and operations associated with the existing facility.

The metrics for maintenance and operations are:

- ◆ Low: Amount of structure has not increased and structure maintenance is routine. Operations of pump stations and tunnel sections are not required.
- ◆ Medium: Amount of structure has increased or structure maintenance is significant. Operations of pump stations are required. Operations of tunnel sections are not required.
- ◆ High: Amount of structure has increased significantly or structure maintenance is significant. Operations of pump stations and tunnel sections are required.

Environmental Criteria (TES Results)

Noise - Noise impacts were predicted for the Year 2000 existing conditions, as well as future 2030 “No-Build” and “Build” conditions (all alternatives). New and replacement noise walls were designed to mitigate Category B (exterior) NAC noise impacts, which includes recreational areas, cemeteries and residences. Since recreational areas and cemeteries were mitigated through noise wall designs (except for Annunciation School playground), alternatives will be evaluated based on the Category B NAC residential impacts. While new noise walls were designed to eliminate noise impacts, replacement noise walls were designed to approach “in-kind” effectiveness of existing noise walls, thus yielding noise levels similar to “No-Build”.

Residential Noise Impact Reduction - The construction of new and replacement noise walls will reduce the number of residential units that experience noise levels in excess of the Category B NAC (66 dBA) compared to the No-Build alternative.

The metric for noise reduction is measured as the number of receptors presently above the Category B NAC who will be reduced below the Category B NAC as a result of the project.

Post Mitigation Residential Noise Increase over Existing Conditions - Noise levels resulting from this project have been projected, assuming that all proposed noise walls and replacement noise wall segments will be constructed. [Although new and replacement noise walls proposed under each design alternative eliminate a significant number of impacts, several residential noise impacts remain. The degree of each remaining impact is determined by the noise level increase over existing conditions.] Under normal circumstances, a change in noise levels less than 3 decibels is not perceivable to the human ear. A change greater than 3 decibels is considered to be a perceivable increase in noise. An increase of 7 decibels or more is noticeable.

The metric for remaining noise impacts are measured as the number of receptors experiencing an increase over existing conditions in each of the following three ranges:

- ◆ **Less than 3 dBA (Not Perceivable):** Number of receptors with a noise level increase that is not perceptible to the average person;
- ◆ **Greater than 3 dBA but less than 7 dBA (Perceivable):** Number of receptors with a perceivable increase over existing conditions;
- ◆ **Greater than 7 dBA (Noticeable):** Number of receptors with a noticeable increase over existing conditions.

Air Quality - The Air Quality Technical Environmental Study documents carbon monoxide concentrations for each alternative. No carbon monoxide impact was documented under the 2030 “No-Build” or any of the “Build” Alternatives. Air Quality is improved under all build alternatives to the same relative degree across the project area. The difference between the No-Build and any of the Build alternatives at the area wide level was not significant to constitute a distinguishing characteristic.

Hazardous Waste - Seventeen Areas of Concern (AOCs) within the study area were identified based on the potential impacts to properties from proposed construction activities. After further study, three of these AOCs were found to have a possibility of affecting the five Build Alternatives. However, the effect on each alternative was similar such that hazardous waste was found not to be a distinguishing characteristic among the alternatives.

Natural Ecosystems - The Natural Ecosystems TES identified impacts to floodplains, wetlands, stream ecology and storm water quality. The opportunity for waterfront access was a beneficial attribute identified in the Natural Ecosystems TES. Results of the Natural Ecosystems TES are captured in four rating criteria as follows.

Floodplain - Floodplains within the project area were mapped. Permanent impacts to floodplains were measured in acres for each Build Alternative. The No-Build Alternative results in no impact to floodplain acreage.

The metric for floodplain is the actual acreage of floodplain lost due to construction and fill.

Total Wetland and State Open Waters (SOW) Permanent Impacts - Wetlands were delineated within the project area. Impacts to SOW, tidal wetlands and non-tidal wetlands were quantified for the five Build Alternatives. All impacts to wetlands must be mitigated in accordance with US Army Corps of Engineers (USACE) and NJDEP regulations and directives for all Build Alternatives.

The metric for wetland impacts is the actual acreage of permanent wetland and SOW impacts.

On-Site Wetland Mitigation Opportunities - Required acres for mitigation were estimated within the TES. The actual acreage available for on-site mitigation is dependent on final design. Not all alternatives could accommodate on-site mitigation. On-site mitigation is preferred because the mitigation is in close proximity to the areas of impact and thus, the benefits of mitigation will enhance the natural resources within the project area. On site mitigation will enhance and restore wetland functional characteristics, including water absorptive capacity, increased water quality and enhanced conditions for wildlife habitat including the potential expansion of wild rice, an important food source. The No-Build Alternative results in no impact.

The metric for this criterion is the percentage of acreage available for on-site mitigation.

Total Impervious Coverage - Total impervious coverage provides a good working comparative analysis of the effects on stormwater quantity, quality and recharge within this area of a sole source aquifer. Stormwater management will not be provided in the No-Build Alternative.

The metric for this criterion is the total impervious coverage in acres.

Waterfront Access - Access to stream corridors for passive recreational opportunities is an enhancement for the community. Some alternatives provide the opportunity for waterfront access as a design characteristic, while others do not.

The metrics for waterfront access are yes or no.

Socioeconomics - The Socioeconomic TES identified that all Build Alternatives would have impacts due to right-of-way acquisitions and easements. Visual impacts due to construction affect all Build Alternatives. There will also be positive economic benefits associated with the Build Alternatives. The criteria for the Socioeconomics follow:

Visual Impacts - Under this criterion, an evaluation will be made of whether an alternative introduces a visual intrusion that does not fit into the context of the project area. A balloon study, in which weather balloons were floated at the heights of the proposed structures, was used to evaluate the range of view shed impacts. Photo simulations were created at selected view sheds to illustrate the change.

The visual quality of the area would be changed by all the Build Alternatives. All Build Alternatives would require the construction of a new structure throughout the interchange while some would require the construction of new double-decker structures. New noise walls would be constructed on top of these structures to mitigate the noise impacts. The visual intrusions do not fit the current context of the project area.

The metrics for visual impacts are:

- ◆ None: There will be no change to viewshed.
- ◆ Low: View is open with limited intrusion of concrete infrastructure. Landscape is dominated by vegetation, existing buildings or buildings of a consistent nature.
- ◆ Medium: View has changed to include some road infrastructure, but infrastructure is balanced with the rest of the landscape. Although the view has changed, the view is recognizable.
- ◆ High: Field of view is dominated by massive intrusive structures, and the resulting view is barely recognizable from existing conditions.

Residential Acquisitions - Impacts to residents were evaluated for each of the alternatives by counting the number of discrete residential structures that would require taking. For multi-family structures, each individual residential unit was counted separately.

The metrics for residential acquisitions are the actual number of residential acquisitions.

Community Property Acquisitions - Impacts to community properties were evaluated for each alternative. Each Build Alternative would affect four community facilities (not including the 4(f) property discussed below). Although impacted, all facilities would function normally after project completion. Some unavoidable impacts to support

facilities result from permanent easements/acquisitions. The metrics for community facilities are measured as follows:

- ◆ None: No impact to community facility.
- ◆ Low: No loss of use of community facility.
- ◆ Medium: Temporary loss of use of community facility.
- ◆ High: Permanent loss of use of community facility.

4(f) Property Acquisition - Impacts to 4(f) resources were evaluated for each alternative. Each Build Alternative will affect one facility that is protected by 4(f) regulations. Although impacted, the functionality of this facility will not be impaired after project completion.

The metrics for 4(f) property acquisition are the actual acreage acquired from the 4(f) property.

Regional Accessibility - This pertains to the ease with which travelers may get to a specific destination. The Build Alternatives would generally result in improved accessibility within the secondary study area (Bellmawr, Mount Ephraim, and Gloucester City) by reducing congestion on most segments of the principal access roads used for regional destinations. The value of travel time savings and of the reduced variability of travel time can be thought of in terms of dollars saved. Annual dollar cost savings were calculated for trucks and automobiles. The sum of these is annual vehicle dollars saved.

The metrics for economic benefits due to reduced travel time is the annual vehicle dollars saved.

Cost Benefit from Reduction in Accidents - This parameter captures the annual benefit realized by increased safety features and improved road design. The dollar amount reflects the financial benefits of accident avoidance.

The metrics are measured in dollars saved on an annual basis.

Archaeological Resources - The Phase I/II Archaeological Investigation TES involved research and review of existing information obtained from several state and local repositories. Phase II archaeological investigations were conducted at four sensitive sites; however none of the sites were found to have the potential to yield new information important in prehistory or history. No adverse effect to archaeologically significant sites will occur from the project and therefore it is not a distinguishing characteristic.

Historic Architectural Resources - Within the project site there is a District of Historic Significance. For the purpose of evaluating the impacts to the Bellmawr Park Mutual Housing Historic District, physical, visual and audible impacts were evaluated.

Physical Impacts to Historic District - This is defined by two different criteria. These include 1) the area within the historic district that is impacted by right-of-way takings; and, 2) the number of residential buildings and units requiring demolition and/or relocation within the historic district. For these two criteria, a reduction in integrity of the design, setting, and materials are represented. The No-Build scenario for this overall criterion is defined as No Impact since there would be no physical destruction or taking of area of the historic district, no contributing resources (residential buildings) would be demolished, and no open spaces within the district would be removed/reduced if this project were not constructed.

The Bellmawr Park Mutual Housing Historic District comprises 82.24 acres and includes 176 multi-unit residential and support buildings.

The overall metric is the actual acres impacted, and the number of structures impacted.

Noise Impact Reduction to Historic District - The construction of proposed and replacement noise walls will benefit some area residents by reducing the number of residential units that will experience excessive noise levels.

The metric for noise reduction is measured by the number of residential units in the historic district presently above the Category B NAC (66 dBA) that will be reduced below the Category B NAC as a result of the project.

Post Mitigation Residential Noise Increase over Existing Conditions - Noise levels resulting from this project have been projected assuming that all proposed noise walls and replacement noise wall segments will be constructed.

The metric for remaining noise impacts on the Historic District is measured as the number of contributing buildings within the Bellmawr Park Mutual Housing Historic District that would have an increase in noise levels over current conditions in each of the following three ranges:

- ◆ **Less than 3 dBA (Not Perceivable):** Number of receptors with a noise level increase that is not perceptible to the average person;
- ◆ **Greater than 3 dBA but less than 7 dBA (Perceivable):** Number of receptors with a perceivable increase over existing conditions;
- ◆ **Greater than 7 dBA (Noticeable):** Number of receptors with a noticeable increase over existing conditions.

Impact to Viewshed - This criterion incorporates the relative comparative amount of visual intrusions as viewed from the contributing buildings within the Historic District. The visual intrusions are due to the size of the highway structure and noise walls that will be constructed for each alternative. The measurements of low, moderate and high are not based on quantitative information obtained from studies, but are qualitative in nature and derived solely from visual comparison of the alternatives. The determinations were greatly assisted by the photosimulations of each alternative as viewed from Victory

Drive. The reduction in integrity of the design, setting, materials, and feeling are represented by this criterion. The metrics for impact to viewshed are:

- ◆ None: There will be no change to the viewshed.
- ◆ Low: The viewshed would remain relatively unchanged and open with limited intrusion of physical infrastructure.
- ◆ Medium: The viewshed would be changed to include some new infrastructure at a relatively close distance to the historic district.
- ◆ High: The viewshed would be dominated by intrusive infrastructure at a relatively close distance to the historic district.