RAIL ENGINEERING SERVICES
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Rail engineering is a specialized field requiring a deep understanding not only of railroad engineering, but also the business of railroading; the history and future of railroading; and each railroad’s engineering department, organization, priorities and goals.

Arcadis has been serving the North American railroad industry since 1994. We currently serve all seven Class I railroads and have completed more than 6,000 projects for our rail clients.

The Arcadis railroad team is your trusted partner, delivering solutions that meet all your needs because — like you — we live railroading, every day.
Our goal is to be a trusted partner, delivering solutions to meet all of your engineering needs.

WHO WE SERVE
- CSX Transportation
- Norfolk Southern Corporation
- Union Pacific Railroad
- BNSF Railway
- Canadian Pacific Railway
- Canadian National Railway
- Kansas City Southern Railway Company
- Alaska Railroad Corporation
- Conrail
- Florida East Coast Railway
- Metrolink
- North Carolina Railroad Association
- Progressive Rail, Inc.
- RailPros Inc
- Terminal Railroad Association of St. Louis
- Valley Metro
- Palmetto Railways
- Other Confidential Clients

6,000 Railroad projects completed
Keep health and safety on TRACK.
Before every task, STOP and...

THINK through the task
RECOGNIZE the hazards
ASSESS the risks
CONTROL the risks
KEEP health and safety first in all things
Nothing may be as important — or have as great an impact on the lives of our people and those for whom and with whom we work — as Health & Safety (H&S).

Arcadis understands the railroad industry and knows it is imperative to abide by Federal Railroad Administration (FRA) regulations and to implement specific internal H&S programs to meet your needs.

We are committed to providing our employees with proper training, procedures and tools to create and maintain a safe and secure working environment that minimizes the risk of injury or accident. As part of our comprehensive H&S program, we ensure that our staff are trained and certified through FRA, e-RAILSAFE, Rail Car/Tank Car Safety Training, National Incident Management System (NIMS) programs, and OSHA 40-Hour HAZWOPER.

As one of the few firms in the consulting engineering field that administers a behavior-based safety system and approach, we focus on managerial stewardship, proactive hazard assessment, and comprehensive incident investigation and root cause analysis to continuously provide feedback and improve our H&S performance.

We require extensive and continuous health and safety training that embeds the need to Think and Recognize, Assess and Control all hazards, and to Keep H&S first (TRACK) in all of our activities. H&S is at the forefront of everything we do, both on and off the job site, and is the foundation for an H&S culture that is one of the best in our industry. If an employee feels that any condition of the workplace or task is not safe, he or she is empowered to stop work, inform Arcadis project management of the situation and use TRACK to identify the appropriate hazard controls.

Our national network of trained professionals is available around the clock to coordinate response efforts as part of our Incident Response and Recovery (IRR) team. We also actively participate in various emergency response drills with our Class I railroads.
RELATED PROJECT HIGHLIGHTS

Universal Interlocking
The client contracted Arcadis to prepare plans for the installation of a new interlocking on a very active mainline track. These efforts included rock revetment design, construction phasing, track alignment design, property assessment, project management, signal design coordination, geotechnical investigation, utility assessment, stormwater design and environmental permitting plan preparation.

Yard Expansion Project
This facility expansion design project, led by Arcadis, consisted of more than 26,000 linear feet of track; one new undergrade bridge structure; gas line modifications; erosion and sediment control plans; lighting layout; construction phasing, maintaining existing operations; geotechnical investigation, including sinkhole remediation; and a hydraulics and hydrology study.

Mainline Expansion
Plans and specifications for the installation of eight miles of second track were prepared by Arcadis. Elements included two new interlockings, grade crossing modifications, two new undergrade bridges, property assessments, utility relocations, project management, signal design coordination, geotechnical investigation, stormwater design and environmental permitting plan preparation.

Industry Projects
Our staff have completed several projects involving yard expansions. Elements of these projects involved track concept layout, final track alignment design, project management, stormwater design and environmental permitting coordination, geotechnical investigation, stormwater design and environmental permitting plan preparation.

Siding Projects
In order to accommodate increased rail traffic, Arcadis staff developed plans and specifications for a siding expansion project. This project was developed under an aggressive schedule to meet demands. We developed concept track layout, final track alignment, project management, stormwater management design, geotechnical investigation and environmental permitting.
Railroads require strong bridges, many of which were constructed in the late 1800s and early 1900s and are nearing the end of their useful life span. This represents a critical liability to rail infrastructure. The challenge is that replacement or rehabilitation must be completed with minimal or no interruption to rail traffic. Arcadis brings creative, practical and cost-effective solutions for the rehabilitation or replacement of railroad structures. We include experienced construction personnel early in the planning stage to develop an approach that maintains railroad operations throughout construction.

Our structural engineering and track design teams work together to develop a total project approach that is highly effective while driving down cost. Our structural engineering services include the following:

- Rail bridge design
- Bridge inspection
- Bridge load rating
- Bridge rehabilitation
- Bridge hydraulics
- Retaining wall design
- Highway overpass design
- Construction services

**HYDROLOGIC AND HYDRAULIC MODELING**

- Bridge hydraulics
- Culvert analysis
- Stormwater systems
- Open channel flow and natural river and stream systems

### RELATED PROJECT HIGHLIGHTS

**Bridge Replacement**

The client requested plans and specifications for the replacement of a single span open deck plate girder superstructure on masonry wall abutments. The new bridge was designed in a phased manner to maintain railroad traffic. These structures were designed with no skew to eliminate the effects of the existing 30 degree skew. The 107’ single span, ballasted deck on steel plate girders is supported on concrete stub abutments founded on drilled shafts. Temporary soldier pile walls were designed to allow for constant operation of rail traffic throughout construction.

**Bridge Replacement**

The client requested plans and specifications for the replacement of a four span open deck plate girder superstructure on concrete and masonry wall abutments and piers. A new three span bridge was designed with 45’ outer spans using rolled steel beams and a 97.5’ center span using steel plate girders. The ballasted deck superstructure is supported on concrete wall abutments on micropiles and cap/column piers on drilled shafts. To maintain track operations, the new substructure is constructed below the existing superstructure and within the existing abutments.

**Bridge Inspection and Load Rating**

This project required Arcadis engineers to provide inspection and load ratings for 11 bridges. Bridge types included steel deck truss, plate girders, rolled beams and rail top. Summary reports, including load rating results and rehabilitation recommendations, were completed for each bridge.

**Four Hole Swamp Bridge Replacement**

Plans and specifications were prepared by Arcadis for the replacement of three bridges over Four Hole Swamp. The existing three bridges are multi-span with open deck timber superstructures on timber bents. The three new bridges have total lengths of 215’, 561’ and 181’ with typical spans of 30’ and 34’. The bridges were constructed below the existing track to minimize track disruption using two 30” diameter pipe piles and precast concrete caps. Standard box beams were used for the ballasted superstructure.

**Raccoon Creek Bridge Replacement**

Plans and specifications for the replacement of Raccoon Creek Bridge were prepared by Arcadis. The existing single track bridge is a 130’ multi-span with open deck timber superstructures on timber bents. The new 146’ double track bridge is on new alignment adjacent to the existing bridge. The ballasted deck superstructure uses 36’ prestressed box beams on four 30” diameter pipe piles with cast-in-place concrete caps. The substructure is designed for 25’ of scour in Raccoon Creek.
INTERMODAL Services

Increasing domestic and international container volumes, coupled with port expansions on both the east and west coast, necessitate the expansion of — and improved operational efficiencies within — existing intermodal rail terminals, as well as the construction of new terminals.

Arcadis provides the following services for intermodal rail terminals:

- Maintenance facility design
- Surveying
- Conceptual design
- Storm Water Pollution Prevention Plan development
- Design development
- Construction bidding services
- Acquisition permitting support
- Construction management

RELATED PROJECT HIGHLIGHTS

**Jacksonville, FL Dames Point ICTF – New Terminal Design and CM**

The Jacksonville Port Authority (JAXPORT) was awarded federal and state grants to construct a new Intermodal Container Transfer Facility (ICTF) in Jacksonville, FL. JAXPORT required assistance in developing a concept plan into 30% plans and a Design Criteria Package for a Request for Proposal Package (RFP) for procurement of design-build contractor construction management services.

The Arcadis team developed revised concept alternatives to fit the project within limited available real estate and provide the project components required for the federal and state grants. We prepared 30% plans and the Design Criteria Package used for a design-build solicitation.

Construction phase management services provided by Arcadis included onsite management of the design-build contractor, coordination of materials testing, monitoring of construction activities, schedule management, budget management, contract administration, contract change management, claims management, mitigation materials management and review of the contractor’s applications for payment.

**Salaberry-De-Valleyfield, Quebec, Canada – New Terminal Construction CM**

Arcadis serves as the Construction Manager on this new Intermodal terminal project located west of Montreal, Canada. This project required many pre-construction services, including refining the overall project design and coordinating around local conditions. Significant focus was placed on the construction schedule, factoring in differing weather conditions and holidays. The project consists of installation of a new section of mainline track with turnouts and track heaters, installation of five new terminal tracks with new turnouts and switch heaters, storm drainage, terminal lighting, security cameras, security fencing, three new terminal structures, and installation of a new terminal lead and wye track.

The construction on this project is projected to be completed ahead of schedule and within budget.

**Worcester, MA Terminal Expansion and Reconstruction CM**

Serving as the Construction Manager for this project, Arcadis was selected by the client to expand and reconstruct an existing intermodal terminal in Worcester, MA. In order to accommodate the terminal improvements, it was necessary to realign 5 miles of mainline track. The mainline remained operational and in use by CSX, AMTRAK, the P&W Railroad and MBTA commuter service. The project consisted of constructing 6 miles of new track and 25 turnouts, relocating and re-profiling 2 miles of existing track, roller compacted concrete (RCC), a new drainage system, lighting, fencing, security cameras, landscaping, a new bridge over the terminal on a public roadway and four new buildings.

The project was completed safely, without impacting any of the operating railroads, on time and on budget.
Facility Engineering Services

Facilities engineering is a specialized field within the railroad industry. Successful railroad facility design and construction require an understanding of both the functional purpose of the railroad facility and how to seamlessly integrate the full range of engineering and construction disciplines. Arcadis is one of the few firms with this specialized knowledge and the experience needed for success.

Our multidisciplinary team of track, civil, mechanical, structural, electrical, and instrumentation and controls engineers; architects; and environmental experts provide full-service shop, building, facility and utility solutions to our rail clients nationwide.

Our services include:

- Due diligence services
- Diesel and car shops
- Wheel truing facilities
- Locomotive wash facilities
- Yard offices and crew facilities
- Mainline and service fueling facilities
- Tank car loading/unloading facilities
- Truck loading/unloading facilities
- Storage tanks
- Tank containment
- Pump houses
- Diesel fuel, lube oil, journal oil, methanol and water systems
- Sanding systems
- Yard air systems
- Utilities
- Truck pads
- Industrial wastewater treatment

Related Project Highlights

**Locomotive Shop and Yard**

The design and construction management of this greenfield locomotive shop and yard consists of 29,000 linear feet of track, 30,000-square-foot shop, locomotive wash, offices and welfare area, covered locomotive service facility, and all utilities. Building and environmental permitting were completed by Arcadis.

**Locomotive Service Facility**

The design and construction of this new locomotive service facility was led by Arcadis and includes one track providing a two-spot facility for diesel, lube oil, water and sanding. The service facility is covered to reduce contact stormwater directed to the industrial wastewater treatment plant and includes a concrete platform with high density polyethylene (HDPE) under liner to prevent hydrocarbon products from impacting the underlying soil and groundwater.

**Car Shop Improvements**

This project included design and construction assistance for replacement of the car jacks in an existing car shop. The existing car jacks were decades old, one-of-a-kind and difficult to service. Jack replacement included new, easy access jacking pits; installation of standard jacks; system-wide, new concrete top slab to provide a uniform work surface and compatibility with other car equipment; and electrical improvements.

**Tank Car Off Loading**

This national industrial client contracted Arcadis to design ethanol rail offload facilities in Michigan, Ohio, Kentucky and Florida. The largest of these facilities was designed to handle up to 18 cars at once. The designs had to accommodate cars that varied in length and height, limited space, strict health and safety requirements, and environmental compliance and permitting. These facilities were completed by our multidisciplinary team on a compressed schedule to meet client business demands.

**Secondary Containment**

The existing geomembrane liner for a diesel fuel containment dike was experiencing failure and was “floating” seasonally due to elevated groundwater. The “floating” created unstable and unsafe walking surfaces. In light of safety and extent of failure found by liner integrity testing, it was decided to replace the liner. Arcadis developed a cost-effective liner design and construction controls that addressed the groundwater, access safety and new liner integrity.
CONSTRUCTION MANAGEMENT Services

Railroads are undertaking an increasing number of construction projects. The best-engineered and best-constructed projects meet all goals, are completed on schedule and budget, and do not negatively impact ongoing railroad operations. Arcadis provides the full range of Program and Construction Management services. We have an entire business line that is dedicated to providing these services to transportation and infrastructure projects. Our services include:

PRE-CONSTRUCTION PHASE
• Planning and programming
• Feasibility and contract delivery method analysis
• Land acquisition assistance
• Master budget and schedule preparation
• Value engineering
• Project bidding services and contractor selection assistance

CONSTRUCTION PHASE
• Contract administration
• Construction engineering and inspection
• Quality assurance management
• Schedule management
• Budget management
• Change control and management
• Issues management and resolution

POST-CONSTRUCTION PHASE
• Punch list coordination
• Project close-out reporting
• LEED certification and coordination
• Commissioning
• Claims support and resolution

RELATED PROJECT HIGHLIGHTS

Intermodal Terminal Expansion
Construction management services were provided by Arcadis for this terminal expansion project to change the lift equipment from side loaders to reach stackers while the terminal remained in operation. The project consisted of aggregate base course placement; earthwork; erosion control; shifting and re-profiling approximately 2 miles of track and three turnouts; construction of an additional 200+/- parking spaces; new stormwater collection system, including detention ponds; pavement improvements throughout the property footprint; underground electrical and high mast lighting throughout the terminal; and security fencing and cameras.

Intermodal Terminal Reconstruction
Construction management services on this terminal expansion and reconstruction project were completed by Arcadis while the terminal remained in operation. The project consisted of constructing 6 miles of new track and 25 new turnouts, relocating and re-profiling 2 miles of existing track, 155,000 SY of roller compacted concrete, new drainage system, lighting, fencing, security cameras, landscaping, a new bridge over the terminal on a public roadway and four new buildings (totaling approx 16,500 SF).

New Intermodal Terminal Construction
The Arcadis team is providing Construction Management on this greenfield terminal construction project consisting of installation of new section of mainline track, which includes roughly 10,000 feet with four new turnouts, as well as the installation of five new terminal tracks totaling roughly 15,000 feet of track and nine new turnouts. Includes complete comprehensive storm drainage system, terminal lighting, security camera system, perimeter security fencing, four new terminal structures totaling approximately 15,000 SF, and the installation of new terminal lead and wye track roughly 7,000 feet long to service other end of terminal.

New Intermodal Container Transfer Facility
When the owner was not able to secure all of the real estate needed for their original concept, they requested assistance from an Arcadis-led team to develop a revised concept plan for a new intermodal container transfer facility. Arcadis prepared 30% plans and a design criteria package for procurement of a design-build contractor. Arcadis is assisting the owner with selection of the D-B contractor and will provide full construction management services during both the design and construction phases of the D-B contract.

Mainline Capacity Expansion
Arcadis successfully handles the Construction Management of mainline capacity projects. We employ experienced professionals both on the contractor and construction management side of track projects. Our approach includes management of contractors on the railroad rights-of-way along with full-service quantity and budget management during construction. Our staff approaches the management of a contractor with an emphasis on safety and overall project control. Project activities are reviewed prior to work commencing to ensure that we keep the railroad moving during construction in a safe manner.
Most railroad expansion, bridge replacement and facility projects involve geotechnical investigation. Our experienced in-house geotechnical staff provide both design and field services, and we maintain and run two geotechnical testing laboratories. We also have a seasoned staff of field geologists based throughout North America.

Our services include:

- Geotechnical field investigations
- Subsurface geotechnical reports
- Concept planning for geotechnical solutions
- Retaining wall design
- Revetment design
- Roadbed stabilization design
- Foundation design

**Geotechnical Engineering Reports**

Subsurface investigations to evaluate the condition of the soils and bedrock at various project locations are conducted by Arcadis. Samples from these sites are collected for laboratory testing. These findings, along with findings in the field, are compiled and presented to the client in the form of boring logs, cross sections and a written report that includes thorough recommendations.

**Bridge Foundation Investigation**

The Arcadis team has incorporated subsurface investigations in the evaluation of various bridge foundations. These efforts included subsurface investigation, laboratory testing, boring logs, cross sections and foundation modeling to determine most appropriate foundation design.

**Soft Soil Remediation**

Arcadis has prepared plans and specifications for soft soil remediation near planned structures. Compaction grouting and slurry grouting were recommended and implemented in areas of concern encountered during subsurface investigations to consolidate loose and soft soils. These areas also had a history of known sinkholes.

**Sinkhole Remediation**

Our staff have completed several projects involving sinkhole remediation near track alignments. Elements of these projects involved subsurface investigation, laboratory testing of soil parameters, and soil stabilization action plans and specifications (compaction grouting as mentioned above).
Arcadis environmental brings one team to a project.
ECOLOGICAL PERMITTING

Services

Arcadis has the experience and resources to support and resolve the complex environmental issues associated with rail engineering projects. From environmental planning and permitting to facility maintenance and project-specific compliance, we understand the rail industry’s unique environmental challenges.

Arcadis is a leader in helping our clients navigate and comply with federal and local requirements. We understand that engineering initiatives require environmental support prior to construction, such as due diligence for a new acquisition or complex regulatory coordination and management due to a federal nexus (such as federal funding for positive train control or a federal permit) or unique state-specific requirements. During construction, we help ensure the construction timeline, objective and budget are met. Following construction, and throughout operation, we remain attuned to changing regulations and help you maintain environmental compliance.

Our national railroad program has a network of more than 200 multidisciplinary professionals who understand your industry and have strong regulatory relationships that are critical in helping achieve your goals.

Our services include:

PLANNING AND PERMITTING

- Environmental impact statements
- Permit strategy/acquisition
- Field studies/surveys
- Natural Resource Management Plans
- Public outreach
- Risk management
- Habitat restoration

COMPLIANCE

- National Pollutant Discharge Elimination System Permitting
- Stormwater Pollution Prevention Plans
- Spill Prevention, Control & Countermeasure Plans
- Title V & Non-Title V air permitting
- EPCA Tier II & HMBP reporting
- RCRA permitting and compliance
- Process safety management
- Risk management plans
- TSCA evaluation and compliance

RELATED PROJECT HIGHLIGHTS

**National Gateway**

This project consisted of environmental permitting and NEPA requirements for Phase 1 of a multi-state rail clearance initiative. This phase includes over 40 rail obstructions in four states, which received federal stimulus funding. Work involves submitting deliverables under NEPA; obtaining waterway permits, including involved 401 and 404 water quality permitting; and ensuring commitments under NEPA are carried through. Each obstruction has its own unique set of challenges that needed to be addressed.

**Capacity Siding Projects 404 Permitting**

Arcadis completed wetland delineations, stream classifications; invasive species surveys; GPS surveys; and threatened, endangered and sensitive species surveys for 15 projects to add 2-mile-long railroad sidings throughout various counties in Georgia, Alabama and South Carolina. Arcadis submitted the NWP 14 permits; reviewed national historic sites for compliance with federal and state regulations; managed the land disturbance permits; reviewed design engineering, erosion and sediment control plans; and completed inspections for permit compliance.

**Creek Liner**

This project consisted of detailed design plans and specifications and construction oversight for the installation of a creek liner and channel stabilization to prevent creosote-contaminated groundwater from infiltrating a local creek. Work also included obtaining various agency permits and ensuring compliance.

**Programmatic Sustainability Metrics**

Arcadis assisted a Class I railroad in developing a comprehensive air and sustainability program by working with rail managers to determine and establish company goals and objectives. Arcadis support included a review of available program guidance, benchmarking existing programs, assisting with priorities and developing reasonable performance metrics. In addition, models were developed for “what if” emission scenarios by comparing - haul by rail to highway truck, which helped to obtain funding for strategic projects.
Positive train control (PTC) will present a huge challenge and expense to railroads over the next several years. Building an accurate inventory of critical assets meeting FRA requirements is only the beginning. Once operational, PTC will demand an intensive change management program to maintain the database of critical assets in near real time.

Arcadis provides the two main service lines that a robust PTC program demands: surveying and GIS. We have an impressive number of surveying offices throughout the eastern U.S. from which we can efficiently launch field surveys. All of our field staff are Roadway Worker trained and have e-RAILSAFE credentials. We understand complex field application and attributing, as well as the back-office support required to meet the rigorous FRA specifications. In addition, we have a long history of providing emergency response through our Incident Response and Recovery (IRR) services to the Class I railroad community, and can apply these methods to dispatch resources through a 24/7 PTC response program. We successfully execute all aspects of successful PTC asset management, and can deliver accurate data on demand in every platform.

Our services include:
- Field surveys of critical assets/validation surveys
- Asset management/change management
- GIS development and integration
- Critical field and office response, 24/7
- Certified data accuracy, meeting FRA requirements
- Emergency survey response
PUBLIC PROJECT

All railroads interact with projects being undertaken by, and of high importance to, outside parties. Some of these present a challenge from a technical perspective and some have sensitive governmental issues. Developing a process that establishes and maintains clear communication with the outside party while keeping the railroad operational throughout the project is paramount.

Arcadis has developed a Public Projects Program that is driven by process and procedures to ensure safety and eliminate disruption of railroad operations to the greatest extent possible. Our engineering and field staff ensure that design and construction minimize impacts to both the railroad right-of-way and to the design plans of the outside party. We focus on managing costs and agreements, identify construction challenges early in the project, and strive to keep safety and operations at a high level.

Our services include:
- Review of highway and bridge design plans
- Review of drainage and structural calculations
- Construction oversight and inspection services
- Program administration
- Financial monitoring services
- State and municipal coordination

RELATED PROJECT HIGHLIGHTS

**Overhead Bridge Replacement**
All crane pads, crane charts, and rigging were inspected by an Arcadis structural engineer prior to execution of the lift. All of the lifts were reviewed prior to the work being authorized by Arcadis structural engineers to ensure that the planned contractor approach adhered to railroad standards, the proper crane was planned for and the staging plan was sound.

**Highway Grade Separation**
A grade separating structure was installed by staged construction. Arcadis staff reviewed and coordinated railroad cost participation, coordinated removal of warning systems and abandoned track, and oversaw beam lifts over track.

**Overhead Bridge Replacement**
Our staff facilitated approval of installation of a temporary construction haul road over the mainline track, reviewed contractor methodologies for removal of bridge structures within close proximity to the track, and inspected rigging, cranes, and lifts over and near the track. Continuous monitoring of flagging labor budget was undertaken to ensure that the project was not overrun.

**Highway Surface Widenings**
Several highway projects in the Savannah area have impact to railroads. Arcadis staff have coordinated adjustments of utilities, railroad warning systems, and staging of track and roadway construction, with ongoing monitoring of labor charges.

**Storm Pipe Jack and Bore**
In order to facilitate movement of stormwater away from the railroad right-of-way to accommodate roadway widening across the track, Arcadis was contracted to review design plans. Arcadis staff also reviewed contractor methodology prior to the continuous inspection of the relating jack bore for a storm pipe under a mainline track.
REAL ESTATE Services

Railroads have historically been the largest landholders, occupying a tremendous area and adjoining many thousands of properties. Protecting the railroads’ legal interests in their corridors is essential.

As capacity needs increase, acquisitions of additional property are often necessary. To secure such property, accurate surveys, deed research, and a review of railroad valuation maps and other historical information are necessary to produce maps, deed descriptions, easements and other legal documents that will stand the test of time. In railroad terms, this is measured in hundreds of years.

Arcadis has an unparalleled history of providing accurate research and review of both physical and legal evidence in determining rail corridor limits and property rights. We are adept at working with rail property staff, attorneys and agents in resolving encroachments, boundary disputes and other issues affecting rail property. Our focus is on defining, documenting and protecting railroad property interests.

Our services include:

- Complete surveying and mapping services to identify and document rail corridor boundaries
- Review of historical railroad deeds, valuation maps, title opinions and adjoining properties
- Accurate determination of corridor limits and railroad property rights
- Identification of encroachments from adjoining properties
- Legal descriptions and maps to support new property acquisitions, easements and agreements

RELATED PROJECT HIGHLIGHTS

System-wide

Since 2005, Arcadis has been the preferred provider for real estate surveying and mapping for a Class I rail client. We have performed hundreds of rail corridor and property mapping assignments for this client across the eastern US. These typically support acquisitions, easements, property disputes, encroachments and right-of-way establishment.

Design & Construction – Harpers Ferry Tunnel, MD

In support of the National Gateway, the historic tunnel at Harpers Ferry required modifications. A precise and accurate survey was required through the tunnel. Property lines and the railroad corridor had to be carefully established, along with the alignment over the Potomac River. It was critical to know where the tunnel was in relation to property lines so that tunnel modifications could be made without violating adjoining property rights – both above and below ground. Without hesitation, the client chose Arcadis for this important mission.

Historic Retracement – Daniel Boone Wilderness Trail, VA

The client chose Arcadis for the important and challenging task of reestablishing this portion of the historic rail corridor that opened America to westward expansion. Our mission was to recreate the original rail corridor through diligent research, compile evidence, and survey the old track bed and improvements called for on historical valuation maps. A large body of evidence was gathered and analyzed, resulting in a conclusive finding, maps and legal descriptions to facilitate purchase.

System-wide

In 2012, an eastern railroad selected Arcadis to perform their prestigious Historic Centerline Survey. Since their original charter in 1851, many changes and improvements have occurred over their corridor. In areas over their 317-mile alignment, the location of the right-of-way had become obliterated over time. The challenge was to reestablish the centerline of the original rail corridor, going back in time some 160 years. Old railroad maps, valuation maps, historical deeds and other instruments were carefully examined, along with a complete field survey of property lines and evidence of the old trackbed. This historical evidence was compiled, and the original railroad centerline was determined. Covering over 50 miles, the work done by Arcadis represents the pinnacle of investigative surveying.
Arcadis has unparalleled experience in providing accurate railroad mapping based on historical and physical evidence.
INCIDENT RESPONSE AND RECOVERY

Services

Following an unplanned event, rail service must be restored as quickly and safely as possible.

With more than 125 years of experience and national experts in many fields across your network, Arcadis can provide 24-hour support when the need arises. We understand that incidents can occur anywhere at any time, and we are often on site shortly after the first responders, providing rapid response and expert services. We focus on managing and controlling the impacts to your business from incidents as varied as train derailments, spills, natural disasters and other factors. Our engineers can review safety and reconstruction plans, and provide complete field oversight where and when you need it.

We can review accident damage to your facilities and provide cost-effective solutions so you can get back to business as usual. We’ve been called upon to support litigation, serving as expert witnesses as well as providing data to help refute claims. In addition, we complete network analysis to determine where, or if infrastructure hardening is necessary, as in the case of coastline assets at risk of a natural disaster.

Our services include:

• Track and bridge infrastructure restoration
• Planning and management to minimize impact and decrease long-term cost
• Design-focused inspection and repair actions
• Repair priority assessment and delineation
• Human health risks assessments
• Incident site access control
• Compliance for local, state and federal interactions
• Contractor management and oversight
• Fast-tracked land disturbance permits
• Culvert sizing and typical sections for access road construction
• Expert testimony
• Specialized facility damage review
• Infrastructure hardening analysis

RELATIONED PROJECT HIGHLIGHTS

Train Derailment

The client contacted Arcadis to complete the engineer’s estimate, design and bid documentation for the emergency restoration of more than a half-mile of water main and telecommunication lines impacted during remedial excavation activities completed due to a train derailment releasing hazardous material. Our team worked closely with city water department and other contractors to ensure the design was protective of human health, and construction was completed safely during 24-hour workdays. We completed oversight of the work, as well as testing to ensure the utilities were constructed according to specifications.

Geotechnical Evaluation Post Derailment

This project consisted of restoration after a derailment involving two locomotives and multiple coal cars. Access was limited and via a 2,000-foot-long county road with a large elevation change. Arcadis completed the emergency sediment control plan for the incident, following state requirements. During site restoration, Arcadis reviewed and provided backfill requirements for the excavated area, as well as culvert sizing and recommendations for slope stability.
Railroad industrial wastewater and operations are unique. Locomotive sand, radiator water, shop processes, soap, lube oil, diesel, debris and stormwater uniquely impact this “oily” wastewater. Possessing technical wastewater knowledge alone is not sufficient. Successful wastewater solutions require in-depth holistic knowledge and expertise in wastewater as well as railroad operations, management and environmental compliance. As one of the few companies who understand and specialize in all of these areas, Arcadis can provide successful, industry-leading solutions to address the specific needs of your project.

Our services include:

- Assessment
- Study
- Design
- Bid
- Construction management
- Procurement
- Design-Build
- O&M Training
- Wastewater characterization
- Collection systems
- Lift stations
- Lagoons
- Oil/water separation
- Dissolved air floatation
- Sludge handling
- Drying beds
- Collection system mapping
- Stormwater collection
- Conveyance
- Detention
- Retention
- Treatment permitting
- Instrumentation & control
- PLC/SCADA
- Permit negotiation support
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