

EXHIBIT A

UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

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GRAFTON & UPTON RAILROAD)
COMPANY, JON DELLI PRISCOLI AND)
MICHAEL R. MILANOSKI, AS TRUSTEES)
OF ONE HUNDRED FORTY REALTY)
TRUST,)
Plaintiffs,)
)
v.)
)
TOWN OF HOPEDALE, THE HOPEDALE	Civil Action No. 4:22-cv-40080-ADB)
SELECT BOARD, BY AND THROUGH ITS)
MEMBERS, GLENDA HAZARD, BERNARD)
STOCK, AND BRIAN KEYES, AND THE)
HOPEDALE CONSERVATION)
COMMISSION, BY AND THROUGH ITS)
MEMBERS, BECCA SOLOMON, MARCIA)
MATTHEWS, AND DAVID GUGLIELMI,)
Defendants.)
)
)
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AFFIDAVIT OF SEAN P. REARDON, P.E.

I, Sean P. Reardon, P.E., depose and state as follows:

1. I am a Vice President at Tetra Tech, a provider of engineering services for complex infrastructure projects for private and governmental clients around the world. I am a Licensed Professional Engineer with 28 years of experience in planning, permitting, design and construction of facilities and infrastructure. My curriculum vitae is attached at Exhibit 1.

2. I have carefully reviewed the “Site Layout Plan” revised through July 8, 2022 by an entity known as the D&L Design Group (“D&L”), for the Grafton & Upton Railroad (“GURR”). This plan was attached to GURR’s Verified Complaint, and I have attached it here

for ease of reference as Exhibit 2. I have also reviewed the Second Affidavit of Michael R. Milanoski filed in this matter, which references the Site Layout Plan.

3. Though I am generally familiar with design and engineering firms in Massachusetts, I have never heard of D&L.

4. D&L's Site Layout Plan was not signed or stamped by any person.

5. Though difficult to read because of its size, the lower right hand corner of the Site Layout Plan reflects the following information for D&L:

115 Water Street • Milford, MA 01757
P: (508) 408-2577
www.dandldesigngroup.com

I attempted to access the website. It does not exist, but simply directs you to "GoDaddy.com." I attempted to call the phone number. The phone number is "not in service."

6. Mr. Milanoski acknowledges in his affidavit, at paragraph 28, that there are "topography challenges with the site." This is an understatement. I am extremely skeptical that the project shown on the Site Layout Plan is buildable. I have attached as Exhibit 3 a Topographic Heat Map for the project site, which is derived from 2010 FEMA Blackstone LiDAR Data publicly available from MassGIS. The site rises approximately 260 feet over approximately 2000 feet, for an average grade of 13%. The grade for a significant portion of the site, shown in the darkest red shading, is 20% or more. The existence of the current rail tracks and a gas easement running across the site effectively preclude grade changes across significant portions of the site.

7. The project shown on the Site Layout Plan is unrealistic and impractical given the topography and related site challenges. The Site Layout Plan fails to provide any realistic accommodation for a railroad's limited tolerance for grade changes. I have attached as Exhibit 4 an excerpt from design specifications published by Norfolk Southern Railway Company.

Sections 6.04 and 6.05 reflect permissible grades limiting loading and unloading tracks to 0%, lead tracks to 2% and spur tracks to 3% with required reductions for any curves in the tracks. These grade tolerances are typical in the railroad industry, and are not practically achievable given the number of curves in the tracks and the density of the project shown on the D&L Site Plan Layout.

8. In addition to problems with topography, the plan shows glaring flaws with respect to tractor trailer access. The plan shows paved areas 70 feet wide or less adjacent to the buildings. At least 100 - 120 feet of paved area is required to back a tractor trailer into a loading dock and to be able to pull out again in a typical docking configuration. The paved area around each side of the buildings would need to expand by 50 feet in width before any of the uses shown would be practically accessible by tractor trailers, and the plan does not provide any room for that. The plan also fails to provide any accommodation or dedicated space for fire truck emergency vehicles.

9. Finally, the plan fails to show a reasonable storm water mitigation strategy given the massive conversion of woods to impervious surface. Woods, even steeply sloped woods, generate very little stormwater runoff, while roofs and paved surfaces generate the highest volume and intensity of runoff which, unless mitigated properly, will result in downstream flooding and potentially uncontrolled erosion. Mitigation shown on the plan is inadequately sized and at illogical locations for the development. In all likelihood a significantly larger portion of the site will be required to adequately mitigate changes in runoff.

Dated: August 8, 2022


Sean P. Reardon, P.E.

CERTIFICATE OF SERVICE

I hereby certify that this document filed through the ECF system was sent electronically to counsel of record for all parties on this 8th day of August, 2022.

/s/ Sean Grammel _____

Sean Grammel

EXHIBIT 1



Sean Reardon, PE Vice President

EXPERIENCE SUMMARY

Mr. Reardon is a Vice President at Tetra Tech who specializes in guiding site/civil engineering and land development programs to successful completion. He has more than 25 years of experience in the planning, permitting, design and construction of a wide range of facilities and infrastructure. His broad background encompasses all service sectors: municipal, institutional, private land developers and public/private partnerships. He is particularly skilled in managing multidisciplinary services under aggressive due diligence timeframes, as well as design/build and on-call engineering contracts. Mr. Reardon prides himself on building long-term, collaborative client relationships and overcoming technical and regulatory challenges with creative solutions that optimize project objectives. In addition to his leadership on residential, institutional, commercial and mixed-use development programs, Mr. Reardon is regularly called upon to provide expert witness testimony and litigation support.

RELEVANT EXPERIENCE

Land Development – Private

Anaerobic Digesters, Vanguard Renewables, Various Locations, MA, 2016 to 2018. Principal in Charge for detailed due diligence reviews to determine the presence or absence of environmental resources, review local zoning bylaws, and identify local, state and federal permitting requirements for several potential project locations across Massachusetts. Tetra Tech is supporting the preparation of conceptual site plans and development of permitting strategies for obtaining local, state and federal environmental and zoning approvals for each potential project location.

Genzyme Corporate Expansion Program, Framingham and Allston, MA. For more than 15 years, manages comprehensive land development services for Genzyme, one of the world's leading biotechnology companies. Work has included site/civil engineering, environmental permitting, transportation planning and design and construction management projects at Genzyme's Framingham and Allston facilities.

Master Plan. Helped Genzyme develop a 10-year Master Plan to expand its manufacturing and research/development campus in Framingham and Southborough. The Master Plan will provide the additional facilities and infrastructure to support Genzyme's future growth while providing significant tangible environmental benefit and support to local businesses and communities through economic investment, major improvements to the public open space, and transportation infrastructure. It includes construction of nearly 1 million square feet of new research and development, office, and manufacturing space and 2,400 new parking spaces.

EDUCATION

BS, Civil Engineering,
University of Massachusetts,
1991

AREA OF EXPERTISE

Civil Engineering

REGISTRATIONS / AFFILIATIONS

Licensed Professional Engineer:
Connecticut No. 0024852
Massachusetts No. 41062
Maine No. 10902
New Hampshire No. 11710
Rhode Island No. 8402
Vermont No. 018.0008720

TRAINING/CERTIFICATIONS

40-Hour OSHA Hazardous Waste Site Operations Training
8-Hour OSHA Hazardous Material Emergency Response Training Recertification
Competent Person Training

OFFICE

Marlborough, MA

YEARS OF EXPERIENCE

28

YEARS WITH TETRA TECH

27

Tetra Tech's services included preparation and submittal of a Draft Environmental Impact Report (DEIR) outlining project-related impacts and proposed mitigation measures. Also coordinated with MassDOT, MA DEP and MWRA to help advance the project.

Pedestrian Safety Improvements. Oversaw project to address pedestrian safety issues at the Allston and Framingham campuses. In Allston, Tetra Tech evaluated potential installation of an unsignalized crosswalk on Western Avenue at the intersection of the Genzyme and Harvard University driveways. Also managed the permitting and design/build of a crosswalk between Genzyme's properties at 10 and 11 California Avenue in Framingham.

Chiller Alley Drainage Improvements. Principal-in-Charge for the drainage conveyance design improvements within a critical utility corridor in Framingham. The project includes investigation and redesign of a compromised culvert that is causing routine flooding of the utility corridor and loading dock. The redesign will provide a hydraulic connection to the downstream receiving water that will lower the 100-year flood elevation to below critical utility pad elevations. The scope includes coordination and permitting with the Town of Framingham, production of construction documents and specifications, construction inspections, and contractor management and oversight

Science Research Center, Framingham, MA. Managed site engineering, permitting and traffic planning for a \$180M research and lab facility. Oversaw site feasibility analyses involving building demolition, property boundary and topographic surveys, environmental and geotechnical analyses, water supply and wastewater disposal system evaluation, hazardous waste risk assessments, and asbestos abatement specifications prior to demolition. Work included design of steam and condensed water infrastructure.

rProtein Manufacturing Facility, Framingham, MA. Managed civil engineering and permitting for a \$300M protein manufacturing facility on the Framingham/Southborough border. The site is adjacent to railroad rights-of-way and a 600-space, pre-cast parking structure. The project required extensive negotiation with town planning boards, zoning boards and conservation commissions to permit construction within a riverfront area. It included coordination with MWRA and MA DEP's Northeast and Central Regions with regard to sewer discharge and air quality permits. Managed the design/build of expanded and renovated parking and loading dock facilities and drainage improvements to manage run-off within an area of chronic flooding. Work was completed without disrupting access or product flow through the site.

Phase II Expansion – Manufacturing Facility, Allston. Responsible for all site design and permitting services related to the expansion of Genzyme's Allston Manufacturing Facility including construction of an on-site steam cogeneration facility, an underground parking garage and potential future expansion. Oversaw design and construction of a replacement parking facility for ~140 vehicles on a limited, very visible site. Coordinated with local/state permitting agencies, complied with difficult lease conditions and reconciled the needs of an active construction site with those of an operating manufacturing facility.

Stormwater Compliance, Framingham Campus. Principal-in-Charge overseeing the development of a campus-wide stormwater pollution prevention plan (SWPPP) and spill prevention, control and countermeasure (SPCC) plan for Genzyme's corporate campus in Framingham. Work includes coordination with corporate environmental staff to resolve questions of jurisdiction, documenting sampling and program maintenance tasks, mapping utility infrastructure, and coordination with local and state regulators.

Engineering and Permitting Services, Rushy Marsh Farm Expansion Cotuit, MA. Currently providing site design and environmental permitting services for the proposed expansion of an operating farm within a coastal community on Cape Cod. Work includes survey, site design, project design coordination, state and local permitting, and construction services. Specific tasks have included permitting, design and construction of a replacement outfall to Nantucket Sound under emergency authorization from MassDEP and the US Army Corp of Engineers.

Stormwater Permitting and Compliance Services, Sterling Suffolk Racecourse, LLC Revere/Boston, MA. Currently assisting owners and their legal team in developing multiple stormwater improvement options and Nutrient Management Plans in response to USEPA enforcement actions and to obtain Individual Surface Water Discharge

Permit. Services include developing more than 30 options to meet stringent stormwater guidelines for large Concentrated Animal Feeding Operation (CAFO) on the 163-acre parcel, assisting in negotiations with USEPA regarding compliance schedule and deliverables, and implementing comprehensive compliance sampling program. Work included wet and dry weather sampling of eight outfalls.

Ground-Mounted Solar Arrays, SoCore Energy, Various Locations, NY, 2016 to 2017. Project Engineer for detailed due diligence reviews to determine the presence or absence of environmental resources, review local zoning bylaws, and identify local, state and federal permitting requirements for several potential project locations across the State of New York. Supported the development of permitting strategies for obtaining local, state and federal environmental and zoning approvals for each potential project location.

Solar Energy Facilities, Bright Lite Energy, North Brookfield and Orange, MA, 2017 to 2018. Principal in Charge for the full range of site design and permitting services of four ground-mounted solar array projects located in North Brookfield and Orange totaling 27 megawatts. Work included conducting detailed due diligence reviews to determine the presence or absence of environmental resources, review local zoning bylaws, and identify local, state and federal permitting requirements; delineation of wetland resource areas; coordination of ALTA/NSPS Land Title Survey; development of permitting plans including solar facility infrastructure and utility interconnection layout, grading and stormwater Best Management Practices design; preparation of local, state and federal permit applications; and leading public presentations as part of various permit approval processes.

Solar Projects at Landfills, Soltage, LLC, East Bridgewater, Randolph, and Plainville, MA. Project Manager overseeing preparation of Stormwater Management Reports, due diligence investigations, and wetlands delineation for proposed solar projects at Massachusetts landfills in East Bridgewater Randolph Landfill and Plainville.

Solar Projects, SunEdison LLC, Various Locations, MA. Project Manager for civil engineering and permitting service for proposed solar sites in six locations. Projects involve conducting due diligence investigations, preparing conceptual sketches and site plans, coordination of permitting, as applicable, with state and local regulators, and performing wetland delineation. Projects are located in Sturbridge, Foxborough, Otis Air National Guard Base, Norton, Canton, and Dartmouth, MA.

Ground Mounted Solar Arrays, SunBug Solar, Bellingham, Erving, and Wilbraham, MA. Project Manager for civil engineering services at several locations in Massachusetts. Work includes detailed due-diligence review and preparation of permitting strategy for obtaining environmental and zoning approvals for each site.

Proposed Foxwoods Catskills Resort Casino, Mashantucket Pequot Gaming Enterprise, Liberty NY, 2014. Principal-in-Charge of site development planning services, including civil engineering and environmental permitting for Foxwoods' proposed resort gaming facility to be located on approximately 40 acres of land in Liberty New York as part of the resort gaming licensing process in the State of New York. Work included the critical initial evaluations and assessments necessary to address the feasibility of constructing, accessing and providing key utility service to a resort gaming facility with approximately 4,000 gaming positions, 700 hotel rooms and related amenities as well as preparation of documentation required for application to the Town of Liberty for a Planned Unit Development (PUD) and for the New York State Environmental Quality Review (SEQR) process.

Region C Gaming License Support, Foxwoods-Luzich LLC, New Bedford and Fall River, MA, 2014. Principal-in-Charge of planning and engineering services to support the development team's efforts to secure a Category 1 resort gaming license from the Massachusetts Gaming Commission for Region C for a proposed resort gaming facility to be located in either the City of Fall River or New Bedford. The work included evaluation of multiple sites for suitability including the development of project design, related impact analysis and documentation necessary to assist the Client in developing a program of improvements for the selected site that considers inherent development constraints and negotiate land acquisition.

Proposed Foxwoods Resort Casino, Crossroads Massachusetts, LLC, Milford, MA, 2013. Principal-in-Charge of site development planning services, including site civil engineering, water and sewer infrastructure design,

transportation planning and design and environmental permitting for Foxwoods' proposed 2.8-million-square-foot resort in Milford. Project included planning and design of more than \$100 million of offsite transportation improvements to the interstate highway system and local roads, \$75 million of site improvements, \$20 million of offsite utility infrastructure mitigation and the proposed relocation of overhead power transmission lines serving the entire region. The work was completed in an extremely aggressive time frame to support local approval and Massachusetts State Gaming License process and included coordination with state and local interest groups and surrounding communities and extensive public outreach.

Drainage/Utility Design and Stormwater System Maintenance Program, First Group America, Marlborough, MA. Principal-in-Charge for the design of drainage and utility infrastructure, including a 10,000-gallon diesel fuel storage and dispensing tank to serve a First Student bus maintenance facility in Middleborough. Work involved drainage design and analysis; local and state permitting, construction specifications and construction-phase services. The project also required extensive coordination with the local and state fire officials, MA Department of Fish and Wildlife, local planning board and local conservation commission to permit the construction of the facility adjacent to wetlands and within a priority habitat area. Under a separate three-year contract, now overseeing stormwater system maintenance services at the bus maintenance facility. The scope of services includes: bi-monthly site and system inspection; quarterly catch basin and water quality unit cleaning; periodic parking lot sweeping; and annual at-grade detention pond and underground detention system maintenance. This work helps the client comply with environmental regulations, meet maintenance and repair commitments and minimize infrastructure expenditures.

Seaport Square Development, Gale International, South Boston, MA, 2012. Principal-in-Charge of Tetra Tech's engineering support services for the planning, permitting and design of Seaport Square. Spanning 23 acres of waterfront, Seaport Square is the largest undeveloped parcel in the City of Boston. It is master planned to include 6.5-million square feet of residences, shops, restaurants, cultural institutions, schools, hotels and open space, as well as a business district with research and office space. The project calls for the realignment of a significant portion of Northern Avenue, a major collector street, and the relocation of underground utilities to maximize development potential. Tetra Tech's work to date has included: field survey, feasibility study and conditions assessments of utilities and building systems, including existing and proposed conditions for water, wastewater and stormwater; Chapter 91 delineation and permitting support, including aspects of the ENF/PNF and DEIR/DPIR related to water, sewer, storm drain, gas, electric and telecommunications; conceptual design of utility relocation and roadway realignment; and rough order of magnitude cost estimates for utility improvements. Also provided engineering services for parking lot improvements at 145 Seaport Boulevard. This effort allowed for repaving of the gravel portion of the lot to provide an additional 317 parking spaces while maintaining daily operations at the existing paved portion of the lot.

South Shore Plaza Expansion, Simon Property Group, Braintree, MA, 2010. Managed the design/build contract for all transportation mitigation associated with the proposed expansion of the 1.4-million-square foot South Shore Plaza to accommodate a Nordstrom's department store. Helped negotiate traffic mitigation with the MassDOT Highway Division in advance of any filings with the town, thereby allowing the project to bypass the Massachusetts Environmental Policy Act review process. This saved the project substantial costs and avoided months of delay. Followed up this effort with an expedited local site plan review process to address local and neighborhood traffic concerns. The design/build arrangement for traffic mitigation allowed the owner's project manager to deal with construction of the new store on a full-time basis, without the distraction and worry of dealing with the town and state highway department regarding off-site mitigation.

Engineering Services for Harbor Garage Redevelopment, The Chiofaro Company, 2009. Principal-in-Charge of preliminary site/civil engineering services at Harbor Garage, 70 East India Row in Boston. This work related to a proposed mixed-use concept of approximately 1.5 million square feet of new construction supported by 1,200 square feet of below grade parking. Also assisted the design team with state and local permitting efforts and required submissions to the Boston Water and Sewer Commission and the City of Boston Public Improvement Commission.

Engineering and Design Services, Marriott Corporation, Newton, MA, 2009. Directed engineering and design services related to site exterior work at the Boston Marriott Hotel in Newton. Also helped to reconstruct the 50-year history of the site and its permits to get renovation approved post construction. (Marriott had expanded its facility without a special permit or Order of Conditions from the city and was subsequently issued a stop work order.) Within six weeks, negotiated stormwater control improvements package and secured the Conservation Commission Approval and received approval from the Land Use Committee of the Newton Board of Alderman.

Parking Lot and Infrastructure Improvements, EMC Corporation, Apex, NC, 2009. Principal-in-Charge of parking, grading, drainage and utility design and erosion control for the parking lot and infrastructure improvements at the EMC campus in Apex, NC. Involved coordination with the local planning board and other town departments during the permitting and environmental review process.

Campus Expansion Feasibility Study, EMC Corporation, Apex, NC, 2009. Principal-in-Charge of planning, civil engineering and permitting services for the feasibility study for a new office/warehouse facility on EMC's Apex, NC property. The study involved identifying several on-site locations for various development programs and identifying potential permitting restrictions, utility capacity issues and land development limitations. Deliverables included plans, estimated costs and recommendations regarding the most favorable locations.

International Cargo Center of New England, Boston, MA, 2008. Principal-in-Charge of Tetra Tech's services in support of Phase II of the International Cargo Center of New England project. Oversaw site planning and engineering services for the design and construction of parking areas and water, sewer, drainage and other infrastructure improvements. The project area includes more than 150,000 square feet of office and warehouse space in Boston's Marine Industrial Park. While working on the design for Phase II, Tetra Tech was asked by Cargo Ventures to help complete several items related to Phase I of the work that were originally contracted to another engineering firm. Assisted in completing the design and overseeing construction for these outstanding improvements, including: the pedestrian/fire access alley and entryway located in the rear of the building; remaining punch list items on the Phase I site; and the relocation of a portion of Harbor Street, a public roadway located between Phase I and Phase II of the project. Coordinated extensively with the Boston Redevelopment Authority's Economic Development and Industrial Corporation (EDIC), which oversees and approves all work within the Marine Industrial Park, and obtained approvals from the Boston Water and Sewer Commission to commence utility work. Also provided permitting, design and construction phase services for Cargo Ventures' work in Marine Industrial Park and provided similar support services for our client's facility on McClellan Highway in East Boston.

Luxury Residential Development, Northland Investment Corporation, Milford, MA, 2007. Principal-in-Charge of the 40B apartment development, which features 180 units in five, 3- to 4-story buildings, as well as a 5,000 square-foot clubhouse. Directed civil engineering services including conceptual and schematic design, design development, state and local permitting, construction documentation, environmental review, traffic analysis and construction administration services. The project required submittal of a comprehensive permit application to the Milford Zoning Board of Appeals and a Notice of Intent (NOI) under the Massachusetts Wetlands Protection Act and the town's Wetland Administration By-Law.

Engineering and Construction Services, Aggregate Industries, Saugus and Shrewsbury, MA, 2007. Oversaw drainage utility improvements at Aggregate's Saugus maintenance garages and Shrewsbury asphalt plant and gravel yard. Work involved extensive coordination with client's environmental, facility and sales staff to cooperatively develop plan to address storm water compliance issues at both facilities. Managed engineering design, permitting and construction-phase services including: design of low-cost, low-maintenance stormwater treatment system utilizing idle sections of on-site quarry to manage discharge, verification of existing utilities to determine their capacity to serve proposed drainage system changes and a new evaporator, design/build installation of a vehicle wash bay and a retractable industrial wash bay curtain, (16 feet high by 110 linear feet), to isolate steam cleaning activities from the rest of the maintenance garage; relocation of steam cleaning equipment, including 140 linear feet of high pressure water pipe with welded fittings; installation of a wastewater evaporator (SAMSCO Evaporator II,

600 Series), a 1,600-gallon above ground holding tank, air diaphragm pumps, effluent level sensors, interface controls and a vapor exhaust stack; and preparation of necessary utility permits, extensions and connections to service the evaporator unit and pumps, including compressed air, gas and electric. Also responsible for construction specifications, shop drawing review and on-site coordination meetings with the owner and contractors. Services have helped Aggregate Industries improve both its operations and environmental performance.

On-Call Engineering Services, The McCourt Company, South Boston, MA, 2006. Managed on-call engineering services for several projects including the redevelopment of the new Northern Avenue corridor in the Commonwealth Flats section of South Boston. Oversaw civil engineering design and review tasks for the reconstruction of parcels formerly owned by the client, as well as conceptual designs for an adjacent roadway. Also managed conceptual design, layout and review, permitting and construction services for parking lots owned and operated by the McCourt Company. Work included reconstruction of two parking lots and improvements to several others. Coordinated extensively with state transportation agencies and the City of Boston, including its Public Improvements Commission.

Warehouse Expansion and Site Improvements, Lincoln Property Companies, West Bridgewater, MA, 2005. Project Manager for the addition of 12 new loading docks, the expansion of a parking lot and the development of a new access road to an existing 315,000-square-foot warehouse. Managed the project schedule, obtained bids, scheduled subcontractors and ordered materials as part of the procurement process.

Design/Build Signal Installation, Geisler's Supermarket, Bloomfield, CT, 2004. Managed design-build signal installation to mitigate traffic for the proposed redevelopment of a 53,400-square-foot shopping center in Tunxis Plaza. The project required State Traffic Commission (STC) permitting, including an STC certificate. The design-build approach shortened the typical design and construction timetable, ensuring that the signal was in operation prior to the opening of the supermarket, as required by the STC certificate.

Drainage Swale Reconstruction, NStar, Westwood, MA, 2004. Managed a \$250,000 design/build project to repair two failed drainage swales that were not constructed in accordance with design specifications. The swales required reconstruction after undersized rip-rap and underlying material was washed down the slope during rain events. The repair included reconstruction of the drainage swales using gabions, rock-filled, heavy-gauge wire baskets used extensively in slope retention and stabilization. This method of repair allowed for the reuse of the undersized rock material and saved the cost of disposing of the existing material and importing additional rock material. Responsible for design of the improvements, subcontracting with licensed contractors and construction administration.

Parking Expansion, Sabre Management, Norwood, MA, 2004. Managed professional engineering services associated with the design, permitting and construction of 32 additional parking spaces at 670 Canton Street in Norwood. The design/build of the parking spaces included installation of a 15-foot-high modular block retaining wall and related paving and surface improvements. Responsible for all procurement activities, including but not limited to, obtaining bids, scheduling subcontractors, negotiating contracts and ordering materials. Also provided on-site supervision for the duration of the project, including construction layout and contractor oversight for adherence to the plans and specifications.

Phase 1 Parking Improvements, Depuy/Johnson & Johnson, Raynham, MA, 2003. Principal-in-Charge of the design/build installation of a 273-car parking lot to serve the expanding Johnson & Johnson facility. Responsible for design, permitting, layout and construction of the parking lot and associated utility improvements. Project completed in 2003.

Feasibility Study and Survey Services, Boston Red Sox, Fenway Park, Boston, MA, 2002. Managed the evaluation of public and private infrastructure required to serve a relocated Fenway Park in the Kenmore section of Boston. Work was performed as part of a comprehensive feasibility study to evaluate potential cost and impacts of the project. Investigated the drainage and sanitary sewer systems inside the ballpark, as well the public systems

that serve the area to determine location, size and available capacities of each. Estimated existing and future (short-term) drainage and wastewater needs of the park and identified existing and potential deficiencies, including the chronic drainage problems at the lower ballpark levels. Developed options to address deficiencies in the infrastructure system and identify improvements that may be required in the municipal systems required to satisfy projected park demands. Also managed survey services.

Compliance Review of Suffolk Downs Racetrack, Hall Properties, Boston and Revere, MA, 2001. Project Engineer for a utility and stormwater compliance evaluation of the racetrack. Work included a comprehensive site feasibility analysis for the approximately 190-acre parcel with review of environmental permitting and licensing issues including MEPA, Chapter 91, state/federal wetlands regulations and NPDES, as well as investigation of releases of oil/hazardous materials, zoning constraints analysis, water and sewer service and survey. Project completed in 2001.

Avalon Bay Communities, Weymouth Residential Development, Weymouth, MA, 1998. Senior Project Engineer for the permitting and development of a 350-unit multi-family residential project. Developed alternatives to meet stringent permit requirements imposed through DEP consent orders regulating new connections to the municipal water and sewer systems. The development utilized the comprehensive permit process and involved extensive negotiations with local and state agencies.

Site Improvements, Poland Spring Corporation, Framingham, MA, 1998. Project Manager for the reconstruction of existing parking facilities and traffic patterns at Poland Spring's regional distribution facility.

Utility and Stormwater Impact Evaluation, Quarry Hills Associates, Quincy and Milton, MA, 1997. Project Engineer for utility and stormwater impacts evaluation portion of a Draft Environmental Impact Report for the proposed redevelopment of a 355-acre parcel consisting of the closed Quincy landfill, the active Milton landfill and adjacent lands.

Engineering Design, Roadway Reconstruction Projects, Corporate Property Investors, Braintree, MA, 1997. Civil Engineer responsible for the engineering design and contract documents for the design of several roadway reconstruction projects. These projects consisted of approximately three miles of roadway improvements, including widening and installing traffic islands and signals and sidewalks for heavily traveled area, to accommodate anticipated traffic generated by expansion of the South Shore Plaza.

Feasibility Study, General Motors Corporation, Framingham, MA, 1996. Project Engineer for the feasibility study of a vacant parcel for the proposed development of a General Motors automobile sales and service facility.

Traffic Analysis, Killingly Oaks Business Park, Killingly, CT, 1996. Responsible for traffic data collection and impact study for the redevelopment and expansion of the Killingly Oaks Business Park.

Land Development – Institutions

Three-Rink Skating and Training Facility, The Skating Club of Boston, Norwood, MA, 2018 to Present. Principal in Charge for site design and permitting services as part of a multidiscipline and multi-firm project team responsible for the development of a new three-rink skating and training facility at a site located within the Fowl Meadow and Ponkapoag Bog Area of Critical Environmental Concern and containing extensive wetland resource areas. Work includes conducting detailed due diligence reviews to determine the presence or absence of environmental resources, review local zoning bylaws, and identify local, state and federal permitting requirements; delineation of wetland resource areas; coordination of ALTA/NSPS Land Title and Topographic surveys; preparation of an Environmental Notification Form for submission to the Massachusetts Environmental Policy Act Office; preparation of a Notice of Intent application and supporting materials for submission to the Norwood Conservation Commission and Massachusetts Department of Environmental Protection; preparation of Major Site Plan Review and Major Project Special Permit application and supporting materials for submission to the Norwood

Planning Board; participation at public presentation as part of various permit approval processes; development of civil design plans from conceptual thru construction documents; development of civil technical specifications; preparation of a Stormwater Pollution Prevention Plan for compliance with the United States Environmental Protection Agency National Pollutant Discharge Elimination System Construction General Permit; and construction administration services.

Multidisciplinary Services for Campus Expansion and Site Improvements, Boston College, Chestnut Hill, MA, 1999-2013. Managed a range of engineering, environmental, transportation and construction-phase services for Boston College. Projects of note include two of the college's most recent renovations: the St. Ignatius Gate Residence Hall and the Yawkey Athletic Center Stadium Expansion.

St. Ignatius Gate. Oversaw all utility infrastructure and site improvements for the construction of St. Ignatius Gate, a signature dormitory that houses 600 students. Clearing the footprint for the facility required the relocation of an existing 1,200-gpm pump station that serves the entire lower campus. Due to site constraints, replacement of the head house was not a viable option. Worked closely with Boston College's planning, management and capital programs staff to design a creative solution that would satisfy the college's aesthetic concerns regarding odor and appearance and helped maintenance workers transition comfortably to the new pump arrangement. Also coordinated the project with MA DEP.

Alumni Stadium. Oversaw civil engineering design, permitting, hazardous materials management and construction-phase services for the expansion of Alumni Stadium. The design included a new 400-gpm duplex wastewater pump station. Due to site constraints and complex construction phasing, the pump station had to be located completely below grade. The project also included roadway and parking improvements, such as the relocation of Campanella Way and related utilities. Construction oversight was provided under very aggressive schedules that limited construction to the summer months.

St. Clements Hall. Managed civil design and construction services for renovations to St. Clements Hall. The site improvements included utility design for new water, electric and gas connections from the roadway to the building. Surface treatment repairs were also necessary due to the utility installations, as was replacement of existing drainage infrastructure. Services also included construction administration.

Campus-wide Stormwater Pollution Prevention Plan. Principal in Charge overseeing engineering support services for several construction projects throughout the Chestnut Hill Campus including the development of Stormwater Pollution Prevention Plans (SWPPP) for several projects in addition to a campus wide SWPPP in compliance with the Environmental Protection Agency National Pollutant Discharge Elimination System General Permit for Stormwater Discharges Associated with Construction Activities. A generic plan was prepared that could be applied to several projects establishing the approach to controlling water pollution during construction activities and included structural and non-structural Best Management Practices (BMPs) to be employed by the contractor to control storm water pollution.

Tsongas Arena Facility Inspection and Physical Conditions Report, University of Massachusetts Building Authority, Lowell, MA, 2009. As a subconsultant to Simpson Gumpertz & Heger, directed the site/civil aspects of the facility inspection and physical conditions report for the 176,000-square-foot, 6,500-seat, multi-purpose Tsongas Arena, located on an 8.16-acre site along the Merrimack River at the northern edge of Lowell's renovated central business district, as well as an adjacent parcel housing a city maintenance garage. The final Physical Conditions Report summarized the findings of the condition assessment, including recommendations regarding necessary upgrades and improvements and requirements for continued operation and maintenance, and order of magnitude costs. The civil/site aspects included parking facilities, sidewalks, pavements, curbing, utilities, stormwater drainage and landscaping.

Parking and Utility Improvements, Mount Ida College, Newton, MA, 2008. Managed a drainage analysis, grading and drainage and utility design associated with the new dormitory. Also prepared construction documents

for a new parking facility and associated appurtenances. Local permitting required coordination with the Newton Planning Board and Tree Warden.

Wastewater Infrastructure and Treatment Plant, The Rivers School, Weston, MA, 2003. Principal-in-Charge for the design/build installation of a 15,000-gallon-per-day wastewater treatment facility and wastewater infrastructure system for The Rivers School campus. Responsible for project management, contract negotiation, design, permitting and construction of the wastewater infrastructure improvements substantially within the jurisdiction of the Weston Conservation Commission and subject to a MA DEP Consent Order.

Catholic Memorial High School, Athletic Facility Improvements, West Roxbury, MA, 2003. Managed engineering services for the rehabilitation and expansion of the school's existing athletic facility. Work included design and construction oversight for a new surface combination football/soccer/lacrosse field with artificial turf, a new 400-meter, post-tensioned concrete running track with a rubber all-weather running surface, two new tennis courts and associated site improvements. Following the exceptional reviews of its new artificial turf field, Catholic Memorial decided to replace its natural sod baseball field with an in-fill type artificial surface and install a field lighting system for both fields. Subsequently completed the design, bidding and award of the baseball field, lighting and associated site and seating improvements. The baseball field was the first of its kind in the area.

Boston Common Garage Expansion Feasibility Study, Massachusetts Convention Center Authority, Boston, MA, 2014. Oversaw an expansion feasibility study for the Boston Common Garage. The work involved assessing the complex financial, technical and social issues related to the possible proposed expansion within an iconic area of downtown Boston. Services include conceptual layout and building design, market and financial analysis, permitting summary and related reporting.

Boston Convention and Exhibition Center, D Street Parcel Landscape Improvements, Massachusetts Convention Center Authority, Boston, MA, 2014. Principal-in-Charge for the permitting, design and construction-phase services for the D Street parcel adjacent to the Boston Convention Center & Exhibition Center. The parcel required interim landscape improvements to accommodate hotel and potential retail development along D Street. The project consisted of improvements to Claflin Street, new pedestrian walkways, a tent for vendors and events, and associated drainage and utility improvements.

Boston Convention and Exhibition Center, Massachusetts Convention Center Authority, Boston, MA, 2004. Managed the planning, permitting and design of utility and roadway infrastructure improvements for the 600,000-square-foot Boston Convention and Exhibition Center. Work included design of on-site roadway and utility improvements, off-site transportation and utility mitigation, and preparation of local and state permitting documents, from feasibility review through construction administration. It also involved design of the convention center's on-site water, stormwater and wastewater utility systems. Since the existing drainage system had limited capacity to handle the building's roof runoff and local drainage, it was necessary to design a new stormwater system. Worked with the designer to develop an innovative, metered roof drain system that allows the roof drains to perform under pressure, minimizing the size of the downspouts, roof leaders and storm pipe. The system stores and discharges stormwater runoff from the 40-acre roof after the peak of the storm subsides.

On-Call Services Contract, Massachusetts Convention Center Authority, South Boston, MA, 2010. Project Director for on-call civil engineering services in support of miscellaneous projects. Recent projects include a feasibility analysis for a bus turnout lane at the main entrance to the Boston Convention and Exhibition Center (BCEC); an airlock study required for the Hynes Convention Center; and a drainage improvement design associated with a joint replacement project along the elevated roadway system at the BCEC. Project tasks typically include development of construction drawings, specifications, estimates and construction oversight.

Annual Facility Inspections and Physical Conditions Reports, Massachusetts Convention Center Authority, Four State-Owned Facilities. As a subconsultant to Simpson Gumpertz & Heger, managed the site/civil aspects of annual facility inspections at four facilities: the Boston Convention and Exhibition Center, the Hynes Convention

Center, the Boston Common Garage and the MassMutual Center. The three-year contract included life cycle assessments of all site/civil conditions including parking areas, sidewalks, utilities, stormwater drainage and landscaping. Also oversaw design services with respect to the repairs or replacements identified during the inspections and contributed to a 20-Year Capital Reserve Replacement Study for each facility.

Public Sector

Peer Review Services, Town of Norfolk, MA, 2017 to Present. Principal in Charge for Comprehensive Permit (40B) Peer Reviews for Abbyville Commons and Preserve at Abbyville, and The Enclave at Norfolk and Lakeland Hills developments. Tasks include Civil/Site/Utility Plan, Document Review, Water Supply Review, Wastewater Review, Wetlands Review, Traffic Review and overseeing the Definitive Open space Subdivision review of Norway Farms.

Chapel Hill Landing, Town of Medfield, MA, 2016 to Present. Principal-in-Charge for Chapel Hill Landing 40B Development in Medfield, Massachusetts. Tetra Tech provided professional engineering services for the Town of Medfield's Chapel Hill Landing. Work included providing final review of the proposed Project and providing review comments related to impacts to the well-being and safety of the surrounding areas and the design as it relates to good engineering practice. Tetra Tech was recently awarded a contract to provide on-call peer reviews to the Medfield Planning Board.

Royal Saudi Land Forces Aviation Command Phase 2A Base Expansion, Kingdom of Saudi Arabia, United States Army Corps of Engineers Middle East District, 2016 to 2018. Principal in Charge for the development of a design/build package for the Phase 2A infrastructure improvements at the 2nd Aviation Group base located in Khamis Mushait. Phase 2A infrastructure improvements will establish, renovate and augment the base to support the fielding and operations of various rotary wing aircrafts. Site and supporting utility infrastructure, including upgrades to and expansion of the currently non-operational helicopter and support facilities, are designed to accommodate the full future build out of the base.

On-Call Engineering Services, Town of West Springfield, MA, 2016. Principal-in-Charge of a 3-year, on-call engineering services contract with the Town of West Springfield. Tetra Tech has an ongoing "Complete Streets" assignment, which consists of preparing conceptual traffic plans for Park Street, Park Avenue and Elm Street.

Statewide Stormwater Discharge Compliance, MassDOT Highway Division, MA, 2010 to Present. Principal-in-Charge for two, multi-year Stormwater Discharge Compliance contracts providing water quality assessment and design services to MassDOT. Services include designing improvements and water quality assessments to comply with stringent water quality standards as required in judicial ruling on Civil Action. To date, Tetra Tech has evaluated over 179,000 acres of impaired waters watersheds with MassDOT roadway discharges and developed designs for more than 400 acres of MassDOT roadways.

On-Call Design and Review Services, Town of Medway, MA. Principal-in-Charge of two consecutive, on-call engineering design and review services for the Town of Medway. Work includes plan and analysis review for multiple boards, committees and departments with regard to site plans, stormwater analysis, utility design and town regulation review. Oversees construction progress and reports to the town regarding the status and quality of particular development projects. Design projects have included parking, access and utility improvements associated with the reconstruction of the McGovern School site, as well as a major slope stabilization project along the Charles River.

Subdivision Plan Review and Construction Inspection, Towns of Ashburnham, Westminster and Hubbardston, MA. Principal-in-Charge of reviewing Definitive Subdivision Plan Submissions to the town planning boards to ensure conformance with subdivision and zoning regulations and sound engineering practice. Responsible for reviewing subdivision plan submissions and all supporting documentation including, but not limited to, drainage analyses, traffic analyses and community impact statements. Also manages Tetra Tech's construction inspection services for the three towns including inspection of newly installed utilities (water, sewer, gas, drain,

electric, telephone and cable) to service the subdivisions. This work includes inspection of all earthwork, grading, paving and curb installation within the subdivision road right of ways.

Bureau of Prisons, Federal Correctional Institution, US Department of Justice, Berlin, NH, 2010. As part of the Bell-Heery Joint Venture, Project Manager for all environmental permitting and civil engineering services required for the design/build of the new 480,000-square-foot Federal Correctional Institution in Berlin, NH. The project, located on a 700-acre site, features a medium security correctional facility, a minimum-security camp, a utility/warehouse building complex and a 16-station firing range and training center. Oversaw civil engineering and environmental permitting services throughout the entire life cycle of this \$250M project, including design and construction phase services for facilities, associated infrastructure and off-site transportation improvements.

Kendall Square Ice Skating Rink, City of Cambridge, MA, 2009. Managed the feasibility study and design improvements for the renovation of the Kendall Square public ice skating rink. These renovations included the installation of a new concrete slab, prefabricated cast in the slab piping, insulation and a new grading and drainage design. The improvements will result in the upgrade of the existing facility into an 8,500-square-foot permanent concrete ice skating rink floor for winter skating and patio for summer activities.

Traffic Management Center System Integration, Delcan Corporation/NHDOT, Concord, NH, 2008. Construction Manager for the Traffic Management Center System Integration project at New Hampshire's new emergency management facility. The design/build project included completion of the electrical work, interior finishes and mechanical system improvements, as well as procurement and installation of rack-mounted computer hardware and the center's DLP technology video wall. The system integrates and centralizes data regarding the state's traffic management infrastructure, including traffic signals, signs, roadway information and dispatch services.

On-call Peer Review Services, Town of Manchester-by-the-Sea, MA, 2007. Directed on-call services for the conservation commission and planning board for several technical project submittals including an earth removal permit application and a middle school design. Work involved site plan, stormwater analysis, utility design, earth removal and Notice of Intent review. Reviews culminated in the production of a review letter and presentation at local authority hearings.

Russell Field Improvement Program, City of Cambridge, MA, 2006. Managed multidisciplinary services for the complete redesign of an eight-acre recreational facility, as part of the Brown, Richardson & Rowe team. Solicited input from the project stakeholders, including several departments within the city and community groups, and incorporated their comments into the design. Responsibilities included oversight of drainage, utility and civil engineering services for the design of improvements to an artificial turf football and soccer field, two practice soccer fields, two baseball fields and a playground. Also oversaw construction management services for a new field house, a new press box and improved parking areas and pedestrian walkways. This \$8.2-million project received a Certificate of Merit from the American Council of Engineering Companies of Massachusetts in 2006.

North Point Mixed-Use Development, City of Cambridge, MA, 2005. Managed the design of utility and roadway infrastructure improvements for the 45-acre North Point Redevelopment project, which included 200,000 square-feet of office development, a 450-unit residential development and a new 10-acre public park along the Charles River. Also oversaw for the construction administration associated with this project, coordinating with both Central Artery/Tunnel and City of Cambridge representatives. Work included planning of an advance roadway package to provide access to buildings already completed in the first phase of the project. Additional roadways connecting the area to the new park and to the vicinity were designed with designated bike lanes promoting the City of Cambridge's commitment to bicycle access.

School Department, Reconstruction of High School Track and Field Facilities, Town of Mansfield, MA, 2003. Project Manager for survey, design, permitting and construction procurement for the reconstruction of Mansfield High School's track and sports field. The project included the replacement of an existing track and field with a lighted 400-meter rubberized running track and the development of a combined football, soccer and lacrosse field with an

in-fill type, artificial surface. The project also included the relocation of streams and associated wetlands and the installation of athletic lighting systems. Succeeded in meeting an aggressive project schedule and managing a limited project budget by using resources available through the town's department of public works and its existing contracts.

High School Athletic Field Improvements, Town of West Bridgewater School Department, MA, 2003. Managed the Master Plan development while working with the town to fund, design and construct a new artificial playing surface and all-weather running track. The success of the project required resolution of layout conflicts between track and field uses under a limited budget and within an aggressive schedule.

Melrose High School Athletic Field Improvements, City of Melrose, MA, 2002. Consulted with the City of Melrose and the Melrose High School Athletic Department to fund, design and construct a new artificial playing surface and all-weather running track. Reconstruction included a new 400-meter running track, a new football field and practice area and other site improvements. Successfully resolved layout conflicts between track and field uses.

Gate 6/Charlestown Navy Yard, Boston Redevelopment Authority, Charlestown, MA, 1999. Provided construction oversight for the construction of the Gate 6 entrance to the historic Charlestown Navy Yard. Gate 6 provides access/egress to a nearby garage and the Yard's End area of the Navy Yard, a key link to Boston's waterfront Harbor Walk System. The two-phase project involved partial demolition of an historic building (Building 114) to make room for the new roadway, and reconstruction of the existing building face to historical standards. Other major work involved steel erection; retaining wall construction; pile, signal, and lighting installation; utility installations/relocations; landscaping; and various site improvements.

Webb Street/Fort Avenue Roadway Reconstruction, South Essex Sewerage District, Salem, MA, 1998. Resident Engineer during the completion of two separate roadway reconstruction projects for the South Essex Sewerage District. Responsibilities included maintaining open communications with the district and surrounding businesses and residents during construction phases as well as oversight of construction activities. The Webb Street/Fort Avenue Project Corridor, approximately two miles in length, included roadway resurfacing/reconstruction and installation of traffic islands and signals and sidewalks through a heavily populated and historic area of Salem.

Route 9 Drainage Improvements Project, MassDOT Highway Division, Wellesley, MA, 1998. Project Engineer for the design of drainage improvements to the Morses Pond drainage basin to reduce existing flooding problems on a section of Route 9 in Wellesley. This project included hydrologic analysis, concept development, alternatives analysis, permitting, and design. The results of the analysis were used to prepare recommendations for alleviating the problem and produce 25-percent design plans.

Sagamore Rotary Grade Separation Study, MassDOT Highway Division, Bourne, MA, 1997. Project Engineer for the development of traffic alternatives to the intersection of Route 3 and Route 6 (Sagamore Rotary) near the Sagamore Bridge in Bourne.

Hobbs Brook/Stony Brook Watershed Drainage Improvements Study, MassDOT Highway Division, Cambridge, MA, 1997. Project Engineer for the preparation of the Draft and Final Environmental Impact Reports for the Hobbs Brook/Stony Brook Watershed Drainage Improvements Study. Also responsible for development and design of stormwater controls and an Emergency Response Atlas for preventing adverse impacts of roadway runoff on the water quality of the Cambridge Reservoir system.

Central Artery/Tunnel Project, MassDOT Highway Division, Boston, MA, 1996. Civil Engineer for design of stormwater pumping stations, force mains, discharge manholes, utilities layout and site development.

Backflow Prevention Survey, US Postal Service, New England and New York, 1996. Civil Engineer for Backflow Prevention Survey for the US Postal Service. Involvement included compilation and analysis of drinking water regulations, public health regulations, and plumbing codes for cross-connection control requirements for the state of New York and each of the New England states. Conducted site visits at postal facilities throughout New England to identify compliance with applicable federal, state, and local regulations.

Washington DOT. Prior to joining Tetra Tech, served as a Design Engineer with the Washington Department of Transportation. His responsibilities included preliminary and final design, final quantity and cost estimates and development of contract documents for environmentally sensitive highway reconstruction and improvements.

Litigation Support

Maple Woods (2015). Wenham, Massachusetts – Currently serving as technical expert in support of abutter review of proposed residential development proposed under Comprehensive Permit. Work includes review of site, drainage and septic system design in support of attorney negotiations with the town and the developer.

Ross Lane Subdivision (2015). Middleton, Massachusetts – Currently service as technical expert in litigation related to downstream drainage impacts resulting from development of residential subdivision. Work includes review of drainage design and providing assistance to attorney in negotiations.

15 Medway Street, LLC v. Oaktree SLR, LLC (2009). Boston, Massachusetts – Provided support to defendant's attorney during discovery and hearing on summary judgment including deposition and expert testimony at hearing. Work included review of plaintiff's arguments and preparation of response. Case involved disputed easement rights. Defendant's motion for summary judgment was granted.

Opa-Opa LLC v. Southampton Environmental Services, Inc. (2007). Southampton, Massachusetts – Provided support during discovery for defendant's attorney in case involving failed septic system. Work involved reviewing design documents and construction activities and assisting in development of negotiating strategy and testimony. Case settled prior to deposition.

Webster Engineering Co. Inc. v. Skanska USA Building Inc. (2008). Boston Massachusetts – Provided support during discovery for plaintiff's attorney in case involving underground stormwater detention system which failed during construction following heavy rain event. Work involved reviewing design documents and construction activities and assisting in development of negotiating strategy and preparation for testimony and included deposition and representation at mediations. Worked extensively with defendant's expert witnesses during mediation process to develop testing protocol and build consensus as to cause of failure. Case settled prior to trial.

Town of Middleboro v. A.J. Welch Corp. (2007). Middleboro, Massachusetts – Provided support during discovery for defendant's attorney in case involving the Massachusetts Department of Environmental Protection (MaDEP) denial of a Landfill Operation Permit and plaintiff's claim that denial was due to defendant's improper execution of the work and in particular the defendant's improper stabilization of side slopes which failed during rain event. Work involved reviewing design documents and construction activities and assisting in development of negotiating strategy, preparation for testimony and deposition and representation at mediation. Case settled prior to trial.

Boston College v. McCourt Construction and Rizzo Associates Inc. (2009). Newton, Massachusetts – Served as defendant's representative (Rizzo Assoc. Inc.) in case involving damage sustained to athletic facility following significant rain event. Included preparation for testimony, deposition and representation at mediation. Case settled prior to trial.

Ellingwood Construction v. Genzyme and Rizzo Associates Inc. (2008). Framingham, Massachusetts – Served as defendant's representative (Rizzo Assoc. Inc.) in case involving contractor claim for additional work. Included preparation for testimony, deposition and representation at mediation. Case settled prior to trial.

Commonwealth of Massachusetts v. Warren Mobile Home Park (2005). Provided expert witness testimony on behalf of defense in case brought by the Massachusetts Attorney General's Office against the owner of a mobile home park in Warren, Massachusetts following repeated failures on an on-site septic system. Included review of regulatory compliance, development of alternatives to connect to public sewer, deposition and expert witness testimony at trial.

St Paul Fire and Marine Insurance Company vs. Trigen Energy Corporation et al. (2003). Provided support to plaintiff's attorney during discovery. Work included review of defendant's response to document request, investigation and documentation of as built conditions; and preparation of summary of findings. Case involved damage to telecommunications duct banks resulting from reported steam leak.

SCIENTIFIC/TECHNICAL PUBLICATIONS

Billa, Michael E., R. J. Hughto, and S. P. Reardon, Environmental Science and Engineering for Lawyers, Second Edition, (Co-Author, Chapter 24: Environmental Engineering for Lawyers), Massachusetts Continuing Legal Education, May 7, 2008.

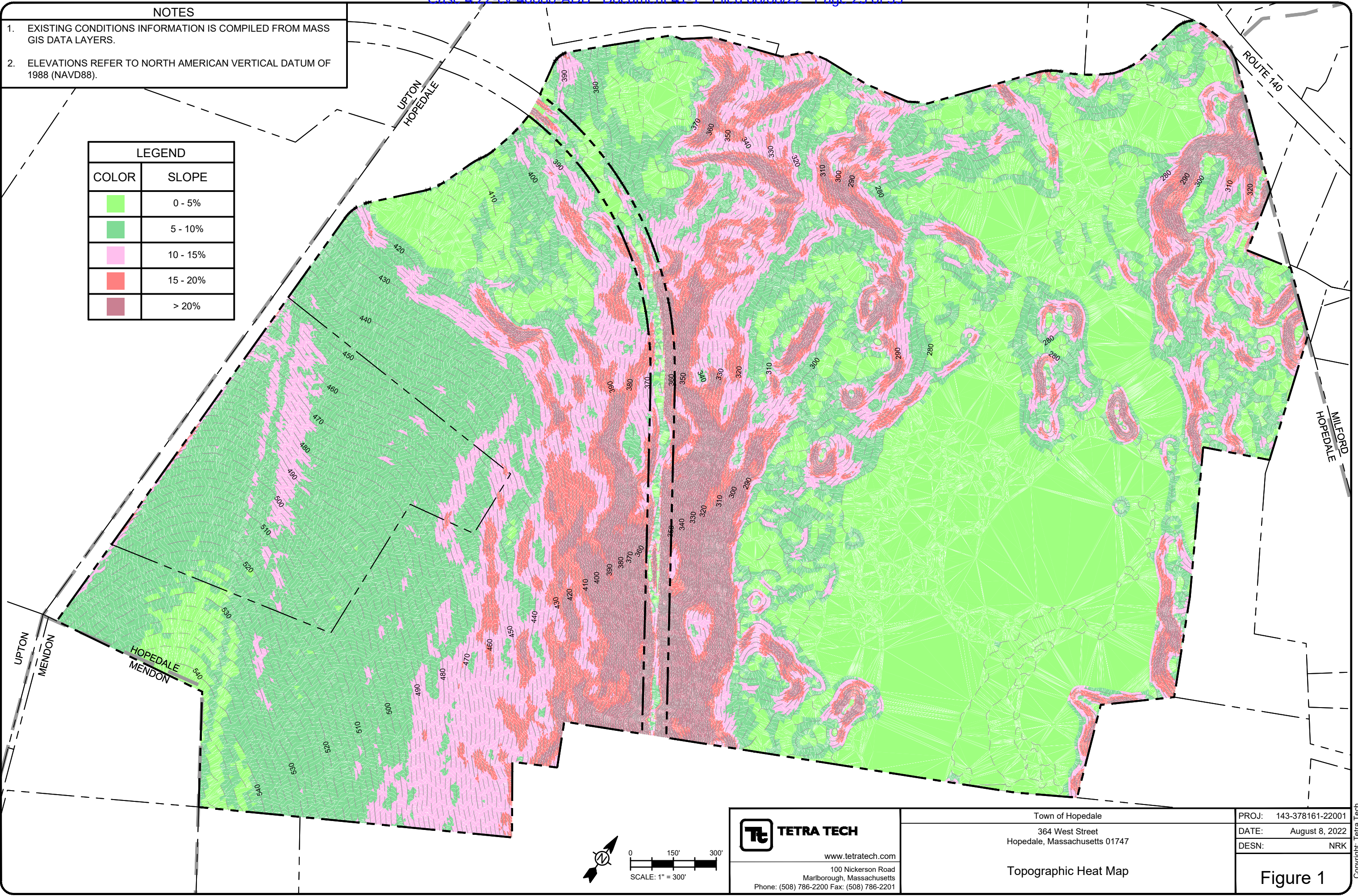
EXHIBIT 2

EXHIBIT 3


NOTES

1. EXISTING CONDITIONS INFORMATION IS COMPILED FROM MASS GIS DATA LAYERS.
2. ELEVATIONS REFER TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

LEGEND	
COLOR	SLOPE
	0 - 5%
	5 - 10%
	10 - 15%
	15 - 20%
	> 20%



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 TETRA TECH www.tetrattech.com 100 Nickerson Road Marlborough, Massachusetts Phone: (508) 786-2200 Fax: (508) 786-2201	Town of Hopedale 364 West Street Hopedale, Massachusetts 01747 Topographic Heat Map	PROJ: 143-378161-22001 DATE: August 8, 2022 DESN: NRK
	Figure 1 Bar Measures 1 inch	

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EXHIBIT 4



**NORFOLK SOUTHERN RAILWAY COMPANY
SPECIFICATIONS FOR DESIGN
AND CONSTRUCTION OF
PRIVATELY OWNED
INDUSTRY TRACKS**

JULY 2020

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VI. INDUSTRY TRACK DESIGN

6.01 GENERAL

The following sections describe the criteria to be used in the design of industry track(s) served, or to be served, by the Company. Any exception to these requirements must be approved by the Company's Chief Engineer or designated representative.

6.02 HORIZONTAL CURVATURE

DEGREE OF CURVE

All horizontal curve calculations shall be based on the chord definition.

The chord definition for horizontal curves is as follows:

$$R \text{ (chord definition)} = \frac{50}{\sin (D/2)}$$

where: R = Radius (feet)
D = Degree of Curve

Tracks should be designed utilizing the minimum degree of curvature practicable, but must be limited to a maximum of 12 Degrees (R = 478.34 feet) on spur tracks and 10 Degrees (R = 573.69 feet) on lead and loop tracks.

Tracks for rail cars with coupler to coupler length exceeding 73 feet should be designed based on maximum degree of curvature of 10 Degrees (R = 573.69 feet).

Horizontal curves should be at least 100 feet in length if at all possible, but not less than 50 feet.

REVERSE CURVES

Tangent distance between the points of tangency of reverse curves should be at least 100 feet if at all possible, but not less than 70 feet.

Distance between facing point switches leading from opposite sides of a through track (creating a reverse effect) should be at least 100 feet if at all possible, but not less than 70 feet.

RETURN CURVES

Return curves, C₂ (in Degrees), shall correspond to *NSRC Plan 2-17* for the proposed turnout(s) to be used for all parallel sidetracks and industry tracks at minimum track centers.

SPIRALS AND SUPER-ELEVATION

Spiral curves and/or super-elevation are required where the speed of operation dictates. Design for lead tracks of one mile or longer will be evaluated by the Company on an individual basis to determine if spirals and super-elevation are required.

CURVE PLACEMENT

Horizontal curves shall not begin on the long ties of a turnout. Horizontal curves should not be located within a double switch point derail (DSPD).

6.03 VERTICAL CURVATURE**CURVE PLACEMENT**

Vertical curves shall be provided at break points in the profile of the track and should be as long as practicable. A minimum vertical curve length of 100 feet is preferred.

Vertical curves shall not begin or end on the long ties of a turnout. The track profile through the proposed turnout shall match the track profile of the existing track from which it diverges.

Tangency between crest and sag curves should be 50-100' preferred.

VERTICAL CURVE RATE OF CHANGE

Vertical curve rate of change (r) shall be calculated as follows:

$$r = \frac{(G_2 - G_1)}{L}$$

where: r = Rate of Change
L = Length of Curve in 100' Stations
G₁ = Entrance Grade
G₂ = Exit Grade

MINIMUM CURVE LENGTH FOR LEAD TRACKS

The calculated minimum vertical curve length for lead tracks, in feet, is 100 times the algebraic difference of grades in percent for summits and sags, i.e., maximum rate of change for summits and sags = 1.0.

MINIMUM CURVE LENGTH FOR SPUR TRACKS UP TO 1500 FT IN LENGTH

The calculated minimum vertical curve length for spur tracks up to 1500 feet in length is 33.3 times the algebraic difference of grades in percent for summits and 40 times the algebraic difference for sags, i.e., maximum rate of change for summits = 3.0 and maximum rate of change for sags = 2.5.

NSRC Specifications for Design and Construction of Privately Owned Industry Tracks
Chapter VI. Industry Track Design
July, 2020

MINIMUM CURVE LENGTH FOR SPUR TRACKS OVER 1500 FT IN LENGTH

The calculated minimum vertical curve length, in feet, for spur tracks over 1500 feet in length shall be 40 times the algebraic difference of grades in percent for summits and 50 times the difference for sags, i.e., maximum rate of change for summits = 2.5 and maximum rate of change for sags = 2.0.

6.04 GRADES

Track grades should be kept to a minimum and shall be restricted to a maximum of 2 percent (compensated) on lead tracks, and 3 percent (compensated) on individual spur tracks. Loop track grades shall be 0% preferred, 0.2 percent maximum, with the pit/loading area on a 0% grade. Any grade should be ascending to the pit/loading area.

Grade compensation for curvature shall be a 0.04 percent reduction per degree of curvature. For example, the maximum grade on a lead track with a 10° horizontal curve is: $2.0\% - (0.04 \times 10) = 1.6\%$.

6.05 LOADING, UNLOADING AND STORAGE TRACKS

Industry track where rail cars are loaded and unloaded shall be on a 0% (flat) grade. Storage tracks shall be on a 0% grade, unless approved by the Company.

Tracks are to be designed to avoid coupling cars in curves during switching operations.

Industry tracks should have 30 feet or 1/2 the proposed car length, whichever is greater, between the end of any vertical curve and the beginning of the nearest car spot for loading / unloading.

Industry tracks shall have 30 feet or 1/2 the proposed car length, whichever is greater, between the end of the last car spot for loading / unloading and the end of track device (see section 6.09).

Tracks with turnouts and ladders at both ends shall be designed to include a clearance buffer equal to 30 feet or 1/2 the proposed car length, whichever is greater.

Loop tracks shall include a minimum safety buffer of at least 100 feet.

6.06 TRACK CENTERS AND CLEAR POINTS

TRACK CENTERS

(TRACK LOCATED ON INDUSTRY PROPERTY)

Track centers for parallel Industry tracks located on Industry property shall be no closer than 14 feet, centerline of track to centerline of track, and shall be adjusted (increased) for curvature in accordance with *NSRC Plan 7-1*.

(TRACK LOCATED ON COMPANY RIGHT-OF-WAY)

Track centers for Industry track located on Company right-of-way and parallel to main line or siding shall be no closer than 15 feet, centerline of track to centerline of track, to main line or siding and shall be adjusted (increased) 1" per degree of curve on curved tracks. In multiple curved track territory, when the track on the inside of the curve has less super-elevation than the track on the outside of the curve, track centers shall be increased by 4-1/2 inches for each inch difference in super-elevation between the involved tracks. Track centers between multiple industry tracks shall be no closer than 14 feet and shall be similarly adjusted for curvature.

Where public law or regulation requires clearances greater than Company standard, such laws or regulations will govern.

(YARD LADDERS)

Tracks parallel to yard ladders shall be no closer than 22 feet, centerline of track to centerline of track.

CLEAR POINTS

The following apply to clear points and car storage limits:

- Clear points shall be shown on the plans and indicated in the field by the presence of a derail, clearance post or crosstie painted green.
- Rail cars shall not be spotted within 300 feet of the edge of public or private at-grade crossing on any tracks on Company right of way where practical.
- At locations where Industry track crosses privately owned Industry at-grade road crossings, cars shall be spotted as far as practicable from the grade crossing to provide adequate site distance.

6.07 TURNOUTS

All main line turnout shall be No. 10 or larger. Turnouts in Industry tracks shall also be No. 10 unless space will not permit, in which case a No. 8 turnout will be considered.

Turnout geometry, layout and materials are shown on the attached *NSRC Plans 2-4, 2-6, 2-8 and 2-17*.

Mainline turnouts shall not be placed within horizontal or vertical curves. Industry turnouts should not be placed within horizontal curves and shall not be placed within vertical curves.

For two turnouts in the same track diverging in opposite directions, thereby creating a reverse curve situation, it shall be necessary to provide preferably 100 feet but at a minimum of 70 feet between the points of switches of the two turnouts.

Facing point switches located in the same track and diverging to the same side of said track shall be separated by a minimum distance of 14 feet.

For a main line turnout diverging in the same direction as a preceding curve, the turnout should be placed 50 feet preferred, 25 feet minimum from the end of the curve.

For an industry turnout diverging in the same direction as a preceding curve, the turnout should be placed at least 10 feet from the end of curve.

For a main line turnout diverging in the opposite direction from the preceding curve, the turnout cannot be placed before 100 feet beyond the end of the curve.

All work on Company tracks, including main line turnouts, shall be accomplished by the Company.

Turnouts in the main line should not be placed within 100 feet of an at-grade road crossing.

Turnouts in Industry tracks shall not be placed within 10 feet of an at-grade road crossing.

Turnouts in the main line shall not be placed within 50 feet of a railroad signal.

Turnouts in the main line should not be placed on a railroad bridge or within 100 feet of a railroad track bridge face of back-wall.

Turnouts in the main line shall not be placed underneath an overpass.

6.08 DERAILS

Derails are installed on Industry track(s) at the clear point to derail away from the main line anything moving on the Industry track that does not have authority to use Company tracks.

Derails can also be used where safety is a concern. For example, derails can be placed before tracks cross public or private streets at grade or at the top of steep grades to prevent "run-away" situations.

All derails to be operated by Company personnel shall be equipped with a Company supplied lock and key. These locks shall be operated by Company personnel **Only**.

A double switch point (DSP) derail shall be installed by the Company, with the non-switch end of the derail at the clear point of the Industry track, on Industry track with descending grade towards the Company track. The entire DSP derail (43' long) shall be located in vertical tangent track outside of any vertical curves. The long timber (end) of the derail shall be placed at the clear point, NOT the point of switch (beginning). See attachment for derail details.

Hayes Model HB Derails will be installed, by the Company, at the clear point of tracks which have no grade or a descending grade away from the Company track.

A DSP derail will be installed at the clear point on *any* track that handles hazardous materials (*NSRC MW&S Standard Procedure 100*).

Derails are to be painted international orange. Glass beads should be sprinkled on after painting while paint is still wet to increase night time visibility (*NSRC MW&S Standard Procedure 100*).

Additional derails may be required due to site specific safety concerns and / or operational considerations.

6.09 END OF TRACK DEVICES

End of Track (EOT) Devices shall be placed at the open end of all stub-ended tracks.

Earth mounds are the preferred EOT Device. Earth mounds should be of an approved design sufficient to stop a moving car and should be protected against erosion.

Where earth mounds are impractical, bumping posts shall be used on all stub end tracks which end at a structure, dock, or road. Bumping posts shall be either new or second-hand, of good quality and approved design.

Use of wheel stops should be avoided and are only allowed with the expressed written consent of the Company.

6.10 SIDE AND OVERHEAD CLEARANCES

Standard vertical and horizontal clearances based on the centerline of Industry track at top of rail are shown on *NSRC Plan 7-1*, attached to these guidelines. ***Where law or regulation requires clearance(s) greater than Company standard, such laws and regulations will govern.*** All substandard clearances must be approved by the responsible Operating Officer of the Company provided that the Company Clearance Engineer determines that there are no issues related to the proposed substandard clearance.

NSRC Plan 7-1 should be referenced for design clearance requirements for all structures including buildings, loading racks, stairways, and overhead fall arrest protection supports, etc... to be constructed adjacent to or over Industry tracks. ***The Industry should review all federal, state and local safety and environmental regulations to determine what structures and/or appurtenances will be required for their particular method of operation and commodity early in the design process.***

Although the maximum vertical distance from the proposed top of rail to a platform, loading dock, or building finished floor elevation is shown as 4 feet – 0 inches on *NSRC Plan 7-1*, the Company recommends a design distance of 3 feet – 9 inches. This is the average floor height of a standard box car. The Industry's engineer should coordinate rail car information with the Company's engineer to verify the proper design distance between the top of rail and the finished floor elevation of the dock or building.

Standard vertical clearances from the centerline of track at top of rail for overhead electric lines are shown on *SP-1621*, attached to these guidelines.

Required side clearances for storage of rail cars and storage tanks for hazardous commodities can be found in Chapter 14 of these guidelines.

“Close Clearance” signs, if required, shall be posted as directed by the Company. Close clearance signage shall be as shown in *NSRC Plan 6–14*, attached.

6.11 ROADBED SECTION

Requirements for roadbed shoulder width, ditches, and slopes are shown on the following Company Plans (attached to these guidelines):

NSRC Plan 1–21 - ROADBED SECTION FOR HEAVY TONNAGE TRACKS
OTHER THAN MAIN TRACKS

NSRC Plan 1–22 - ROADBED SECTION FOR INDUSTRIAL TRACKS

NSRC Plan 1-22A - TURNOUT PAD FOR No. 10 INDUSTRY TURNOUTS

Industry should note the importance of constructing these typical roadbed sections which will provide an adequate walkway for both Company and Industry personnel. This is especially true in the area between switch stands and derails and any other areas as required by federal, state and/or local regulations.

Consideration of operational and tonnage requirements must be taken into account when designing roadbed sections for new track. The *NSRC Plan 1–22* roadbed section can be used for most spur tracks.

Heavy tonnage spur tracks such as those serving coal facilities typically require a roadbed section as shown on *NSRC Plan 1–21*.

Lead tracks of considerable length such as those serving an industrial park typically require a roadbed section as shown on *NSRC Plan 1–21*.

6.12 GRADE CROSSINGS AND ROADS

Roads Crossing or Parallel to Company Tracks

New at-grade road crossings over Company Tracks should be avoided. Design, permitting, and approval for new grade crossings over Company tracks can be an extensive and time consuming process. The applicant should initiate the crossing permit application early in the conceptual phase of project planning with the Industrial Development Manager, who will coordinate the application with the various departments involved in the approval process. The Industry should work closely with the Company’s Engineering Department on design and location of the proposed crossing and preparation of plans for final approval submittal to the Division Superintendent.

Safety is always the controlling factor in design of new at-grade road crossings. Factors such as sight distance of train and vehicle operators, type of vehicles utilizing the proposed crossing, grade of the proposed road, vehicle braking ability, and accessibility of the location to be served by the crossing if the crossing is blocked by a stopped train are examples of factors which must be considered, to name a few. It is the Industry’s responsibility to incorporate any local, state or federal regulations, guidelines or

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mandates which may govern grade crossing design at their proposed location. This is often, but not always, governed by the type (e.g. local, state or federal highway) of road.

Grade crossing warning devices such as cross bucks (Passive Warning) or flashing light signals with or without gates (Active Warning) are highway traffic control devices. The Division Superintendent shall determine the level of warning or device to be installed for a crossing over a private road. For a crossing over a public road or street the state agency or local authority (road authority) with jurisdiction over the road shall evaluate and determine the level of warning or device required for that crossing. The Industry should work closely with both the road authority and the Company to assist in determining the adequate level of warning device for the proposed crossing.

If the governmental agency having jurisdiction requires that automatic warning devices be installed at the crossing, before industry purchases and installs said devices, it will be necessary that the plans for installation for such control apparatus and equipment be submitted to the Company's Signal and Electrical Department for review and approval. Engineering plans for installation of the grade crossing warning devices must also be reviewed and approved by the governmental agency prior to installation. This level of involvement may vary depending on the type of Company owned track involved, i.e. main line vs. lead track serving an industrial park.

Asphalt paving with rubber flange way (a.k.a. Rubber Rail Seal) is the current standard crossing surface for at-grade road crossings over Company tracks (see *NSRC Plan 7-05B*). Any desired use of alternative surface types, such as Concrete Panels (see *NSRC Plans 7-6 and 7-6A*), by any party should be discussed with the Company's Engineering personnel and will be covered in the crossing agreement.

Roads parallel to Company tracks on Company property shall be designed to provide for the safety of all parties using the proposed road. Many factors contribute to roadway design and the Industry should work closely with the Company in this regard. This type of use of the Company's property almost always requires a formal agreement with the Company.

Roads Crossing Industry Tracks

Private at-grade road crossings and roads parallel to Industry tracks located beyond the Company's Division of Ownership and Maintenance point in the track shall meet or exceed Company standards and will only be permitted under the terms of the Industry Track Agreement.

Crossing surface types for private at-grade crossings are at the discretion of the Industry but shall be built in accordance with Company standards. Attached *NSRC Plans 7-5, 7-5a, and 7-5b* govern timber and rubber rail seal crossings while *NSRC Plans 7-6 and 7-6A* govern concrete crossings.

Safety of rubber tired vehicular traffic around railroad tracks inside Industry facilities is the responsibility of the Industry. Design of proper side clearances to tracks from adjacent roads, site distances at grade crossings, and proper signage shall be in accordance with Company standards.

6.13 AT-GRADE TRACK CROSSINGS

Rail crossings should be used as little as possible. All rail crossings shall be approved by the Company. The angle of the rail crossing shall be that shown on the approved plans and/or as further defined as staked in the field. Detailed manufacturer's plans and specifications shall be furnished for approval by the Company.