Amtrak’s Stimulus Program (ARRA)  
Challenges and Lessons Learned

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On February 17, 2009, Congress passed the American Recovery and Reinvestment Act (ARRA), which appropriated $1.3 Billion to Amtrak for capital investment. In anticipation of this funding, Amtrak had prepared a list of potential projects that exceeded the grant funding. A selection process was needed and the selection criteria were:

- Activities that could be started and completed expeditiously
- Projects that supported development of intercity high speed rail service
- Projects that would preserve and create jobs and promote economic recovery
- Projects that align with Amtrak’s corporate continuing goals; Safer, Greener, and Healthier; including projects that repair, rehabilitate, and/or upgrade infrastructure and rolling stock

Amtrak was challenged to ramp up to implement safely and effectively over 100 projects at more than 500 different locations in 46 states in under 24 months. Project values ranged from $50K to $100M. In addition Amtrak had already committed resources to implement its annual Capital Program of $350M.

Implementation Approach

Hire additional Amtrak personnel – not practical for a short duration program
Design/Build Fast Track – not a good fit for all projects
Traditional A/E and CM firm support – not practical and timely

Planned Approach – split 4 ways, not all the eggs in one basket

Traditional Forces Account Work - $ 220M
Traditional Amtrak contracted construction - $200M
CM on Amtrak awarded construction Contracts - $280M
Design/Build with incentives - $ 260M

This approach reduced the risk and provided flexibility to react to changes and issues as the Program is implemented.
Amtrak Engineering was allocated approximately $959M of ARRA funds

115 Engineering Projects

Track $171M
Structures $431M
Communications & Signals $135M
Electric Traction $148M
Construction $65M
Mobility First $9M

TOTAL $959M

Major Track Projects

Replace Concrete Ties New England (NEC) $45M
Replace Concrete Ties Mid-Atlantic (NEC) $51M
Right of Way Improvements New York Division (NEC) $44M
Right of Way Improvements Mid-Atlantic Division (NEC) $20M
Right of Way Improvements New England Division (NEC) $12M
Right of Way Improvements (non-NEC) $9M

Major Structure Projects

Niantic River Bridge (NEC) $60M
Improve River Road Bridge (NEC) $2.5M
Improve Pelham Bay Bridge (NEC) $13M
Improve East and West Harbor Bridges (NEC) $30M
Improve Thames River Bridge (NEC) $26M
Miamicock Bridge Replacement (NEC) $20M
Improve Washington DC Undergrade Bridges (NEC) $4M
Wood and Union Street Bridges (non-NEC) $9M Amtrak; $6.5M NS
## Major C&S Projects

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install Radiax RF cable in Baltimore Tunnels (NEC)</td>
<td>$1M</td>
</tr>
<tr>
<td>Install Radiax RF cable in New York Tunnels (NEC)</td>
<td>$6.8M</td>
</tr>
<tr>
<td>Demo Abandoned Structures WAS to BOS</td>
<td>$3.5M</td>
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<tr>
<td>Install 26 miles of Redundant Communication Cable</td>
<td>$9M</td>
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<tr>
<td>Initiate Positive Train Control Design</td>
<td>$5M</td>
</tr>
<tr>
<td>Install fiber optic cable on the Michigan Line</td>
<td>$7M</td>
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<tr>
<td>Install; ITCS on Michigan Line</td>
<td>$25M</td>
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<tr>
<td>Construct a new Train Dispatching Center</td>
<td>$9M</td>
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## Major Electric Traction Projects

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Cost</th>
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</thead>
<tbody>
<tr>
<td>Rewind Lamokin Frequency Converters (NEC)</td>
<td>$57M</td>
</tr>
<tr>
<td>Install Metuchen UG Transmission Lines (NEC)</td>
<td>$15M</td>
</tr>
<tr>
<td>Improve 18 Electric Traction Substations with new</td>
<td></td>
</tr>
<tr>
<td>transformers, circuit breakers, switches, remote</td>
<td></td>
</tr>
<tr>
<td>terminal units (On and Off NEC)</td>
<td>$21M</td>
</tr>
<tr>
<td>Install Ivy City Substation and Transmission Line (NEC)</td>
<td>$28M</td>
</tr>
<tr>
<td>Install new Transmission Lines on A&amp;S Branch</td>
<td>$30M</td>
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## Major Construction Projects

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Cost</th>
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</thead>
<tbody>
<tr>
<td>Renovate Historic Wilmington Train Station (NEC)</td>
<td>$35M</td>
</tr>
<tr>
<td>Construct Los Angeles Progressive Maintenance Facility (non-NEC)</td>
<td>$40M</td>
</tr>
<tr>
<td>Construct Hialeah Progressive Maintenance Facility (non-NEC)</td>
<td>$35 M</td>
</tr>
<tr>
<td>Construct Sanford Florida Auto Train Station Expansion (non-NEC)</td>
<td>$10M</td>
</tr>
<tr>
<td>NYPS Service Building Upgrades – Chillers</td>
<td>$22M</td>
</tr>
</tbody>
</table>
**Major Facility Projects**

- Upgrade Chicago Facilities, terminal and infrastructure  
  $120M
- Upgrade Boston Yard & Mechanical Facilities  
  $25M
- Construct 15 Inventory Security Facilities (NEC)  
  $19M
- Improve Sunnyside Yard (NEC)  
  $9M
- Hellgate Bridge Ballast Mitigation (NEC)  
  $13M
- Maintenance of Way Base Improvements at Hamden, Groton and Providence (NEC)  
  $1.7M

**Station Program**

Mobility First – ARRA and GCAP funded improvements including wheelchair lifts, enclosures, and accessible paths at over 200 locations

Station Improvements – 550’ long platforms, tactile edge, handicap parking, etc.

**Implementation**

Amtrak’s Management realized that in order to successfully implement a capital program of this magnitude, they would need additional resources. They solicited and selected two firms, a joint venture of URS Corporation/CH2M Hill to act as Program Management Oversight (PMO), to assist Amtrak as an extension of Amtrak staff, and Jacobs Program Management Company to act as Regional Program Manager, procure the Design Builder, and Construction Manager for the DB contracts and Amtrak procured contracts. Approximately 125 projects were selected for inclusion in the Stimulus Program, with about 70 to be self-performed and/or contracted by Amtrak and the balance of 55 to be completed utilizing a unique Design-Build (DB) process. This contracting strategy was selected because of the aggressive schedule that was mandated in the ARRA legislation that required Amtrak to complete construction on all of their stimulus projects by 2/17/11.

This strategy brought about many challenges, such as utilizing a design-build approach for projects on railroads that were used to the more traditionally design-bid-build. For Amtrak to get this work completed on time, the railroad industry would need to have confidence that the processes that would be put in place would ensure the numerous multiple contractors would produce the same end product. It was necessary to develop a 30% design that the Host railroad would find acceptable and guide the design/build contractor to acceptable means and methods of construction.
Unique Challenges and Opportunities

There were many unique challenges that Amtrak, URS/CH2M Hill and Jacobs would need to address in order to get from a conceptual list of projects to construction completion in approximately 18 months on hundreds of projects in multiple locations throughout the US and involving at least 10 railroads and hundreds of third party owners.

URS/CH2M HILL had to establish a program office in Philadelphia. While the RFP stated the need for the office, it wasn’t possible for the JV to secure an office space without Amtrak approval and the contract being in place. The search for office space was straight forward, but took valuable time that prevented the Program Implementation Team (PIT) as it became to be known, from coming together in a single location to be as effective as possible. Once the contract was awarded, the office location was accepted, a lease executed, and phone and internet service established, the program had been underway for 8 months. The URS/CH2M team had been formed and was working out of various Philadelphia locations including each of the joint venture offices in Philadelphia and 30th Street Station. During this time, the JV had to establish a set of project controls that could not only track and manage the Amtrak self-performed portions of the program, but also be able to accept data from Jacobs project controls. It was necessary to combine all of this data in order to give Amtrak management a complete picture of the progress of the stimulus program.

Extensive coordination was required between Amtrak and each of the Host Railroads (BNSF, CN, CPR, CSXT, NS, UP, BB, CLP, MBTA, MNNR, NECR, and VTR) that the projects were located on, and new processes had to be developed in order to meet the Host RR’s requirements. Also, processes were established to control more than a dozen contractors, and hundreds of sub-contractors working on these properties.

The Stimulus grant required a competitive procurement, complete transparency and participation of small and disadvantaged businesses (more than 1/3 of the program)

The Program’s aggressive schedule required initiation of a procurement project packaging tactic and then development of a fast track procurement process across 46 states

Another challenge was how to manage, measure, and ensure the required quality during the design/build construction process

Establishing the Program Office and Team

It was quickly apparent that the PMO Program Staff would have to do more than oversight of a fast track program which included projects in 46 states with different delivery mechanisms. The PMO quickly evolved into the PIT in order to implement the program. The team’s personal dedication and skills was a major contributor to the program success. The team replaced their corporate identity for the time being and identified themselves as members of the Program Implementation Team (PIT). In addition Jacobs established the RPM team to manage, design to 30%, procure design/builders, and control their assigned projects.
Host Railroad Coordination

The design and construction of projects on the Host Railroads required extensive coordination. Important additions to the Team were the host railroad facilitator and a team of expeditors, each of which had a relationship with and familiarity with the respective host railroad that they dealt with, that would help coordinate and resolve submittals to the host railroads, shortening the time for design reviews and identifying access and construction issues.

Dedicated Project Management teams for Chicago and Boston

The magnitude and complexity of the improvements planned for Chicago and Boston required a dedicated local Project Team. The ability to implement the scope of improvements and maintain railroad operations was an obvious challenge.

Scope Definition

The first step of the DB process was transmitting the Amtrak requirements with limited scope information to Jacobs to deliver a project definition report and project budget. After Amtrak review and approval Jacobs was authorized to start design and development of bridging documents. The design was developed to a bridging level (approximately 30%) and used to procure competitive design/build contractors to complete the design and construct the improvements.

Background

In 1971, Congress and President Nixon created the National Railroad Passenger Corporation, Amtrak. For many years prior, the private railroads had neglected their passenger infrastructure, and though its entire existence the company has been subjected to political cross-winds and insufficient capital resources, including owned railway, Amtrak's ridership has maintained consistent growth.

A backlog of needed improvement projects was increasing account of inadequate investment. Many assets were not in a state of good repair but needed extensive maintenance to maintain safe and reliable operations.

Amtrak evaluated this backlog of projects and selected projects that could meet the ARRA Goals and Requirement. The significant ARRA funding provided an opportunity to improve assets and infrastructure that may not be selected for capital funds. Many of these selected projects provided benefits to improved safety, improved railroad operations, reduced the use of energy, reduced costs, improved train inspections and maintenance, improved employee health and welfare facilities, etc.
The Project Execution

The work that was self-performed by Amtrak included typical projects that could meet the ARRA Goals and Requirement including track, signal, communications, ET (Electric Traction), facility improvements, and some signal and communication work associated with Amtrak's Positive Train Control initiative, known as ACSES (Automatic Civil Speed Enforcement System). Amtrak also contracted work out to construction contractors for projects that had 100% design completed, such as bridges and facilities.

The Jacobs projects had a different type of complexity because of the design build process, and because they involved station and facility work throughout the entire U.S. In addition they involved work on all of the Class 1 Railroad properties. This work required a completely different strategy that would allow Jacobs and it’s contractors to perform project work on property that was owned by the host railroads, Amtrak, or third parties. Amtrak, URS, and Jacobs developed processes that had to be agreed to by the Host RR’s, and could still support the DB methodology.

Establishing Optimum Contract work packages.

Amtrak and Jacobs developed a contracting strategy that optimized the unique scope of work and the capability of the supply chain. As these packages were initiated, construction program controls were developed around the Work Breakdown Structure (WBS) to a level that is tangible, manageable and meaningful. The work package could then be estimated for cost and schedule and this would form the baseline for the project.

Optimum work packages are work packages that can be safely and efficiently managed and delivered by the DB Subcontractors while delivering value for the investment. In order to establish optimum work packages the team used its combined national experience & knowledge of the scope of work to be delivered, the environment for delivery, the available contractors and the capability and availability of the supply industry. The procurement team’s challenge was to select DB Subcontractors in an environment of competitive bids and a truly transparent process. There were many aspects of the overall scope of work that required careful consideration to determine which supplier is best equipped to deliver the best value. Once the full scope of the work was understood it became possible to assess the risks attached to that package. The level of risk will be the driver in deciding the most appropriate procurement strategy and philosophy.

Access and Third Party Coordination

Jacobs provided dedicated staff to communicate with the third party stakeholders establish a relationship and obtain access to the site. This process included over 200 locations, many with complex ownership and control issues.
Managing the construction works and provide appropriate field supervision.

Once the project entered into construction the challenge was to provide resources that would assure the safety and quality in the field. Any failure in either safety or quality would have an enormously detrimental effect on the entire program. The Amtrak, URS/CH2MHiIl and Jacobs “team” of construction managers recognized the need to be extremely hands on to ensure that the only work carried out in the field is work that has been approved for construction. Contractor’s Work Package Plans, safety plans and quality plans were the prerequisite to any field activity. Once the extent and intensity of the construction work is fully understood an execution strategy can be developed that will identify the work that will be executed where and when. This will allow a site supervision resource plan to be created.

While the program was being fast tracked the Team also recognized that the safety of railroad operations was the cornerstone of all work plans and execution. This required that Host RR design approvals, and the DB’s means and methods were reviewed/approved before work could start.

Also to provide Host RR RWP protection and integration with the Host RR’s own schedules 6 week look ahead schedules had to be prepared/reviewed with all of the Host RR on a weekly basis.

Planning, cost and controls management of the work packages

The team as you would expect has a full suite of project controls systems and planning tools. Working in partnership we baselined the planned work and during the phase-in period identified the most appropriate tools to provide the required output to inform the project reporting requirements.

Issues of SBE/DBE compliance

Many of the selected SBE/DBE contractors were used to performing the traditional fixed price/lump sum contracting approach and did not have experience with fast paced design build at multiple geographic locations. The ARRA reporting and Amtrak/Jacobs contract requirements were also a challenge to these small businesses. The Amtrak ARRA program is proud of its achievements in the area of DBE and SBE participation. The DB program goals were aggressively set at 15% for DBE and 20% for SBE. The Team is please to report that the overall percentage of DB participation exceeded the goal.

Other management requirements normally associated with projects of this scale and complexity.

There is no question that the delivery environment for a program of this size and complexity will be an extremely stressful one. The overriding management requirement will be the ability to deal with the stress and continue to try and maintain an environment that is conducive to a productive outcome.
Safety

Safety and proper processes were needed to reduce the risk of injury, accidents and property damage. A site specific work and safety plan was required for each construction site. Roadway Worker Protection was typically provided by railroad forces. Proper communication between the RWP staff and on site construction personnel was required.

Jacobs DB contractor pre-qualification, evaluation and selection process was heavily weighted relative to safety to provide for a safe work environment. Since many of the DB had not worked in the operating railroad environment prior to this project it was necessary to ensure that safety was an important factor in the procurement and award process as well as implementation of their contracts.

Underground utilities were a major issue and improvements were made to reduce the risk of hitting a public or railroad utility. Jacobs instituted this procedure to avoid utility damage and employee injury:

- An excavation permitting process prior to the start of the work
- Contact the public utility locator serving the area
- Hand digging to expose known or suspected utilities locations
- Using existing as built drawings to pin point locations
- Contract with private utility locating companies for assistance
- Investigating with local staff who have worked in the area for ideas on locations
- Utilities mark outs are often missed and sometimes utilities do not participate in the marking procedure.
- Do not assume that everything is marked out. Anticipate what could be in the area.
- Ensure that although the utility has been marked, everyone in the work process must be double checking each other to avoid a mishap. In addition all incidents must be reported immediately to a supervisor.
- Have an excavation permitting process prior to the start of the work

In situations where a utility was struck, a Root Cause analysis was completed:

- The utility facilities were not installed per specification below grade.
- The utility facilities were found at various elevations and in some cases were not located on the plans.
- Utility facilities were not properly located in the field.
Safety issues and Lessons Learned

- Ensure that all staff is competent and hold current competence cards e.g. OSHA 10, etc.
- Obtain utility plans and ensure that employees are trained in reading and understanding them, work with the contractor.
- Use appropriate equipment cable locating devices and ensure that they are well maintained.
- Obtain Plans and walk the site to check for obvious signs of utilities.
- Use safe digging practices; require the contractor to locate utilities 3 feet past the outside diameter not the typical 18 inches.
- Look for external evidence of underground services, e.g. Gas service boxes, telephone/cable boxes, street lights, or manhole covers.
- Hand-dig trial holes to confirm the position of services.
- Ensure that staff is trained and competent to use GPR, CAT’s and Gennys.
- Depending on the scope of work, require that the contractor complete a GPR (or similar technology) survey.
- Use the C.A.T in the trench/hole once they have excavated approximately 1 foot to locate deeper or smaller services not locatable from the surface.
- Remember the C.A.T alone cannot always locate every conductor including small services and street lighting - use the Genny.
- Remember the C.A.T will only trace metallic conductors and not plastic pipes or fiber optic cables for example.
- Maintain the C.A.T and Genny regularly to ensure continued trouble free performance, log the calibrations.
- Use on-site records to record pre-work checks eg. on-site risk assessment or permits to dig, maintain a daily log.
- HydroVac excavating in sensitive areas.
- Prohibit the use of teeth on the excavator bucket, supplement with straight faced bucket (if utility is struck, may reduce puncture).
- Reduce the size of the scoop to 2 inches in areas that are questionable.
- Ensure that subcontractors are held to the same standards.
- Provide daily tool box talks and maintain the records.

Common Challenges

- Facility owner’s failure to respond to locate requests.
- Locate requests are not always the facility owner’s primary concern and may
be considered a nuisance.

- Locate activities are not billable to the requestor by the facility owner and are labor intensive.
- Facility owner’s inadequate technical staffing level to respond to locate requests efficiently.
- Facility documentation inaccuracy.
- Third party locators rely on documentation provided by the facility owner and may not be familiar with the system or the area.
- Locating technician training, skill level and experience.
- Locating equipment limitation.
- Loops or diversions in the cable path can go undetected.
- Limited time for locates due to technician work load.
- Lack of marking ribbons.
- Time, labor and equipment cost of potholing.
- Abandoned facilities left concealed but removed from drawings and not located. Some are still live and/or connected.
- The cost of the occasional repairs may be less than the costs associated with supporting locate activities.
- Facility owners are not subject to excavating contractors delay claims, damage claims or contractors other costs resulting from hits.

**Overhead Utilities**

- Ensure that a Safe Plan of Action is developed that incorporates all of the known hazards. Once developed, keep to the script.
- Take the time to locate overhead obstacles and properly mark them, know what systems are energized.
- Double check your daily job briefings so they address the locations of all overhead obstacles.
- While moving equipment around a busy area, use a spotter who can notify the operator of potential hazards before an incident occurs.
- Use the proper equipment for the job at hand. Don’t take shortcuts when you don’t have the proper tools. Stop the work and ask for guidance.
- Before delivery type vehicles are allowed on site they will get a job briefing from the General Contractor, which will include overhead obstacles.
- Provide adequate lighting when working at night.
- That all overhead obstacles have been identified by the day shift and passed down to
the next crew.

- That all spotters understand that entanglements can come from all directions, not just the ground.
- Use physical barriers such as cones on the ground to remind the operators that there is an overhead obstacle above.

**Program Lessons Learned**

It is all about the people, retain and develop good competent staff
Listen to the experts and evaluate their recommendations
Prepare a plan and revise it as conditions change
Identify risks
Identify resource issues and constraints
Identify track outage and protection requirements
Manage the activities on the critical path or near critical path
Identify and procure long lead materials and equipment
Be flexible and creative
Prepare risk and contingency plans
Collect pertinent information and make timely decisions
Be professional and fair
Have fun and celebrate the successes