ITS Architecture Conformance

Version 1.1

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Version 1.1

Concurrence:

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date

AED Policy, Technology and Customer Service

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AED Capital Plans and Programs

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AED Procurement and Support

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Executive Summary

The FTA policy established project management requirements for comprehensive system engineering analysis, and conformance with an approved Intelligent Transportation System (ITS) Regional Architecture, for projects that implement or support any part of an ITS user service. The policy does not require that transit agencies actually deploy any specific ITS functions or technologies – it merely requires that if they do deploy them, they do so in a coordinated way after considering all stakeholder needs.

The policy introduces the concept of regional ITS architectures -- essentially a consensus vision of locally desired ITS functionality -- and goes on to require that project-level architectures be developed and submitted to the appropriate Metropolitan Planning Organization (MPO) in cases where the MPO's approved regional architectures do not yet address the needs of a given project.

ITS does not only pertain to IS or "technology projects". Many bus, rail and facilities engineering procurements managed by the Capital Plans and Programs Department also contain or support technology components that make them "ITS projects" under the federal policy. Thus, only a fraction of THE AGENCY's ITS projects are represented in the agency's Technology Plan. The great majority of our ITS deployments to date have been managed by other departments -- station and infrastructure projects that happen to contain ITS components. Conformance requires a truly corporate-wide effort.

While a portion of the federal requirements is administrative, the real point of the regulation is to provide a proven template for successful, coordinated project delivery. The policy defines a structured alternatives analysis process to be used by Project Managers in determining the final form, function and design of an ITS system.

Opportunities:

1. We will leverage the ITS system engineering analysis requirement to help us coordinate all projects at THE AGENCY, federally funded or not, using the project initiation process at the request level. A coordinated Project Development Process Flow is proposed in Exhibit 5.

2. We will leverage the free training in system engineering analysis available through USDOT to enhance the knowledge and effectiveness of project managers throughout the corporation.

3. We will leverage the ITS system engineering approach to help ensure adequate sponsorship and staffing for all capital projects.

4. We will extend the ITS architecture model to develop an integrated corporate technology vision – a comprehensive enterprise architecture for coordinated system development, integration and maintenance throughout the corporation.

5. We will leverage the ITS system engineering approach to provide value engineering for inclusion of just the right new technology in new vehicle, facility, infrastructure and system procurements.

6. We will leverage the ITS system engineering approach to ensure adequate stakeholder input and value engineering in the development of corporate and departmental technology policies.

7. We will leverage the ITS architecture development process to build regional consensus for:

    - Regional fare rationalization and integration.
    - Improved operational coordination among regional transportation agencies.
    - Improving intermodal travel opportunities.

Actions:

- Designate and train an "ITS Program Coordinator" to provide technical support for identifying, planning and coordinating ITS-related projects throughout the Corporation.

- Integrate an ITS systems engineering approach directly into the initiation, planning and management of all capital projects throughout the corporation. Extend the system engineering approach to apply to the development of corporate and developmental technology policies as well.

- Build sufficient data collection capabilities into the capital funding request process to allow Capital Funding and Grants Administration personnel to effectively track applicability of, and compliance with, the various federal requirements.

- Expand the Capital Planning & Programs Department's Project Management Training Program to address systems engineering analysis and ITS architecture conformance.

- Update the Capital Planning and Programs Department's existing Project Review Procedure to include support for system engineering analysis and ITS architecture conformance. Use this procedure as a model for a corporate-wide project review policy.

- Leverage the National ITS Architecture development process as a model for the development of an integrated corporate technology vision.

Background

Definitions

- ITS Project – a project contains an ITS component (and is thus termed an "ITS Project" under the law) if it contains electronics, communications or information processing technologies that implement or support a defined ITS User Service. ITS User Services include transit information, electronic payment, incident management, emergency management, transportation security, paratransit operations, fixed route operations, archived data, and others.

- Major ITS Project – a project containing ITS components is a "Major" ITS project under the law if it involves or affects more than a single mode, or a single jurisdiction, or otherwise affects regional integration in any way. Major ITS projects delivering services not yet addressed in an approved regional ITS architecture must include development of a project-level architecture to identify and validate stakeholder needs and responsibilities.

- ITS Architecture – an ITS Architecture is a framework for project planning that describes interagency (or intra-agency) coordination and data exchange in terms of minimum modularity (functionality hosted in discrete subsystems) and the defined data flows that link these subsystems into an integrated regional (or corporate-wide) whole. ITS architectures are usually represented graphically, with separate blocks for each subsystem, and connecting lines depicting the data flows between them.

- Protocol – an ITS protocol is a detailed description of the method, format and request-response behavior of an architectural data flow. ITS protocols for electronic data exchange are described in sufficient detail as to support multi-vendor interchangeability of each individual subsystem (module) defined in the architecture.

- Systems Engineering Analysis (SEA) – the ITS systems engineering analysis is the prescribed method for ensuring that projects that contain ITS components are planned in the most risk-free and cost-effective manner possible. It is a structured process for arriving at a final design of a system, from concept to implementation. The process provides a consistent project management framework for cost-effectively identifying user requirements, evaluating alternatives, building consensus and identifying and addressing risks, consistent with the size and scope of the project.

Scope of ITS Policy

The ITS Policy is not a "technical" requirement. It is a project planning and project management requirement applicable throughout the organization. It is not unique to "technology projects".

As part of the Transportation Equity Act for the 21st Century (TEA-21), in order to provide for future interoperability of key transportation services at a national level, the U.S. Congress mandated that all federally supported investments in transportation technology be coordinated through a National Intelligent Transportation Systems (ITS) Architecture, to be administered and maintained by USDOT.

The National ITS Architecture that was subsequently developed establishes a uniform nationwide framework for standardized vehicle communications, system integration and interagency data exchange. It also provides a voluntary model for internally standardized system architectures within individual transportation agencies, which also may offer significant value to the agency. The architecture doesn't require that transit agencies actually deploy anything – just that if they do, they do so in a coordinated way after considering all stakeholder needs.

USDOT issued final regulations on January 8, 2001 requiring conformance to the National Architecture as a precondition to federal funding for projects that contain ITS components, and establishing a uniform process for systems engineering analysis to ensure that such conformance is routinely achieved. The systems engineering approach institutionalizes a variety of highly desirable accepted best practices in project management. It is this systems engineering element that makes is clear that ITS Conformance is really less about technology, per se, than it is about comprehensive project planning and proactive interagency coordination. Far from an onerous requirement, it's really just "good business".

ITS does not only pertain to IS or "technology projects". Most of NJ TRANSIT's ITS projects are not represented in the agency's Technology Plan. Rather, the majority are bus, rail, police, vehicle and facilities engineering procurements managed by the Capital Plans and Programs Department that contain technology components that make them "ITS projects" under the federal policy. Others are projects managed by individual departments directly. Conformance therefore requires a truly corporate-wide effort – coordinating programs, training project managers, helping them to proactively identify potentially affected projects, supporting conformance and tracking compliance.

This document explains the relevant requirements, and outlines a proposed plan for satisfying the USDOT regulations while deriving maximum benefit from the opportunities they present.

The complete text of the FTA Architecture Conformance Policy is provided as Appendix 6.

Intelligent Transportation Systems (ITS)

TEA-21 defines ITS as "electronics, communications or information processing used singly or in combination to improve the efficiency or safety of a surface transportation system." This rather broad definition was refined during the development of the National Architecture to "electronics, communications or information processing technologies that implement or support a defined ITS User Service."

These "ITS User Services" cover a broad range of automobile, highway and transit applications. They are further developed in the national architecture in terms of distinct "market packages" – templates for types of data interchange intended to satisfy specific system integration requirements. A list of currently defined User Services and market packages relevant to the agency is provided in Appendix 1.

Essentially, if a project involves traffic, transit, commercial vehicle or emergency management, electronic payment, transit security, vehicle safety or traveler information, or if the system will transmit or receive stop inventory, schedule, ridership, incident, performance, maintenance, market research, safety, operations, construction coordination or fare transaction data to/from other agencies, operators or clearing houses, it has an ITS component, and is therefore termed an "ITS project".

National ITS Architecture

The National ITS Architecture formalizes a standard framework for communications between ITS systems. It reduces the systems integration problem to a collection of formalized templates for modular system development and data interchange. Functional requirements and data flows for the various market packages are defined in generic terms that minimize ambiguity in system boundaries while maximizing regional flexibility in choice of specific technologies. An associated software package, "turbo architecture", facilitates traceability of requirements and documentation of conformance. A standard object model and data dictionary is provided. A standard message set is under development.

The National Architecture is a "living" document. It is intended to grow and to change as the nation's vital transportation needs evolve over time. The various elements of the National Architecture are available for download from the Internet at http://itsarch.iteris.com/itsarch/ . USDOT supports the architecture with a dedicated website (www.its.dot.gov), technical assistance contractors, and a variety of free courses on ITS systems engineering, ITS project management, and use of the architecture in system procurement and design. A listing of these courses is provided as Appendix 2.

More than just a set of technical documentation, the National Architecture provides a process for the development of a regional, or corporate, technology vision. This process is outlined in Appendix 3.

Federal Requirements

The Project Managers' responsibilities under the new regulations are summarized in Appendix 4. A detailed discussion of these requirements follows.

Regional ITS Architectures

USDOT's final rule of April 8, 2001 implements the National ITS Architecture through a collection of "Regional ITS Architectures". Where the National Architecture stops short of specifying exact interface specifications, the regional architectures are intended to extend that framework – defining the exact interface standards to be used in a specific region. Under the federal regulations, these "regional architectures" are defined through the Municipal Planning Organization (MPO) planning process. Each MPO is required to develop a regional ITS architecture, based on the National ITS Architecture, for the "region" it serves. The regional architecture is then validated and certified as conformant with the National Architecture. As of April 8, 2005, no new ITS projects (i.e. projects that contain or support an ITS component) were permitted to advance with federal funding unless they are compliant with the approved regional architecture. The content of a compliant regional ITS architecture is generically described in Appendix 5.

The three required regional ITS architectures for the State of New Jersey (North Jersey, South Jersey, and Delaware Valley) were completed and approved in 2005.

Where an agency transcends multiple MPO regions, as is the case with the agency, proactive ongoing coordination by the agency is necessary to ensure that the specifics of the affected regions' architectures remain similar enough to prevent the agency from having to support multiple interface protocols for a single type of data.

Systems Engineering Analysis

The USDOT regulation also establishes project management requirements for formal systems engineering analysis for all new projects. All projects must undergo a systems engineering analysis, the scope of which will be commensurate with the scope of the respective project it supports. The regulation requires that this system engineering analysis be completed before a project enters final design. As defined by FTA, Final design is the last phase of project development, and includes right-of-way acquisition, utility relocation, and the preparation of final construction plans (including construction management plans), detailed specifications, construction cost estimates, and bid documents. The system engineering analysis must be complete before any of these activities are initiated. A USDOT-compliant system engineering analysis includes:

- Reference to the Regional ITS Architecture (how the project fits into the region's overall ITS vision)
- Roles and responsibilities for participating agencies

- Definition of functional and performance (i.e. business) requirements
- Analysis of alternative system configuration and technology options for meeting requirements
- Analysis of financing and procurement options
- Applicable interface standards and testing procedures
- Procedures and resources necessary for operations and management of the system
- Identification of updates to the regional architecture required for system implementation

Other Requirements

Project-Level ITS Architectures

In addition to the systems engineering analysis, where a project includes or supports an ITS User Service not yet addressed in an approved regional architecture and involves or affects more than only a single mode, or a single jurisdiction, or otherwise affects regional integration in any way, development of a project-level architecture is also required. The project-level architecture will serve as the basis for eventually incorporating the affected User Service into an approved regional architecture. As such, it is developed in much the same way as the regional architecture itself. ("Non-Major" projects, i.e. those that involve or affect only a single mode, in a single jurisdiction, and do not affect regional integration in any way, are exempt from this requirement.) The regulation requires that the project-level architecture be completed before a project enters final design. A USDOT-compliant project-level architecture includes:

- Description of project scope, boundaries, stakeholders
- Operational concept
- Functional requirements of the project
- Interface requirements and information exchanges
- Identification of applicable standards

Contractual Provisions

USDOT requires not only that federal grantees comply with the regional architecture and system engineering requirements, but that grantees, in turn, require similar compliance of any third party contractors or subrecipients. Solicitations for federally supported ITS-related projects must include a specific requirement for conformance with the National ITS Architecture.

Grant Applications and Grantee Certifications

In order to apply for Federal grants, the agency must certify that it will comply, and will require its third party contractors and subrecipients to comply, with all the requirements of the FTA policy.

Grantees are required to identify whether or not each grant application includes projects with ITS components; and, if so, whether a regional ITS architecture exists, and whether each such project meets the ITS Architecture Conformity requirements. For ITS tracking purposes, grantees also are asked to identify the type of ITS that the project grant includes: ITS Fleet Management, ITS Electronic Fare Payment, ITS Traveler Information, or ITS Architecture Development.

Under the Policy, a grant with ITS elements can only be approved if it is:

- Exempt (criteria for exemption are discussed below); or
- An ITS project consistent with an existing Regional Architecture and a completed or planned ITS Systems Engineering Analysis; or
- A Major ITS project with a Project Architecture (if no Regional Architecture addresses the project) and a completed or planned ITS Systems Engineering Analysis; or
- A Minor ITS project consistent with the National ITS Architecture and with a completed or planned ITS Systems Engineering Analysis.

FTA expects grant applications to include a statement within the project description regarding the ITS projects included in the grant and their conformity status such as,

> "This grant contains funding for ITS elements which are in conformity with the FTA National ITS Architecture Policy on Transit Projects. They are…"

Each such grant application should include a description of the affected ITS elements and how they meet the Policy requirements.

In submitting grant applications to the Federal Government, the agency's Capital Funding division will:

- Work with project managers to identify if the project contains ITS elements;
- Assign each major ITS component of the Grant to a major ITS type category (e.g. Fleet Management, Electronic Fare Collection, Traveler Information, Architecture Development);
- Work with project managers to determine the ITS budget elements, or the ITS percentage if part of larger budget line items; and
- Work with project managers to provide details on the ITS elements, their value and type, and architecture conformity status.

Exemptions

There are three circumstances under which an ITS project may be exempted from these requirements:

1. The project supports only the routine operation and maintenance of a system that was already in existence prior to June 9, 1998

2. The project supports only the upgrade or expansion of a system that was already in existence prior to June 9, 1998; and
   - the project merely modifies ITS components that are still within their useful life; and
   - a conformant implementation would not be cost-effective; and
   - an exemption for this specific project has been requested, and approved by the US Secretary of Transportation.

3. The project is a research project designed to achieve specific research objectives outlined in the National ITS Program Plan under section 5205 of the Transportation Equity Act for the 21st Century or the Surface Transportation Research and Development Strategic Plan developed under section 5208 of Title 23, United States Code.

Triennial Review

A Triennial Review will periodically assess agencies' compliance with the ITS requirements through the following questions:

- Is the grantee attempting to deploy ITS technologies?
- Is the grantee part of a locally-approved regional architecture?
- Has the grantee established a process for the systems engineering analysis of ITS projects? Has it applied the process?
- Has the grantee met requirements of the FTA National ITS Architecture Policy for transit projects that became effective April 8, 2001? (i.e. system engineering analysis, contractual safeguards, project-level architectures)
- Do procurement files for FTA-assisted projects involving ITS applications include the requirement that these conform to the National ITS Architecture?
- Do solicitations for ITS related projects include a specific requirement for conformance with the National ITS Architecture?

Available Oversight and Technical Assistance

FTA provides consultant support for architecture conformance oversight and technical assistance to requesting agencies. A copy of the FTA Architecture Policy Conformance Checklist is provided as Appendix 7.

Conformance Plans and Activities

The agency has been one of the primary driving forces for ITS architecture and standards development in the greater New Jersey metropolitan area since the early 1990s – long before there was a coordinated ITS program at the national level. The agency began the process of integrating the FTA's architecture conformance requirements into its daily business in 2003.

Building Internal Awareness

ITS Architecture Conformance Plan

This ITS Architecture Conformance Plan, originally developed in 2003 and updated in 2006, is intended as a tool for gaining and documenting consensus on a formalized, coordinated approach for meeting the federal architecture conformance requirements, and for reaping the maximum corporate benefit from the opportunities they present. The Plan also serves to document the agency's conformance activities for the Triennial Review.

Management Briefings

Briefings on the ITS Architecture and USDOT's ITS architecture conformance regulations were provided in 2003 for the following affected management personnel:

- Assistant Executive Director for Capital Planning and Programs
- Assistant Executive Director for Policy, Technology and Customer Service
- Technology Advisory Council
- Senior Director, Capital Funding
- Senior Director, Procurement and Materials Management
- Senior Director, Equipment Engineering
- Director, Grant Administration
- Director, Capital Programming
- Executive Chief Information Officer
- Chief Information Officer
- Chief Engineer
- Director, Procurement Compliance and Records Management
- Director, Rail System Development
- Director, Bus System Development

Project Manager Workshops

Training materials will be developed to support workshops for all the agency project managers. These workshops will serve to familiarize these personnel with their critical responsibilities with respect to ITS architecture conformance and systems engineering analysis, and to make them aware of the supporting resources available to them. The materials will be incorporated into the Capital Planning and Programs Department's Project Management Training Program.

External Training

In 2004 the agency hosted on-site courses for internal staff in ITS Architecture Conformance and Systems Engineering Analysis from the National Transit Institute and the Professional Capacity Building program of the USDOT Joint Program Office for ITS, respectively. Periodic refresher courses will also be requested in future years.

Managing Conformance

Phased Approach - External

The Federal Highway Administration (FHWA), in conjunction with NJDOT and the state's MPOs, sponsored the statewide ITS architecture effort to develop a set of regional ITS architectures for the state of New Jersey. This effort was completed on schedule in 2005. The architectures are available for review at http://www.consystec.com/newjersey/default.htm

The parties recognized that given the potentially global scope of ITS architecture conformance, and the need to be able to continue to fund and deliver the projects the region needs, even in areas where approved regional architectures may not address every new project, a phased approach is required. the agency worked with the State's various MPOs to focus first on formalization of a solid architecture maintenance process, and then to limit the initial regional architectures to detailing just a few key user services. These included:

- Traffic Management
- Incident Management
- Emergency Management
- Itinerary Planning
- Electronic Fare Collection

In future, as major projects are proposed, and in the normal course of regional strategic planning, additional user services will be added using the architecture maintenance process defined under the initial regional architecture work.

Phased Approach - Internal

Internal policies and procedures for vision development, project coordination, system engineering analysis and architecture conformance tracking will be pilot tested on at least one visible enterprise-wide project before final implementation.

The recommended ITS Architecture Conformance Strategy is closely tied to the Capital Funding Request Process. Staff provided technical assistance for policy implementation and conformance at the start of the FY05 Capital Funding cycle.

Once a conformance strategy is adopted, ITS projects can be expected to be developed in full compliance with applicable Federal ITS Architecture and System Engineering requirements. Projects funded with prior year funds that have not yet entered final design may undergo an abbreviated Systems Engineering Analysis if they are identified as ITS projects prior to being advertised.

Intra-agency data exchange

Like any technology, ITS procurements can come in all shapes and sizes -- from major new systems to simple desktop applications, custom developed to purchased off-the shelf. Just as federal regulations distinguish “major” projects, the agency has defined a way of distinguishing those internal procurements that require rigorous coordination (i.e. systems engineering analysis) from those that do not.

The Federal rule defines a “major” ITS project as one that is multi-modal or multi-jurisdictional in scope, or is otherwise expected to have an impact on regional interoperability. “Major” projects mandate a higher level of scrutiny than “non-major” projects. Leveraging this model, and extending it internally within the agency, a “critical” technology procurement (one requiring higher level coordination) is defined as one that

- could be operated by users in more than one organization or business unit;
- could deliver products or services that might be used by stakeholders in more than one organization or business unit; or
- could be expected to set a de-facto corporate standard, or otherwise affect corporate system integration.

Under this model, while all technology purchases will still have to adhere to any established corporate standards, only those technology purchases that met the criteria for “critical” technology procurements will be subject to individual review by the Chief Information Officer, and/or the Technology Advisory Council or ITS Program Coordinator. The TAC will work to develop a matrix to define the exact path, approvals, etc. for each level or type of procurement.

the agency is working to integrate the USDOT System Engineering Analysis approach into the daily business of project planning and project management.

Project Conformance Worksheet

In 2003, the agency developed a comprehensive Project Conformance Worksheet to guide project managers in identifying, planning and executing projects that contain ITS components. This worksheet, intended to be completed at the outset of every project and filed in the project file prior to entering final design, serves as a tool to proactively ensure that projects with ITS components are consistently developed in a conformant way. A copy of the worksheet, recently updated, is attached as Exhibit 1.

Project Review Procedures

The Capital Planning and Programs Department's Operating Instruction 3.01 – Project Review Procedures is currently under review and will be updated to support system engineering analysis and ITS architecture conformance.

Technology Project Life Cycle

the agency's "Technology Project Life Cycle", the Information Services Division's specified process for system development and implementation, has been modified to incorporate the USDOT Systems Engineering Analysis and Regional ITS Architecture conformance requirements. A copy of the life cycle document is attached as Exhibit 2.

Design Checklists

Design checklists have been developed that address the ITS Systems Engineering Analysis requirement. These checklists will be incorporated into the Capital Planning and Programs Department's operating instructions, project management checklists and training programs.

Technology Project Initiation Form

An update to the Technology Project Initiation Form was developed 2003 to include specific cost and schedule entries for ITS System Engineering Analysis. A copy of the proposed updated form is attached as Exhibit 3.

Staff Training

Ultimate responsibility for architecture conformance, and project performance in general, lies with the project manager. the agency will provide project managers with training in requirements definition, systems engineering analysis, risk identification, and software development process management.

Project managers will additionally be trained in use of the ITS Project Conformance Worksheet, the Technology Project Life Cycle, Project Review Procedures, and standard milestones and deliverables, as tools for effective project planning and control.

The Capital Planning and Programs Department's Project Management Training Program will be expanded to include system engineering analysis and ITS architecture conformance.

ITS Program Coordinator

The establishment of the role of "ITS Program Coordinator" was recommended in 2003. Similar in concept to an Environmental or Historical Preservation coordinator, recommended duties of the ITS Project Coordinator include:

- Provide project managers with training in ITS Architecture conformance
- Support project managers in determining if projects contain ITS components, and the degree to which they may be affected by ITS architecture conformance requirements
- Coordinate with the Operating Departments and Information Services on technical aspects of architecture development, use and maintenance
- Coordinate requests for required updates to the various regional architectures affecting the agency service area
- Serve as liaison to the NJ Intelligent Transportation Architecture Committee (New Jersey's statewide ITS architecture coordinating body)
- Serve as liaison to the ITS Architecture Committees of each of the four MPOs with jurisdiction over the respective regional architectures that govern the agency's multi-regional service area
- Support the Technology Advisory Council (TAC) in the area of ITS project coordination
- Provide project managers with technical support for Systems Engineering Analysis and Project-level Architecture development
- Support capital program and grants compliance personnel in determining the conformance status of ongoing and proposed capital projects

Capital Funding Request Process

<u>Analysis of Funding Alternatives</u>

In support of the required system engineering analysis for ITS projects, the Capital Funding Division will carry out an analysis of funding alternatives for each ITS project. A copy of this analysis will be retained in the project file.

<u>Grant Applications</u>

In applying for Federal grants, the Capital Funding division will certify that the agency will comply, and will require its third party contractors and subrecipients to comply, with all the requirements of the FTA policy.

To submit grant applications to the Federal Government, the Capital Funding division will:

- Identify if the project contains ITS elements;
- Assign each major ITS component of the Grant to a major ITS type category (e.g. Fleet Management, Electronic Fare Collection, Traveler Information, Architecture Development);
- Determine the ITS budget elements, or the ITS percentage if part of larger budget line items; and
- Provide details on the ITS elements, their value and type, and architecture conformity status.

To the greatest extent feasible, the collection of this data will be automated within the capital funding request process.

Capital Program Development

The Director of Capital Programming will see that relevant regional architecture conformance, systems engineering analysis, and project-level architecture requirements have been met prior to approving funding for affected projects.

To ensure a cohesive program, the final capital program will be reviewed with the ITS Program Coordinator.

Capital Funding Requests

Assurance of Systems Engineering and ITS Architecture conformance will be integrated directly into the capital funding request process in much the same way as historical preservation and environmental impact.

the agency's Capital Funding Request Form will be modified to clearly show whether or not a given project is subject to the ITS architecture conformance requirement and, for capital funding requests that would advance ITS projects into final design, whether or not the requirements for a project-level architecture and/or system engineering analysis have been met. A standard entry block for system engineering analysis will be added to the schedule and milestones section of the request form, and a copy of the Project Conformance Worksheet will be provided.

Standard Contract Language

In addition to the internal controls noted above, contractors and subcontractors will be responsible for assuring conformance with the National ITS Architecture. the agency's standard ITS Architecture conformance language is attached as Exhibit 4.

Participation in Standards Development Activities

the agency is committed to the success of the National ITS Architecture concept, and has been actively involved in the identification, development and maintenance of many of the electronic interface standards that will ultimately make it work.

Transit Standards Consortium

the agency is a charter member and active participant in the Transit Standards Consortium, a forum for transit standards identification, prioritization, education, outreach, development, implementation, use and maintenance. Agency staff have served, and continue to serve, in technical and leadership positions at all levels of consortium activity.

Transit Communications Interface Profiles

Agency personnel were active contributors to the initial development of the standard TCIP data definitions for Onboard, Control Center, Passenger Information, Incident Management and Common Public Transportation objects. Agency staff served as subgroup leaders during the development of TCIP-1, as working group chair for TCIP-2, and as task force co-chair for TCIP-2.x.

IEEE Rail Transit Vehicle Interface Standards Committee

Since 1995, agency personnel have also been active participants in the identification, development and maintenance of a comprehensive suite of Rail Transit Vehicle Interface Standards sponsored by the Institute of Electrical and Electronics Engineers. These standards provide the basis for intelligent integration of the ITS highway-rail interface.

Participation in National and Regional Architecture Development

National ITS Architecture

Agency personnel actively participated in development and review of the both the National ITS Architecture and the National ITS Program Plan.

FTA Architecture Rule

Agency personnel actively supported development of the FTA architecture rule, submitting comments on both the draft and final Federal Register docket items, and contributing numerous constructive insights during USDOT's ITS Architecture Consistency meetings of May 1998.

Regional Workshops

The agency precipitated a full-day regional workshop, held on Oct 24, 2002, in a proactive effort to identify and address the issues surrounding implementation of MPO-based regional architectures in a statewide multi-regional environment. Attended by the agency, NJDOT, NYMTC, NJTPA, DVRPC, NYSDOT, FTA, FHWA and others, this workshop led to the first official recognition of the multi-regional architecture issue in the greater New Jersey metropolitan area and, ultimately, to the creation of the statewide New Jersey Intelligent Transportation Architecture Committee (NJ-ITAC).

The agency has also participated in numerous ITS architecture and architecture conformance workshops in New York City.

NYMTC Integration Strategy

Agency personnel actively participated in the development of the New York Metropolitan Transportation Council (NYMTC) Integration Strategy, which defines top-level architecture requirements for the New York metropolitan area.

New York City Sub-regional ITS Architecture

In New York City, agency staff provided policy recommendations and technical support to the NYMTC/NYDOT architecture oversight committee, participated in 4 regional architecture workshops, and submitted roughly a dozen modifications to the consultant's draft architecture.

NJ Statewide ITS Architecture

The agency actively participated as a charter member and critical stakeholder on the statewide New Jersey Intelligent Transportation Architecture Committee (NJ-ITAC). With critical technical support from the agency, and funding from the Federal Highway Administration (FHWA), the New Jersey Department of Transportation (NJDOT), the North Jersey Transportation Planning Authority (NJTPA) and the South Jersey Transportation Planning Organization (SJTPO), this committee coordinated the development of regional architectures for North and South Jersey, as well as multi-regional interface requirements for statewide interoperability.

Agency ITS Passenger Information Architecture

Under the agency's leadership, funding in the amount of $0.15 million was committed to the development of an architecture for passenger information, through the I-95 Corridor Coalition's Newark Liberty International Airport Airtrain Access and Information System project. This architecture was completed and forwarded for use throughout the Coalition in 2005.

DVRPC Regional Architecture

In the Delaware Valley, where a regional architecture has already been in place for some years, agency staff is providing technical information and has participated in 3 planning meetings since November 2004 in support of DVRPC's first round of architecture maintenance activity.

NJTPA and SJTPO Regional Architectures

Agency staff participated in consultant selection, specified the tools that will be used to maintain the architectures, notified affected internal stakeholders and attended 11 regional architecture development workshops in North and South Jersey. Agency staff submitted roughly three-dozen modifications to the consultant's draft market packages.

NTI Training Course Development

Agency personnel assisted in the development of the NTI course "Complying with the FTA's Policy on ITS Architecture Consistency and its impact on Project Planning and Implementation"

Conformance Schedule and Milestones

Milestone	Date
Architecture Requirements Incorporated into Standard Technology Project Life Cycle	Completed
Architecture Requirements Incorporated into Technology Project Initiation Form	Completed
Architecture Conformance Language Incorporated into Standard Federal Contract	Completed
Internal Management Briefings Complete	Completed
Statewide/Regional Architecture RFP Complete	Completed
Final ITS Architecture Conformance Plan Issued	Completed
ITS Program Coordinator Authority and Responsibilities Defined	TBD
Statewide/Regional Architecture Consultant Selected	Completed
ITS Program Coordinator Designated	TBD
2003 Triennial Review	Completed
Prepare FY04 Grant Applications	Completed
Architecture Requirements Incorporated into Project Review Procedures	TBD
Architecture Requirements Incorporated into Capital Funding Request System	TBD
Materials for Internal Project Manager Workshops Prepared	TBD
Initial Project Manager Workshops Complete	TBD
System Engineering Analysis Course Offered	Completed
ITS Policy Compliance Course Offered	Completed
Architecture Requirements Incorporated into Project Manager Training Curriculum	TBD
Statewide Architecture Development Complete	Completed
Statewide Architecture Maintenance Process Development Complete	Completed
Prepare FY05 Grant Applications	Completed
NJTPA Architecture Development Complete	Completed
Compliance Achieved in Development of Conformant Capital Program	TBD
SJTPO Architecture Development Complete	Completed

Appendix 1 – ITS User Services

ITS User Services* Applicable to NJ TRANSIT

Travel and Traffic Management Services

- Highway-rail grade crossing protection
- Traffic signal priority
- Probe surveillance
- Incident management
- Electronic toll collection
- Regional traffic control
- HOV lane management
- Traffic information dissemination
- Traffic forecast and demand management
- Parking facility management
- Regional parking management
- Reversible lane management
- Railroad operations coordination

Public Transportation Management Services

- Transit vehicle tracking
- Transit fixed route operations
- Demand response transit operations (paratransit)
- Transit passenger and fare management
- Transit security
- Transit maintenance
- Multi-modal coordination
- Transit traveler information

Emergency Management Services

- Emergency call taking and dispatch
- Mayday and alarms support
- Emergency response
- Emergency routing
- Transportation infrastructure protection
- Wide area alert
- Early warning system
- Evacuation and reentry management
- Disaster traveler information

Commercial Vehicle Operations Services

- Fleet administration
- CV administrative services

- Electronic clearance
- Weigh-in-motion
- HAZMAT management (including rail)

Traveler Information Services
- Broadcast traveler information
- Interactive traveler information

Maintenance and Construction Coordination Services
- Weather information processing and distribution
- Maintenance and construction activity coordination

Advanced Vehicle Safety Systems
- Vehicle safety monitoring
- Driver safety monitoring
- Driver visibility improvement
- Collision safety warning
- Automated highway system

Information Management Services
- Archived data

* officially termed “market packages”

Appendix 2 – Courses Available from USDOT

The following courses in architecture conformance, systems engineering analysis and Use of the National ITS Architecture for system deployment are available free of charge from USDOT.

General ITS

- Intelligent Transportation Systems (ITS) Awareness Seminar
- ITS for Transit: Solving Real Problems
- Introduction to the National ITS Architecture
- NTCIP & ITS Standards - What Do They Mean For You?
- ITS Public/Private Partnerships
- Transit Applications of Multimodal Planning
- Reinventing Transit: Planning Information-based Transit Services
- Managing Information for Success (transit orientation)

Architecture Development

- Turbo Architecture Software Training

Systems Engineering Analysis

- Introduction to Systems Engineering for Transportation
- Applied Systems Engineering for Advanced Transportation Projects

ITS Project Management

- Managing High Technology Projects in Transportation
- ITS Procurement
- ITS Software Acquisition
- Complying with the FTA's Policy on ITS Architecture Consistency and its Impact on Project Planning and Implementation

ITS System Deployment

- Deploying Integrated ITS -Metropolitan
- ITS Telecommunications Overview
- Using the National Architecture for Deployment
- ITS Standards Overview
- Recommended Practices for Management & Operations of ITS
- Center-to-Center Communications Standards
- Actuated Signal Control/Advanced Standards

Appendix 3 – Architecture (Technology Vision) Development Process

1. Define the physical and institutional scope of the vision – this defines the boundaries of "the system", often comprised of many subsystems but all supporting the one unifying vision

2. Define strategic goals and related performance measures

3. Develop scenarios illustrative of strategic goal achievement

4. Identify internal and external stakeholder agencies, departments, business units and individuals with relevant systems, activities, plans or interests

5. Define an operational concept for each scenario – how the stakeholders will interact to provide required services – typically at four distinct levels:
    - The customer's experience
    - The operator's experience
    - The maintainer's experience
    - The administrator's experience

6. Identify services required to reach strategic goals

7. Analyze concepts of operation for scenarios to define concepts of operation for required services

8. Develop business requirements for each required service

9. Analyze the required services to determine the top-level subsystems required to deliver them; subsystem definitions should reflect the minimum modularity required for ease of component upgrade, expansion, maintenance and renewal in light of any expected progress in communications, processing and control technologies.

10. Develop top-level functional requirements for each top-level subsystem; describe what each subsystem must do to support the services implied in the vision – specify "what", not "how"

11. Identify interfaces (interconnects) between subsystems, and between "the system" and the outside world; define required information flows.

(The published National ITS Architecture provides a series of canned templates comprising the output of steps 1-11 for those ITS user services already defined at the national level. Most regional ITS architecture development efforts start from these canned templates.)

12. Define roles and responsibilities for implementation, operation, maintenance, administration, funding and cost allocation of required services

13. Develop required institutional agreements

14. Define and/or identify interface standards for each required subsystem interconnect

15. Define a sequence of projects required to implement the vision; allocate specific required services, subsystems, functions, etc. to each specific project; ensure that all required services are accounted for; identify project dependencies, technical and institutional issues, obstacles to implementation; identify funding

16. Finally, define a mechanism for maintenance of the vision/architecture. Identify who will be responsible for stewardship of the vision; define an update cycle and the process for submitting requests for updates, and for approval of requested changes

Appendix 4 – Project Management Requirements

The policy requires that Project Managers, working with the ITS Program Coordinator, must:

1. Identify those project components that support delivery of an ITS user service

2. Quantify the amount of the project budget that supports each major category of transit ITS components (i.e. fleet management, electronic fare collection, traveler information, architecture development)

3. Determine how the project fits into the Regional vision as defined by the Regional ITS Architecture

4. Prior to entering final design, identify internal and external stakeholders *(if not already defined by an approved Regional Architecture)*

5. Prior to entering final design, obtain stakeholder consensus on a concept of operations for the project's ITS elements *(if not already defined by an approved Regional Architecture)*

6. Prior to entering final design, obtain stakeholder consensus on functional and performance requirements of the ITS components *(if not already defined by an approved Regional Architecture)*

7. Prior to entering final design, obtain stakeholder consensus on interface requirements and information exchanges *(if not already defined by an approved Regional Architecture)*

8. Prior to entering final design, ensure that applicable interface standards are identified *(if not already defined by an approved Regional Architecture)*

9. Define roles and responsibilities of participating agencies and departments

10. Ensure that an analysis of alternative system configuration and technology options for meeting the functional and performance requirements is performed

11. Ensure that an analysis of alternative procurement options is performed

12. Ensure that test procedures are developed for verification of system interfaces, function and performance

13. Ensure that procedures and resources necessary for operations and management of the system have been defined

14. Ensure that any updates to the approved Regional Architectures that may be required for system implementation have been identified

Appendix 5 – Required Documentation

A USDOT-compliant System Engineering Analysis includes:

- Reference to the Regional or National ITS Architecture (how the project fits into the overall plan)
- Roles and responsibilities for participating agencies
- Definition of functional and performance requirements
- Analysis of alternative system configuration and technology options for meeting requirements
- Analysis of financing and procurement options
- Applicable interface standards and testing procedures
- Procedures and resources necessary for operations and management of the system
- Identification of updates to the regional architecture required for system implementation

A USDOT-compliant Regional ITS Architecture includes:

- Description of the Region
- Identification of participating agencies and stakeholders
- Operational concept identifying roles and responsibilities of stakeholders
- Agreements required for operations
- System modularity and functional requirements (top level)
- Interface requirements and information exchanges with planned and existing systems and subsystems
- Identification of ITS standards and supporting regional and national interoperability requirements
- Sequence of projects required for implementation
- Roles, responsibilities and procedures for maintaining (i.e. updating) the regional architecture as technologies and user services evolve over time

A USDOT-compliant Project-level Architecture includes:

- Description of project scope, boundaries, stakeholders
- Operational concept
- Functional requirements of the project
- Interface requirements and information exchanges
- Identification of applicable standards

A USDOT-compliant Grant Application includes:

- Determination that the project contains ITS elements;
- Assignment of each major ITS component of the Grant to a major ITS type category (e.g. Fleet Management, Electronic Fare Collection, Traveler Information, Architecture Development);
- Determination of the ITS budget elements, or the ITS percentage if part of larger budget line items;
- Details on the ITS elements, their value and type, and architecture conformity status.

Appendix 6 – FTA Policy

I. Purpose

This policy provides procedures for implementing section 5206(e) of the Transportation Equity Act for the 21st Century, Public Law 105-178, 112 Stat. 547, pertaining to conformance with the National Intelligent Transportation Systems Architecture and Standards.

II. Definitions

Intelligent Transportation Systems (ITS) means electronics, communications or information processing used singly or in combination to improve the efficiency or safety of a surface transportation system.

ITS project means any project that in whole or in part funds the acquisition of technologies or systems of technologies that provide or significantly contribute to the provision of one or more ITS user services as defined in the National ITS Architecture.

Major ITS project means any ITS project that implements part of a regional ITS initiative that is multi-jurisdictional, multi-modal, or otherwise affects regional integration of ITS systems

National ITS Architecture (also "national architecture") means a common framework for ITS interoperability. The National ITS Architecture comprises the logical architecture and physical architecture which satisfy a defined set of user services. The National ITS Architecture is maintained by U.S. DOT (Department of Transportation) and is available on the DOT web site at http://www.its.dot.gov.

Project level ITS architecture is a framework that identifies the institutional agreement and technical integration necessary to interface a major ITS project with other ITS projects and systems.

Region is the geographical area that identifies the boundaries of the regional ITS architecture and is defined by and based on the needs of the participating agencies and other stakeholders. A region can be specified at a metropolitan, Statewide, multi-State, or corridor level. In metropolitan areas, a region should be no less than the boundaries of the metropolitan planning area.

Regional ITS architecture means a regional framework for ensuring institutional agreement and technical integration for the implementation of ITS projects or groups of projects.

Systems engineering is a structured process for arriving at a final design of a system. The final design is selected from a number of alternatives that would accomplish the same objectives and considers the total life-cycle of the project including not only the technical merits of potential solutions but also the costs and relative value of alternatives.

III. Policy

ITS projects shall conform to the National ITS Architecture and standards in accordance with the requirements contained in this part. Conformance with the National ITS Architecture is interpreted to mean the use of the National ITS Architecture to develop a regional ITS architecture in support of integration and the subsequent adherence of all ITS projects to that regional ITS architecture. Development of the regional ITS architecture should be consistent with the transportation planning process for Statewide and Metropolitan Transportation Planning (49 CFR Part 613 and 621).

IV. Applicability

a. All ITS projects that are funded in whole or in part with the Highway Trust Fund (including the Mass Transit Account) are subject to these provisions.

b. The Secretary may authorize exceptions for:
    1. Projects designed to achieve specific research objectives outlined in the National ITS Program Plan under section 5205 of the Transportation Equity Act for the 21st Century or the Surface Transportation Research and Development Strategic Plan developed under section 5208 of Title 23, United States Code; or

2. The upgrade or expansion of an ITS system in existence on the date of enactment of the Transportation Equity Act for the 21st Century if the Secretary determines that the upgrade or expansion --
    i. Would not adversely affect the goals or purposes of Subtitle C (Intelligent Transportation Systems) of the Transportation Equity Act for the 21st Century and
    ii. Is carried out before the end of the useful life of such system; and
    iii. Is cost-effective as compared to alternatives that would meet the conformity requirement of this rule

c. These provisions do not apply to funds used for Operations and Maintenance of an ITS system in existence on June 9, 1998.

V. Regional ITS Architecture

a. A regional ITS architecture shall be developed to guide the development of ITS projects and programs and be consistent with ITS strategies and projects contained in applicable transportation plans. The National ITS Architecture shall be used as a resource in the development of the regional ITS architecture. The regional ITS architecture shall be on a scale commensurate with the scope of ITS investment in the region. Provision should be made to include participation from the following agencies, as appropriate, in the development of the regional ITS architecture: highway agencies; public safety agencies (e.g., police, fire, emergency/medical); transit agencies; federal lands agencies; state motor carrier agencies; and other operating agencies necessary to fully address regional ITS integration.

b. Any region that is currently implementing ITS projects shall have a regional ITS architecture February 7, 2005.

c. All other regions not currently implementing ITS projects shall have a regional ITS architecture within four years of the first ITS project for that region advancing to final design.

d. The regional ITS architecture shall include, at a minimum, the following:
    1. A description of the region;
    2. Identification of participating agencies and other stakeholders;
    3. An operational concept that identifies the roles and responsibilities of participating agencies and stakeholders in the operation and implementation of the systems included in the regional ITS architecture;
    4. Any agreements (existing or new) required for operations, including at a minimum those affecting integration of ITS projects; interoperability of different ITS technologies, utilization of ITS-related standards, and the operation of the projects identified in the regional ITS architecture;
    5. System functional requirements;
    6. Interface requirements and information exchanges with planned and existing systems and subsystems (for example, subsystems and architecture flows as defined in the National ITS Architecture);
    7. Identification of ITS standards supporting regional and national interoperability;
    8. The sequence of projects required for implementation of the regional ITS architecture.

e. Existing regional ITS architectures that meet all of the requirements of section V(d) shall be considered to satisfy the requirements of V(a).

f. The agencies and other stakeholders participating in the development of the regional ITS architecture shall develop and implement procedures and responsibilities for maintaining the regional ITS architecture, as needs evolve within the region.

VI. Project Implementation

a. All ITS projects funded with Mass Transit Funds from the Highway Trust Fund shall be based on a systems engineering analysis.
b. The analysis should be on a scale commensurate with the project scope.

c. The systems engineering analysis shall include, at a minimum:
    1. Identification of portions of the regional ITS architecture being implemented (or if a regional ITS architecture does not exist, the applicable portions of the National ITS Architecture).
    2. Identification of participating agencies' roles and responsibilities;
    3. Requirements definitions:
    4. Analysis of alternative system configurations and technology options to meet requirements;
    5. Analysis of financing and procurement options;
    6. Identification of applicable ITS standards and testing procedures; and
    7. Procedures and resources necessary for operations and management of the system;
d. Upon completion of the regional ITS architecture required in section V, the final design of all ITS projects funded with highway trust funds shall accommodate the interface requirements and information exchanges as specified in the regional ITS architecture. If the final design of the ITS project is inconsistent with the regional ITS architecture, then the regional ITS architecture shall be updated as per the process defined in V(f) to reflect the changes.
e. Prior to completion of the regional ITS architecture, any major ITS project funded with highway trust funds that advances to final design shall have a project level ITS architecture that is coordinated with the development of the regional ITS architecture. The final design of the major ITS project shall accommodate the interface requirements and information exchanges as specified in this project level ITS architecture. If the project final design is inconsistent with the project level architecture, then the project level ITS architecture shall be updated to reflect the changes. The project level ITS architecture is based on results of the systems engineering analysis, and includes the following:
    1. A description of the scope of the ITS project
    2. An operational concept that identifies the roles and responsibilities of participating agencies and stakeholders in the operation and implementation of the ITS project;
    3. Functional requirements of the ITS project;
    4. Interface requirements and information exchanges between the ITS project and other planned and existing systems and subsystems; and
    5. Identification of applicable ITS standards
f. All ITS projects funded with Mass Transit Funds from the Highway Trust Funds shall use applicable ITS standards and interoperability tests that have been officially adopted through rulemaking by the United States Department of Transportation (US DOT).
g. Any ITS project that has advanced to final design by (effective date of policy – April 8, 2001) is exempt from the requirements of VI.

VII. **Project Oversight**

a. Prior to authorization of Mass Transit Funds from the Highway Trust Fund for acquisition or implementation of ITS projects, grantees shall self-certify compliance with sections V and VI. Compliance with this policy shall be monitored under normal FTA oversight procedures, to include annual risk assessments, triennial reviews, and program management oversight reviews as applicable.

b. Compliance with the following FTA Circulars shall also be certified:
    - C5010.1C, Grant Management Guidelines
    - C6100.1B, Application Instructions and Program Management Guidelines

VIII. **FTA Guidance**

FTA will develop appropriate guidance materials regarding the National ITS Architecture Consistency Policy.

Appendix 7 – FTA Architecture Policy Conformance Checklist

National ITS Architecture Policy for Transit Projects
Oversight Checklist

I. Are the National ITS Architecture Policy requirements applicable?

A. Is the project an ITS project? (Any project that in whole or in part funds the acquisition of technologies or systems of technologies that provide or significantly contribute to the provision of one or more ITS user services as defined in the National ITS Architecture.
Comments:

_____

B. Are Highway Trust Fund, including Mass Transit Account Funds being used? (FTA funding sources include Section 5307, 5309, 5310, 5311, …)
Comments:

_____

II. Identify Regional ITS Architecture Development Status

Regions with ITS, have four years from February 7, 2001 to develop a Regional ITS Architecture. What is the development status?
Comments:

_____

_____

III. Grant / Cooperative Agreement Application Needs

A. Are ITS projects identified in the STIP or TIP? (Y/N) ___
B. Have the ITS codes been identified in TEAM? (Y/N) ___
C. Has the grantee self-certified that they meet all FTA requirements (Y/N) ___
Comments:

_____

IV. Project Implementation

A. Is the project represented in the Regional ITS Architecture? (Y/N) ___
B. Is a system engineering analysis process being used and documented? (Y/N)___
C. Are applicable ITS standards being used? (Y/N) ___
D. Have major ITS projects been identified and policy requirements been followed?
Comments:

_____

_____

Exhibit 1 – Project Conformance Worksheet

Worksheet for Verifying Project Compliance with ITS Policy Requirements

Project Name _____

Cost Objective _____ Project Manager _____ Date _____

1. Does this project have an ITS Component?

Does this project include or support any of the following services or activities:

- ☐ highway-rail grade crossing protection
- ☐ storage of archived ridership, performance, safety or incident data
- ☐ traffic signal priority
- ☐ demand-responsive transit operations (paratransit)
- ☐ fixed route transit operations
- ☐ transit security, video surveillance
- ☐ multi-modal coordination
- ☐ passenger information
- ☐ traveler information
- ☐ emergency response
- ☐ HAZMAT management (including HAZMAT in railcars)
- ☐ parking management
- ☐ transportation infrastructure protection
- ☐ evacuation and reentry management
- ☐ archived data

Does this project include or support provision or receipt (by any means) of the following types of information to or from other agencies, operators or clearing houses:

- ☐ stop location or schedule data
- ☐ service status data
- ☐ traffic incident data
- ☐ security incident data
- ☐ traffic control data
- ☐ construction coordination information
- ☐ archived ridership, performance, safety, security or incident data
- ☐ emergency management information
- ☐ fare transaction data
- ☐ ticket vending data
- ☐ electronic toll data
- ☐ roadway performance or occupancy data
- ☐ electronic payment data

- ☐ None of the above

If yes to any of the above, continue. The project has an ITS component. *If none of the above, this project does not contain ITS components currently defined by an approved Regional Architecture and is therefore not subject to ITS Architecture Conformance requirements.*

2. Are there grounds for the project to be exempt from the ITS Architecture Conformance requirement?

☐ Yes. This project merely provides for the continued operation and maintenance of a system that was already in existence on June 9, 1998, without expansion or modification (e.g. replacement-in-kind of life-expired components).

☐ Yes. This project merely provides upgrades and/or expansion of components that are still within their usable life, in a system that was already in existence on June 9, 1998. Additionally, a non-conformant approach is more cost-effective than any other approach that would meet the architecture conformity requirements, and an exemption for this specific project has been requested and approved by the US Secretary of Transportation.

☐ No. The project meets neither of the above criteria.

If no, continue. The project is not exempt from the policy. *If yes to either of the above, this project is exempt and is not subject to ITS Architecture Conformance requirements.*

3. Was the project in Final Design prior to April 8, 2001? *(As defined by FTA, Final design is the last phase of project development, and includes right-of-way acquisition, utility relocation, and the preparation of final construction plans (including construction management plans), detailed specifications, construction cost estimates, and bid documents.)*

☐ Yes
☐ No

If no, continue. The project is not exempt from either the Project Architecture or Systems Engineering requirements of the policy. *If yes, skip to item 7. This project must still comply with any applicable approved ITS Architectures, but is exempt from the Systems Engineering and Project-level Architecture development requirements of the ITS policy.*

4. Has a formal Systems Engineering Analysis been documented for this project?

- ☐ Reference to Regional ITS Architecture (how the project fits into the region's overall plan)
- ☐ Roles and responsibilities for participating agencies
- ☐ Definition of functional requirements and acceptance criteria (test plans)
- ☐ Analysis of alternative system configuration and technology options for meeting requirements
- ☐ Analysis of financing and procurement options
- ☐ Applicable interface standards and testing procedures
- ☐ Procedures and resources necessary for operations and management of the system
- ☐ Identification of updates to the regional architecture required for system implementation

All required elements complete?

- ☐ Yes
- ☐ No

If yes, continue. *If no, the project is not ready to proceed into final design (i.e. final plans, cost estimates. bid documents, detailed specifications, etc). Consult with the ITS Program Coordinator for guidance on the conduct of a formal Systems Engineering Analysis.*

5. Are all of the ITS elements checked in item 1 addressed in an applicable approved ITS Architecture?

- ☐ Yes
- ☐ No
- ☐ Don't know

If yes, skip to item 7. The project must adhere to any approved regional architectures. If don't know, contact the office of the ITS Project Coordinator to find out. *If no, the existing architectures (if any) do not address the services this project is intended to support; so a project-level architecture may be required prior to the start of Final Design.*

6. *(Where one or more ITS elements are not addressed in an approved regional architecture)* **Are any of this project's ITS elements that are not addressed in an approved Regional Architecture:**

- ☐ Multi-jurisdictional (involving stakeholders in more than one MPO jurisdiction)
- ☐ Multi-modal (involving stakeholders in more than one mode of transportation)
- ☐ Otherwise having an impact on regional or corporate ITS integration

- ☐ None of the above

If none of the above, skip to item 7. The project is not a "major" ITS project, so a formal project-level architecture is not required. *If yes to any of the above, the project is considered a "major" project; a project-level architecture is required. The project-level architecture will serve as a foundation for the eventual inclusion of the affected ITS elements into an approved Regional or Corporate Architecture. See the ITS Project Coordinator for guidance on developing a project-level architecture.*

7. Is the project conformant with the following elements of all applicable Regional ITS Architecture(s)?

- ☐ Concept of Operations
- ☐ Data flows
- ☐ Interface standards
- ☐ Architecture change requests submitted (if any)
- ☐ Architecture change requests approved
- ☐ Project-level Architecture (if required by item 6, above)

- ☐ All requirements met
- ☐ One or more requirements not met

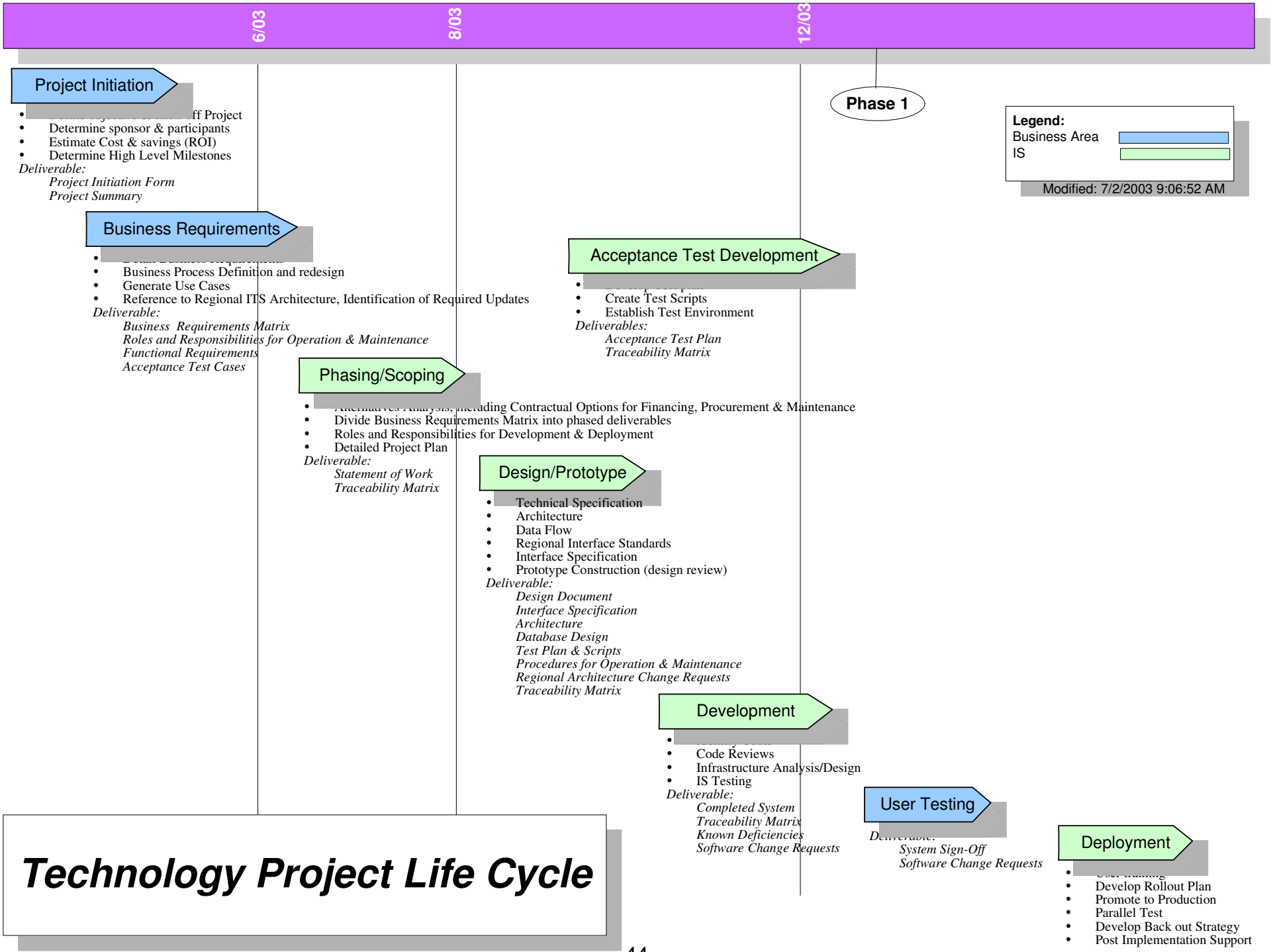
If all requirements have been met, the project is eligible to be advanced into final design. *If one or more requirements have not been met, this project is not ready to be advanced to final design using federal funding.*

8. Does the Capital Funding Division expect that any portion of the project funding may be derived directly or indirectly from the U.S. Highway Trust Fund, including the Mass Transit Account and Congressional earmarks? (Consult the Capital Funding Division for current funding information.)

- ☐ Yes
- ☐ No

If yes, all federal system engineering and architecture conformance requirements must be met prior to entering final design. *If no, it may be possible to relax some of the federal system engineering and architecture conformance requirements for this project. See the Chief Information Officer or ITS Program Coordinator for relevant corporate standards. Note: relaxing federal requirements will make the project ineligible for Federal funding in the future*

Exhibit 2 – Technology Project Life Cycle



Technology Project Life Cycle

Exhibit 3 – Technology Project Initiation Form

NJ TRANSIT
TECHNOLOGY PROJECT INITIATION FORM

Project:
Date:

Lead Area: Bus
Sponsor:
Participants:

Initiative:

ROI:	**FY04**	**FY05**	**FY06**	**Total**
Labor:	**$**	**$**	**$**	**$**
Non Labor:	**$**	**$**	**$**	**$**
Total:	**$**	**$**	**$**	**$**

Description:

Benefits:
Efficiencies:

Safety/Security:

Customer:

Capacity:

Other:

Implementation difficulty:

Low

Challenges:

Comments:

Proposed Scope of Work:	**Duration**	**Cost**
Business Requirements		$
Statement of work		
Pilot		
Technical Specifications		
Systems Engineering Analysis		
Project Architecture (if req'd)		
Development		
Quality Assurance		
User Training		
User Application Testing		
Rollout		
Total		$

Administrative Plans Duration
RFP Process
TEC Recommendation
Contract Negotiation
Board Authorization

AED Approval:

IS Approval:

TAC Approval:

Exhibit 4 – Standard Contractual Provisions

The following language will be included in all federally supported solicitations and contracts for ITS projects:

1. CONFORMANCE WITH NATIONAL ITS ARCHITECTURE AND APPROVED STANDARDS

    1.1. This project is funded in whole or in part by the U.S. Highway Trust Fund, and includes components that implement or support one or more “ITS User Services” defined by the National ITS Architecture. As required by the Federal Transit Administration National ITS Architecture Policy on Transit Projects, the project shall therefore include a USDOT-compliant Systems Engineering Analysis, which shall be completed prior to the start of final design. All deliverables shall conform with any applicable Regional ITS Architecture requirements established by the region(s) affected by the project. Additionally, if the project implements part or all of an ITS User Service that has not yet been addressed in an approved Regional ITS Architecture, and either the project itself, or the User Service(s) it supports, are multi-jurisdictional, or multi-modal, or have an impact on regional ITS integration, then the project shall also include a USDOT-compliant Project-Level ITS Architecture, which shall also be completed prior to the start of final design.

Exhibit 5 – Project Development Process Flow (draft)