

**Table 6-1
Remedial Alternatives Evaluation
Forrest Current-Use Areas, Garfield Avenue Group
PPG, Jersey City, New Jersey**

Remedial Alternative	Remedial Action	Protectiveness of Human Health and the Environment	Compliance with Applicable Remediation Standards	Permanence in Relation to the Anticipated Timeframe until Redevelopment	Structural Feasibility	Effects on Surrounding Structural Elements	Duration of Construction	Construction Equipment Required	Inherent Risks	Impacts to Existing Businesses	Relative Costs
100 Forrest Street Offset											
HDPE Liner/DGA/Geosynthetic Cementitious Composite Mat/Asphalt (water mitigation and cap) (2-3 weeks duration)	<ol style="list-style-type: none"> 1) Install soil erosion and sediment control measures. 2) Prepare, grade, and compact subgrade DGA. 3) Place HDPE liner over DGA and existing concrete apron and up to building and block retaining wall. Place drainage composite over portion of HDPE liner covering existing concrete apron. 4) Place geosynthetic drainage composite on top of the section of the HDPE liner installed on the concrete apron. 5) Place GCCM over a portion of the DGA layer, up to the block retaining wall, and on top of the geosynthetic drainage composite. 6) Anchor the HDPE liner, geosynthetic drainage composite, and GCCM to the concrete apron. Install waterproofing between GCCM, building, and block retaining wall. 7) Place and compact asphalt and tie into GCCM. 8) Install pre-cast parking stops. 	High	High	High	High	Low	Medium	Medium	Low	Low	Medium
84 Forrest Street Building Footprint and Loading Dock											
Remedial Alternative 1 Demolition and Removal of Loading Dock Slab and Front Masonry Wall, Soil Excavation and Construction of New Slab and Front Masonry Wall combined with Remedial Alternative 2 (2-3 months duration)	<ol style="list-style-type: none"> 1) Acquire necessary permits from Jersey City. Install vibration monitoring equipment. 2) Install structural support system to take load off two vertical steel columns. Cut hole in north wall cladding for horizontal beam. 3) Install dust control measures. 4) Demolish and remove loading dock slab and front block wall. 5) Excavate soils beneath slab and loadout. 6) Backfill open excavation and compact. Install HDPE liner against interior block walls. Install liner under new slab. 7) Pour new concrete slab and install new masonry block wall at front face. 8) If necessary, seal remaining impacted concrete and masonry interior loading dock surfaces with epoxy-like material identified in Remedial Alternative 2. 9) Remove temporary structural support system. 	High	High	High	Low	High	High	High	High	High	High
Remedial Alternative 2 Sealing Loading Dock Surfaces with Epoxy-Like Material (2-3 weeks duration)	<ol style="list-style-type: none"> 1) Install dust control measures. 2) Scarify the entirety of the concrete and masonry interior horizontal and vertical surfaces of the loading dock. 3) Install epoxy over the interior surfaces identified above in Remedial Alternative 2, step 2. 4) Install protective wearing surface on horizontal surface where epoxy was applied. 5) Install loading dock bumpers to the vertical surface where epoxy was applied. 	High	High	High	High	Low	Low	Low	Low	Low	Low
Remedial Alternative 3 In-situ Chemical Reduction combined with Remedial Alternative 2 (1-2 weeks duration)	<ol style="list-style-type: none"> 1) Core through the concrete loading dock at two hot-spot locations. 2) Mobilize compact direct push rig. 3) Inject Ferro-Black®-H solution at depth via direct push rig. 4) Grout injection locations with bentonite slurry. 5) Seal each cored concrete location with new concrete patch. 6) Implement Remedial Alternative 2. 	High	High	Medium	High	Low	Low	Low	Low	Low	Low
Remedial Alternative 4 Install New Concrete Block Wall in Front of Existing Block Wall combined with Remedial Alternative 2 (3-6 weeks duration)	<ol style="list-style-type: none"> 1) Install and anchor HDPE liner along entire exposed face of the existing concrete block wall on the south side of the loading dock. 2) Construct new concrete block wall (waterproofed) against existing south wall with HDPE liner in between. 3) Extend existing concrete slab out and on top of new concrete block wall. 4) Scarify the entirety of the concrete and masonry interior horizontal surfaces of the loading dock. 5) Install epoxy over the interior horizontal surface identified above in Remedial Alternative 4, step 4. 6) Install protective wearing surface on the interior horizontal surface where the epoxy was applied. 7) Install loading dock bumpers to the interior vertical surface of the new block wall. 	High	High	High	High	Low	Low	Low	Low	Medium	Medium-Low

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90 Forrest Street Alleyway											
Remedial Alternative 1 Patch/Repair Existing Asphalt Surface (1-2 weeks duration)	1) Clear and sweep area in preparation for field work. Inspect existing asphalt for cracks and broken asphalt. Install vibration monitoring devices on adjacent buildings. 2) Cut out broken asphalt and repair with new asphalt using low-vibration equipment. 3) Clean cracks and install bitumen sealant in cracks. 4) Dispose of asphalt and concrete waste.	Medium	High	Medium	High	Low	Low	Low	Low	Low	Low
Remedial Alternative 2 Mill and Replace Existing Asphalt Surface (2-inches thick) (4-6 weeks duration)	1) Clear area in preparation for field work. Install vibration monitoring devices on adjacent buildings. 2) Mill existing asphalt down 2 inches using low-vibration milling equipment. 3) Seal cracks and repair voids in existing asphalt/concrete sub-base. 4) Apply tack coat to prepared sub-base. 5) Apply 2 inches of new bituminous surface course over prepared sub-base using low-vibration paving equipment. 6) Compact bituminous surface course with low-vibration compaction equipment. 7) Dispose of asphalt waste.	High	High	High	High	Medium	Medium	Medium	Medium	Low	Medium
Remedial Alternative 3 Excavate Existing Asphalt/Concrete Down to 10", Install HDPE Liner, DGA, New Asphalt (8-12 weeks duration)	1) Clear area in preparation for field work. Install vibration monitoring devices on adjacent buildings. 2) Excavate asphalt and/or concrete down to 10 inches below ground surface using low-vibration equipment. 3) Prepare sub-grade. 4) Install HDPE liner on prepared sub-grade. 5) Place and compact 4 inches DGA over HDPE liner using low-vibration equipment. 6) Place and compact 4 inches bituminous base course over DGA using low-vibration equipment. Place tack coat on finished base course. 7) Place and compact 2 inches bituminous surface course using low-vibration equipment. 8) Dispose of asphalt and concrete waste.	High	High	High	Low	High	High	High	High	High	High
90 Forrest Street Alleyway: Grid EE16B											
Excavate and Dispose	1) Clear area in preparation for field work. Install vibration monitoring devices on adjacent buildings. 2) Excavate hot-spot soil sample to the clean PDI sample result using low-vibration equipment. 3) Backfill the open excavation with DGA. 4) Dispose of excavated soil.	High	High	High	High	Low	Low	Low	Low	Low	Low
Forrest Street Utility Offset											
Excavate, Dispose, and Cap	1) Clear area in preparation for field work. Install vibration monitoring devices on adjacent buildings. 2) Excavate down to 18 inches below grade using low-vibration equipment. 3) Prepare sub-grade and place HDPE liner up to the buildings. 4) Place and compact 8 inches DGA. 5) Place and compact 8 inches bituminous base course over DGA using low-vibration equipment. Place tack coat on finished base course. 6) Place and compact 2 inches bituminous surface course using low-vibration equipment. 7) Construct concrete sidewalk and curbing. 8) Dispose of excavated soil.	High	High	High	High	Medium	Medium	High	Medium	High	Medium-High

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90 Forrest Street Boiler Room Basement											
Remedial Alternative 1 Upgrade Sumps/Remove Wood Structures/Replace Stairs/Surface Sealing	1) Upgrade sumps with commercial grade sump system, including sump in adjacent room. 2) Install new PVC piping for sumps. 3) Remove and dispose of wood landing, wood shed, and wood stairs. 4) Demolish and rebuild (masonry) entrance stairway or install steel stairs. 5) Install surface sealant on walls, floor, and masonry stairs.	Medium	High	Medium	High	Medium	Low	Low	Low	Low	Low
Remedial Alternative 2 HDPE Dimpled Membrane/Upgrade Sumps/Remove Wood Structures/Replace Stairs/Surface Sealing Stairs	1) Install HDPE dimpled membrane on walls. Terminate where epoxy coating ends. 2) Install HDPE dimpled membrane on floor. 3) Install subfloor directly on the HDPE dimpled membrane. 4) Upgrade sumps with commercial grade sump system, including sump in adjacent room. 5) Install new PVC piping for sumps. 6) Remove and dispose of wood landing, wood shed, and wood stairs. 7) Demolish and rebuild (masonry) entrance stairway or install steel stairs. 8) Install surface sealant (slip-resistant) on masonry/concrete stairs.	High	High	High	Medium	Medium	Medium	Medium	Medium	Low	Medium
Remedial Alternative 3 Waterproof Wallboard/HDPE Liner/HDPE Dimpled Membrane/Upgrade Sumps/Remove Wood Structures/Replace Stairs/Surface Sealing Stairs	1) Install HDPE on back of waterproof wallboard. Install 2x4 dimensional lumber wrapped in plastic on back of wallboard. 2) Install wallboard on walls. Terminate where epoxy coating ends. 3) Install HDPE dimpled membrane on floor. Install subfloor over dimpled membrane. 4) Upgrade sumps with commercial grade sump system, including sump in adjacent room. 5) Install new PVC piping for sumps. 6) Remove and dispose of wood landing, wood shed, and wood stairs. 7) Demolish and rebuild (masonry) entrance stairway or install steel stairs. 8) Install surface sealant (slip-resistant) on masonry/concrete stairs.	High	High	High	Medium	Medium	Medium	Medium	Medium	Low	Medium
Management of Sump Water											
Remedial Alternative 1 Store and Haul Sump Water to Site 114 Groundwater Treatment Plant	1) Collect field data from sumps for design purposes. 2) Identify permits and/or approvals that may be required. 3) Design and install piping and a bulk storage container with spill prevention measures outside of the basement. 4) Collect analytical data as needed to monitor sump discharge quality. 5) Develop a work plan and schedule to haul the sump water from the bulk storage container to the Site 114 groundwater treatment plant. 6) Haul sump water to Site 114 groundwater treatment plant.	High	High	High	High	Low	Medium	Medium	Medium	Low	High
Remedial Alternative 2 Install Skid-Mounted Treatment System In or Outside of Basement	1) Collect field data from sumps for design purposes. 2) Identify permits and/or approvals that may be required. 3) Design and install skid-mounted treatment system. 4) Develop an operation and maintenance manual for the treatment system. 5) Collect influent and effluent samples as needed. 6) Discharge treated water back to combined sewer.	High	High	High	High	Low	Medium	Medium	Medium	Low	High
Remedial Alternative 3 Convey the Sump Water to the Site 114 Groundwater Treatment Plant	1) Collect field data from sumps for design purposes. 2) Identify permits and/or approvals that may be required. 3) Design and install a subsurface conveyance system that discharges the sump water to the groundwater treatment plant at Site 114.	High	High	High	Low	High	High	High	High	High	High
98/100 Forrest Street and 86/90 Forrest Street Building Footprints											
Utilize Existing Concrete Floor Slabs	1) Seal cracks in concrete to provide a contiguous cap. 2) Utilize existing interior concrete floor slabs over impacted soil as engineering control.	High	High	High	High	Low	Low	Low	Low	Low	Low

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100 Forrest Street Loading Dock Driveway											
Remedial Alternative 1 Utilize Exterior Concrete and Asphalt Driveway/Apron	1) Seal cracks in concrete and asphalt to provide a contiguous cap. 2) Utilize existing exterior concrete and asphalt over impacted soil as engineering control.	High	High	High	High	Low	Low	Low	Low	Low	Low
Remedial Alternative 2 Removal of Existing Concrete Apron, Placement of HDPE Liner, and Install New Concrete Apron	1) Install vibration monitoring equipment. 2) Demolish concrete. 3) Install HDPE liner on prepared subgrade. 4) Install concrete forms, reinforcing steel, and pour new concrete apron.	High	High	High	Low	High	High	High	High	High	Medium
Remedial Alternative 3 Placement and Compaction of Asphalt over the Existing Concrete Apron	1) Install vibration monitoring equipment. 2) Place and compact asphalt over existing concrete apron.	High	High	High	Medium	Medium	Medium	Medium	High	High	Medium
100 Forrest Street Concrete Block Retaining Wall											
Remedial Alternative 1 Demolition and Removal of Concrete Block Wall and Replacement of Wall With Non-Cementitious Retaining Wall	1) Install vibration monitoring equipment. 2) Demolish concrete block wall. 3) Construct new retaining wall using non-cementitious materials.	High	High	High	Medium	High	High	Medium	High	High	High
Remedial Alternative 2 Sealing the Entirety of the Concrete Block Wall with Epoxy Material	1) Install vibration monitoring equipment. 2) Stabilize block wall prior to start of remediation work. 3) Scarify the block wall. Collect dust generated during scarification process. 4) Install epoxy coating.	High	High	High	Medium	High	Low	Medium	High	Medium	Low
Remedial Alternative 3 Installation of Protective Cover over Concrete Block Wall	1) Install vibration monitoring equipment. 2) Stabilize block wall prior to start of remediation work. 3) Seal cracks. 4) Install and anchor HDPE dimpled membrane along entire block wall. 5) Install lightweight facade to protect HDPE dimpled membrane. 6) Install bollards to protect wall from impacts.	High	High	High	Medium	High	Medium	Medium	High	Medium	Medium
100 Forrest Street Concrete Block Retaining Wall											
Remedial Alternative 4 Sealing of Cracks/Breaches in the Concrete Block Wall and Monitoring for Chromium Blooms on the Surface of the Concrete Block Wall	1) Seal cracks/breaches in block wall with masonry/cement compound.	High	High	High	High	Low	Low	Low	Low	Low	Low

Notes:
 CCPW - Chromate Chemical Production Waste
 CrSCC - Chromium Soil Cleanup Criteria
 Cr⁺⁶ - hexavalent chromium
 DGA - dense-graded aggregate
 GCCM - geosynthetic cementitious concrete mat
 HDPE - high-density polyethylene
 PDI - Pre-Design Investigation
 PVC - polyvinyl chloride