CHAPTER 5: CONSTRUCTION PHASE EFFECTS

5.1 OVERVIEW OF CONSTRUCTION ACTIVITY REQUIREMENTS

This section identifies the anticipated sequence, schedule, and methodology of construction for the TSM and LPAP2 alternatives. While the contractor would have a certain degree of freedom to plan construction activities and select methodologies, RT will specify in the construction contracts, that the contractor use sequences, schedules, and construction methods that are not detrimental to the surrounding community. Nighttime construction would occur only for those activities involving street closures required to accommodate construction of trackways crossing roadways.

5.1.1 TSM Alternative

As part of the TSM Alternative, a PNR lot at Cosumnes River College would be constructed. Construction would require approximately six months. Construction would occur during normal weekday daytime shifts. Improvements would include grading, asphalt pavements; concrete walkways, curbs and gutters; storm drainage system; traffic signal modifications; and landscaping and area lighting. Equipment used for construction would include scrapers, bull dozers, front end loaders, backhoes, graders, paving machines, water trucks, earth compactors, small crane, concrete trucks and concrete pumpers. Large and small trucks would import and export material to and from the sites.

5.1.2 LPAP2

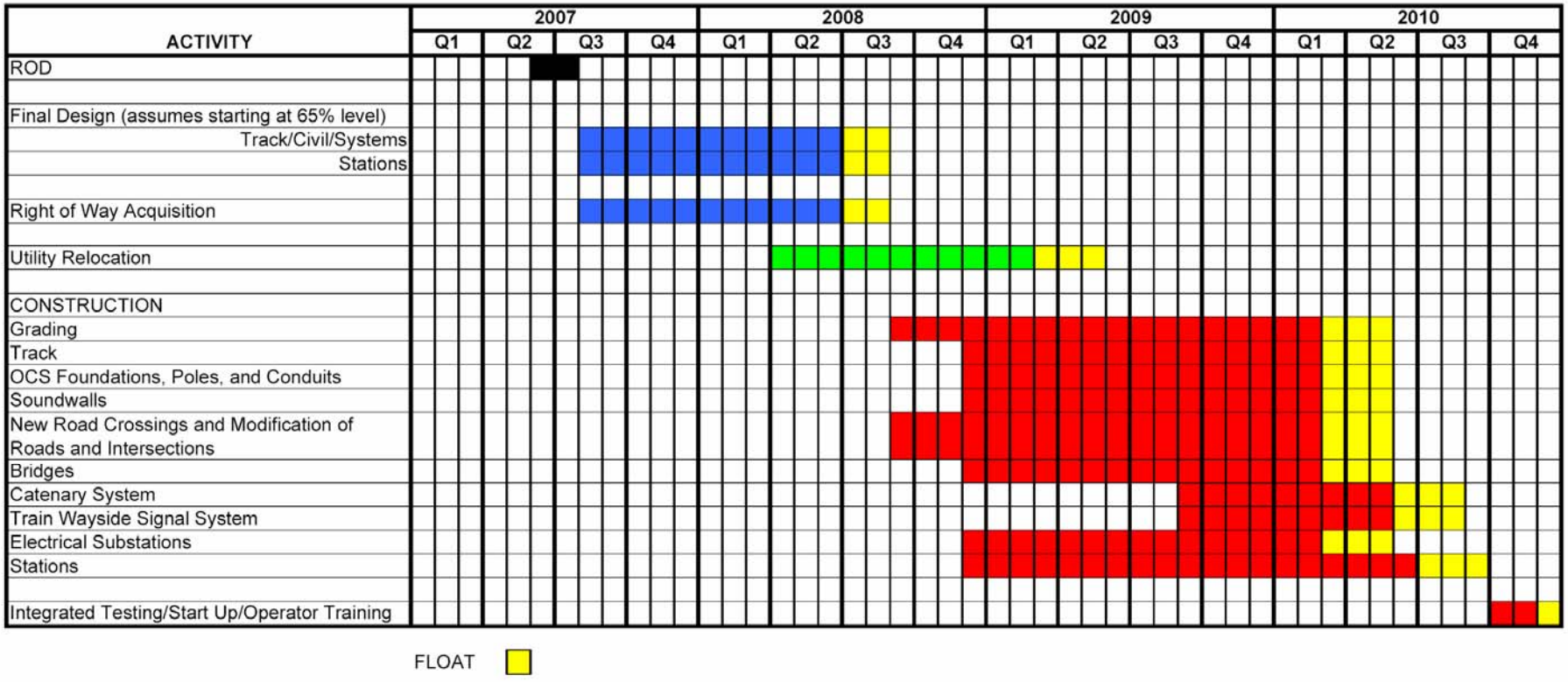
Construction of the LPAP2 would require approximately two to three years and would be phased as indicated in Figure 5.1-1.

5.1.2.1 UTILITY RELOCATION AND PROTECTION

Utility relocations and protection to be performed by the utility companies could start as soon as approximately six months before construction begins by RT's contractor. Utility relocations by utility companies would continue while RT's contractor begins grading in the areas in which utility relocations have been completed. Utility relocations would be completed approximately six to nine months after RT's contractor begins construction.

To facilitate maximum flexibility of construction operations by RT's contractor, utility relocation work is preferably done prior to any other construction. Water supply and sewer relocations would usually be performed by RT's contractor. Relocation of gas, electricity, communications and other selected utilities is usually performed by the respective owners or their contractors.

Figure 5.1-1: Project Design and Construction Schedule – South Sacramento Corridor Phase 2 Project



Equipment for utility work consists of trenching machines, small earth moving machines such as backhoes and front end loaders, earth compactors, dump trucks, specialized equipment for laying pipe or conduit, and cranes in cases where overhead electrical pole lines are being relocated or replaced. Where construction work occurs in roadways, the existing pavement would be sawcut, and trenches excavated with backhoes. Trenches would need to be shored, possibly by using temporary trench shields or by driving sheet piling. Utility relocation and protection work in roadways would be staged to minimize or eliminate impacts to the traveling public and may involve occasional night and weekend work to mitigate these impacts. In the case of night work portable lighting and a generator would be required.

5.1.2.2 LPAP2 CIVIL AND STRUCTURAL

This work would include the following items:

- Site preparation to include clearing, grubbing and grading of the area for the LPAP2 LRT trackway, stations and electrical substations pads.
- Track roadbed construction, including trackway underdrain system and geotextile fabric.
- Drainage improvements to include swales and pipes.
- Underground conduits and duct banks for LRT systems improvements.
- Foundations for catenary poles and wayside signals.
- Concrete slabs for station platforms and electrical substations pads.
- Bridges, retaining walls, and soundwalls.

Grading, track roadbed construction and foundations for overhead catenary system poles would most likely proceed linearly from one end of the project to the other end. Track construction would follow behind completed grading operations. Grading and track roadbed construction would take about one and half to two years. Water trucks would periodically spread water during grading operations to control dust. Foundations for the overhead catenary system poles would be constructed along with grading as would construction of drainage improvements, underground conduits and duct banks, retaining walls and sound walls.

Construction of road crossings and modification of adjacent roadways/intersections would be concurrent with the progression of grading operations. As required to minimize or eliminate impacts on the traveling public construction may take place at night or on weekends.

Civil work would be performed with equipment such as scrapers, graders, bulldozers, front end loaders, backhoes, earth compactors, paving machines, small crane and water trucks. Excavated material or fill material would be moved by dump trucks.

Bridge structures can be constructed independently from other ongoing work. Work can begin after relocation of utilities is complete in the structure's area. The time required to construct each structure would vary depending on its size and complexity. Relatively short structures such as the Morrison Creek Bridge could be constructed in approximately six months, while the longer and more complex bridge spanning Morrison Creek, Union Pacific Railroad and Union House Creek would require approximately nine months to a one year.

Structures work would be performed with equipment such as auger drilling rigs, cranes, backhoes, front end loaders, excavators, and earth compactors. Concrete for structures would be delivered by concrete truck mixers and placed with concrete pumps. Falsework and other materials required for the construction of structures would be handled by trucks.

LRT civil and structures except as noted otherwise would occur during normal weekday shifts during daylight hours to minimize impacts.

Street closures for several hours at a time may be needed to install and remove falsework over local streets if LPAP2 optional LRT grade separation structures are constructed at Meadowview Road, Franklin Avenue or Cosumnes River Boulevard. These temporary closures may occur at night or on weekends to minimize or eliminate impacts to the traveling public.

5.1.2.3 TRACK

Track construction would follow grading operations and construction of the track roadbed. Track construction would take about 1 to 1 1/2 years. It would follow closely behind completion of grading and track roadbed construction. Together grading, track roadbed and track construction would take approximately 1½ to 2 years.

Track construction involves placing rails, ties, rail fasteners, ballast, rail hardware and special trackwork. Specialized equipment is used, such as track liners, ballast tampers, ballast regulators and rail grinders. Track construction would include new grade crossings, which would involve limited partial or complete closure of individual streets. Closure of streets may occur during nights or on weekends to minimize or eliminate impacts to the traveling public. Rail is usually delivered from steel mills in 78-foot-long lengths by rail cars. The rails are then welded into strings about 0.25-mile long at a rail welding location. To take advantage of delivery of rail on the Union Pacific tracks the welding location will need to be along the UPRR corridor. Likely potential sites would include in the vicinity of the Meadowview Station or just north of Morrison Creek. Another option would be if the contractor chose to take delivery via truck. They could then set up their welding location at a proposed station PNR lot.

The welded strings are moved to their final installation locations via completed sections of track using rail mounted rolling supports (rail buggies). Special welding equipment is used to field-weld the strings together. Ballast is usually delivered to the site by dump trucks and rail cars. Cross ties are usually delivered by truck and set in place with a rubber-tired front end loader or similar equipment. After the track structure is assembled it is adjusted to its final alignment with special rail-mounted equipment (liner and tamper) that aligns the track and tamps (consolidates) the ballast. A track mounted rail grinder would then make a pass on the rails to clean them of minor corrosion. Welding of rail into strings and track construction would occur during normal weekday shifts during daylight hours to minimize any impacts.

5.1.2.4 LPAP2 LRT SYSTEMS

LPAP2 LRT systems work includes traction power system, overhead catenary system, wayside signaling, communication lines and grade crossing warning devices. Construction of traction power electrical substations would be constructed independent of track construction but would be concurrent with track construction. The portions of the systems that are installed underground in conduits would be constructed prior to construction of the track on the completed roadbed. After an initial length of track construction is completed, construction of the overhead portion of the system elements to include catenary system (poles and wires), overhead signal system wires and overhead communication lines would begin and would follow close behind. Track-mounted equipment is used to set the poles and string the various systems overhead lines. Construction of the systems work would be completed a couple of months after completion of the rough track construction, but ahead of final track surfacing.

Typically grading for the traction power electrical substations and construction of the substation concrete foundation pads is performed at the time of grading for the trackway. The setting of the

premanufactured substation units then occurs independently of other ongoing work and is completed ahead of, or at the same time as, the overhead catenary system.

Street closures for several hours at a time may be needed to install wires over streets at grade crossings. Temporary traffic control may also be required at existing signalized intersections to facilitate connection of grade crossing warning device pre-emption to the existing traffic signal system. This work could be done at night or on weekends to minimize impacts to the traveling public.

Overhead catenary system, signal system, and SCADA system would use trackmounted trucks and small cranes to erect poles and attach hangers and wires. Wayside signal construction would also involve placing small prefabricated signal bungalows in selected locations. Grade crossing warning devices and signal bungalows would be erected with small rubber-tired cranes. Installation of grade crossing warning devices could occur at night or on weekends to minimize or eliminate impacts to the traveling public.

Construction of LRT Systems facilities would occur during normal weekday shifts during daylight hours to minimize any impacts except as noted above.

5.1.2.5 DEMOLITION

This work would consist of removing existing site improvements. Relatively little demolition work would be associated with this project. Depending on whether the optional Center Parkway pedestrian overcrossing is built, one residential wooden-framed building may be removed. Demolition is usually performed by bulldozers, excavators, front end loaders and other relatively light equipment. No heavy wrecking equipment is anticipated. Dump trucks would be used to haul away the debris. Demolition would occur during normal weekday shifts during daylight hours to minimize any impacts.

5.1.2.6 STATIONS

The LPAP2 includes construction of park and ride lots at the Morrison Creek, Franklin Boulevard, and CRC stations. A station at Center Parkway is proposed without a park and ride lot. An optional satellite parking facility would be constructed at the Calvine/Auberry site. Other than the concrete platforms stations can be constructed independently of trackway grading and track construction operations. Platforms and their amenities would be constructed after construction of the track. Station construction work could begin after utility relocations are completed in the station areas. The stations are distant enough from each other that simultaneous construction of stations would not introduce severe cumulative impacts. Multiple stations could be constructed at the same time as preferred by the contractor. Each station can be constructed in approximately one year or less, depending on the size and complexity.

Earthwork would be done with equipment such as scrapers, graders, bulldozers, front end loaders. Paving would be done with paving machines and compaction equipment. Trucks would import and export materials to the sites. Drainage and utility construction would involve trenching with backhoes, placing pipes, and backfilling with front end loaders. The parking lot construction would be done independent of the trackway and track construction, but scheduled to be completed near the same time as the LRT systems work.

Station landscaping would consist of planting plus some hardscape construction and installation of underground pipes for water supply and irrigation controllers at each station site. Landscaping would be installed after the completion of the station platform and parking lot improvements. The work is manual labor intensive; no heavy equipment would be used. Trucks would be used to import material.

Construction of station improvements would occur during normal weekday shifts during daylight hours to minimize any impacts.

5.2 CONSTRUCTION PHASE IMPACTS AND MITIGATION

RT has developed a series of design requirements and construction best practices designed to minimize the impact of projects and construction on the community. These design requirements and construction best practices are outlined below for particular impact types. In all cases, these requirements and practices will be made part of all appropriate construction contracts. Furthermore, RT will hold regular project planning meetings with the Cities of Sacramento (and Elk Grove and the County if required by optional satellite Calvine/Auberry shuttle lot) to minimize impacts and to better coordinate construction activities with community needs.

5.2.1 Aesthetics

5.2.1.1 IMPACTS

Project construction would be multi-phased and would occur in different locations at different times. All construction activities, whether for the proposed PNR lots in the TSM Alternative or for facilities included in the LPAP2 (grading, trackwork, systems, stations, bridges and structures, optional Calvine/Auberry shuttle lot) would mostly involve the use of relatively light equipment, stockpiling of soils and materials, and other visual signs of construction. While evidence of construction activity would be noticeable to area residents and others in the vicinity, these short-term visual changes would not substantially alter the character of the areas within or surrounding the existing railroad corridor (i.e., in the northern segment of the alignment), where occasional freight trains and track maintenance activities are accepted existing visual elements. It is also important to note that significant segments (UPRR Corridor and Morrison Creek Station segments) of the project are mostly out of view of the traveling public. These construction-related visual changes as well as those that may occur along the remainder of the corridor would be temporary. The visual setting and long-term visual impacts of project operations are discussed in Section 4.1.

5.2.1.2 MITIGATION MEASURES

RT will require the contractor to maintain the site in an orderly manner, removing trash, waste, and securing equipment and vehicles at the close of each day's operation.

To reduce glare from lighting used during nighttime construction activities, RT will require the contractor to direct lighting onto the immediate area under construction only, and to avoid shining lights toward residences and traffic lanes. Nighttime construction would possibly occur only for those activities involving street closures for mitigating impacts to the traveling public such as grading and installation of tracks across roadway, installing of grade crossing safety devices and utility relocations.

To reduce dust the contractor would be required to use water trucks during grading to keep the ground moist.

5.2.2 Agriculture

It is not anticipated that construction activities would disturb agricultural land, crops or soils. Permanent effects on agricultural land in the project area are described in Section 4.2.

5.2.2.1 MITIGATION MEASURES

Construction access roads, staging and equipment laydown areas would be delineated to avoid agricultural property. Provisions will be incorporated into the construction contracts to designate areas for construction worker parking to avoid impacts to agricultural land. No mitigation is required.

5.2.3 Air Quality

5.2.3.1 TSM ALTERNATIVE

Construction would generate short-term pollutant emissions from the following construction activities: (1) site preparation, (2) grading, (3) construction workers traveling to and from construction sites, (4) delivery and hauling of construction supplies and debris to and from construction sites, and (5) fuel combustion by on-site construction equipment. These construction activities would temporarily create emissions of dusts, fumes, equipment exhaust, and other air contaminants. PM_{10} would be the air pollutant of greatest concern, particularly during grading and excavation activities.

Table 5.2-1 presents the estimated daily worst-case emissions associated with construction of the proposed project. As shown, the criteria pollutants are not anticipated to exceed the SMAQMD and federal thresholds.

Table 5.2-1: Worst-Case Daily Construction Emissions - TSM Alternative (pounds per day)

Construction Phase	CO	ROG	NO_X	SO_X	PM_{10}
Site Preparation	14.6	3.4	32.2	2.6	47.9
Grading	21.3	4.6	45.9	3.8	49.0
Maximum	21.3	4.6	45.9	3.8	49.0
SMAQMD Construction Threshold	n/a	n/a	85.0	n/a	n/a
Federal Threshold	550.0	140.0	140.0	550.0	550.0
Potential Threshold Exceedence?	No	No	No	No	No

Source: Air Quality Technical Report, Terry A. Hayes Associates, 2002

5.2.3.2 LIGHT RAIL ALTERNATIVE

Construction for the LPAP2 consists of demolition, utility relocations and protection, grading and track construction, bridge structures, retaining and sound walls, LRT Systems facilities, and stations. This alternative would include construction of four new LRT stations, three new park-and-ride lots, and an optional park and ride lot (at Calvine/Auberry). Construction would last approximately 1½ to 2 years. Although construction-related emissions are short-term, adverse air quality impacts may still result.

Construction for the Light Rail Alternative would generate pollutant emissions from the following construction activities: (1) site preparation, (2) grading/excavation, (3) construction workers traveling to and from construction sites, (4) delivery and hauling of construction supplies and debris to and from construction sites, and (5) fuel combustion by on-site construction equipment. These construction activities would temporarily create emissions of dusts, fumes, equipment exhaust, and other air

contaminants. However, PM_{10} is the most significant source of air pollution from construction, particularly during grading and excavation activities.

Under worst-case scenario, it is assumed that track construction, station construction, grade separation, and bridge structure construction would occur concurrently. Table 5.2-2 presents the estimated daily worst-case emissions associated with construction of the proposed project. As shown, NO_X emissions are anticipated to exceed the SMAQMD threshold. Thus, it is anticipated that construction of the proposed project would result in an adverse NO_X impact.

Table 5.2-2: Worst-Case Daily Construction Emissions - Light Rail Alternative (pounds per day)

Construction Phase	CO	ROG	NO_X	SO_X	PM_{10}
Light Rail Alignment	27.6	5.1	56.0	4.6	81.7
Stations / Park-and-Ride Lots	21.4	4.6	46.1	3.8	88.1
Total Emissions (Worst-Case Scenario)	49.0	9.7	102.1	8.4	169.8
SMAQMD Construction Threshold	n/a	n/a	85.0	n/a	n/a
Federal Threshold	550.0	140.0	140.0	550.0	550.0
Potential Threshold Exceedence?	No	No	Yes	No	No

Source: Air Quality Technical Report, Terry A. Hayes Associates LLC, 2004

5.2.3.3 MITIGATION MEASURES

RT would establish special provisions in the contract documents to implement the following best management practices to minimize fugitive dust and PM_{10} for either the TSM or LPAP2 alternative. All construction contracts shall require that the contractor warrantee that construction equipment has been properly tuned and shall implement best management practices to minimize idling, avoid sensitive receptor locations, and maximize the use of low emission fuels.

- The construction area and vicinity (500-foot radius) will be swept (preferably with water sweepers) and watered at least twice daily. Site-wetting will occur often enough to maintain a 10 percent surface soil moisture content throughout all earth-moving activities.
- All unpaved roads, parking and staging areas will be watered at least once every two hours of active operations.
- Site access points will be swept/washed within thirty minutes of visible dirt deposition.
- On-site stockpiles of debris or dirt will be enclosed, covered or watered at least twice daily.
- All haul trucks hauling soil, sand and other loose materials will be covered and will maintain at least two feet of freeboard.
- All haul trucks will have a capacity of no less than twelve and three-quarter (12.75) cubic yard.
- At least 80 percent of all inactive disturbed surface areas will be watered on a daily basis when there is evidence of wind-driven fugitive dust.
- Operations on any unpaved surfaces will be suspended when winds exceed 25 mph.
- Traffic speeds on unpaved roads will be limited to 15 miles per hour.
- Operations on any unpaved surfaces will be suspended during first and second stage smog alerts.

- Truck loading zones will be maintained in the construction area.
- Temporary traffic control will be provided during all phases of construction activities to improve traffic flow.
- Best efforts will be used to limit truck idling to no more than two minutes.
- Non-toxic soil stabilizers (according to manufacturers' specifications) will be applied to all inactive construction areas.

A plan subject to approval by the SMAQMD will be prepared to demonstrate that heavy-duty (greater than 50 horsepower) off-road vehicles that are to be used during construction would achieve a project-wide fleet-average reduction of approximately 20 percent for NO_X and approximately 45 percent for PM_{10} when compared to the most recent CARB fleet average at the time of construction. Late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, and/or other options as they become available can be used to reduce emissions.

A comprehensive inventory of all off-road construction equipment, equal to or greater than 50 horsepower, that would be used an aggregate of 40 or more hours during any portion of the construction phase will be submitted to the SMAQMD. The inventory will include the horsepower rating, engine production year, and projected hours of use or fuel throughput for each piece of equipment. The inventory will be updated and submitted monthly throughout the construction phase. The inventory would not be required for any 30-day period in which no construction activity occurs. At least 48 hours prior to the use of subject heavy-duty off-road equipment, the project representative will provide SMAQMD with the anticipated construction timeline, which will including start date, the name and phone number of the project manager, and the name and phone number of the on-site foreman.

Emissions from all off-road diesel-powered equipment used during construction will not exceed 40 percent opacity for more than three minutes in any one hour. Any equipment found to exceed 40 percent opacity (or Ringelmann 2.0) will be repaired immediately and the SMAQMD will be notified within 48 hours of identification of non-compliant equipment. A visual survey of all in-operation equipment will be made at least weekly, and a monthly summary of the visual survey results will be submitted throughout the duration of the construction phase, except that the monthly summary will not be required for any 30-day period in which no construction activity occurs. The monthly summary will include the quantity and type of vehicles surveyed, as well as the dates of each survey. The SMAQMD and/or other officials may conduct periodic site inspections to determine compliance. This mitigation measure will not supercede other SMAQMD or State rules or regulations.

5.2.3.5 IMPACTS AFTER MITIGATION

Projected construction air quality impacts with the implementation of design requirements/RT practices and mitigation measures previously described are shown in Table 5.2-3 (TSM Alternative) and Table 5.2-4 (LPAP2). For both alternatives, the daily PM_{10} emissions during construction would not exceed SMAQMD or federal significance thresholds. Mitigation measures identified in Section 5.2.3.4 would reduce NO_X emissions. With implementation of mitigation measures, daily NO_X emissions would not exceed the SMAQMD and federal significance thresholds.

Table 5.2-3: Worst-Case Daily Construction Emissions After Design Requirements/RT Practices nd Mitigation

TSM Alternative (pounds per day)

Construction Phase	CO	ROG	NO_x	SO_x	PM_{10}
Site Preparation	14.6	3.4	23.1	2.6	23.8
Grading	21.3	4.6	34.0	3.8	24.5
Maximum	21.3	4.6	34.0	3.8	24.5
SMAQMD Construction Threshold	n/a	n/a	85.0	n/a	n/a
Federal Threshold	550.0	140.0	140.0	550.0	550.0
Potential Threshold Exceedence?	**No**	**No**	**No**	**No**	**No**

Source: Air Quality Technical Report, Terry A. Hayes Associates, 2002

Table 5.2-4: Worst-Case Daily Construction Emissions After Design Requirements/RT Practices and Mitigation

Light Rail Alternative (pounds per day)

Construction Phase	CO	ROG	NO_x	SO_x	PM_{10}
Light Rail Alignment	27.6	5.1	45.1	4.6	40.9
Stations / Park-and-Ride Lots	21.4	4.6	37.6	3.8	44.0
Total Emissions (Worst-Case Scenario)	49.0	9.7	82.7	8.4	84.9
SMAQMD Construction Threshold	n/a	n/a	85.0	n/a	n/a
Federal Threshold	550.0	140.0	140.0	550.0	550.0
Potential Threshold Exceedence?	**No**	**No**	**No**	**No**	**No**

Source: Air Quality Technical Report, Terry A. Hayes Associates, 2002

5.2.4 Biological Resources

5.2.4.1 IMPACTS

Impacts reported in the following paragraphs would be in addition to any permanent effects as reported in Section 4.4.

TSM Alternative. Construction of the PNR lot under the TSM Alternative at Cosumnes River College may disturb small areas of non-native grassland communities that provide suitable habitat for western burrowing owl. No wetland areas would be affected by the PNR lot construction. The PNR lot site primarily consists of ruderal disturbed vegetation, with some non-native grassland areas and developed properties; therefore, construction-related impacts on biological resources would be minimal. Temporary impacts to natural resources from construction activities due to air pollution from dust and construction equipment, increased runoff and soil erosion, and construction noise would be minimized through the use of Design Requirements and RT Practices as described in Section 5.2.3.2.

LPAP2. Construction of the LPAP2 would cause temporary disturbance to approximately 0.15 acre of wetlands/waters at the Morrison Creek Crossing of the LRT Alignment and approximately 0.05 acre of wetlands/waters at the Morrison Creek/Union House Creek/UPRR flyover.

LPAP2 construction activities may also disturb vernal pool, riparian and non-native grassland natural communities that provide potentially suitable habitat for a variety special-status species as shown on Table 4.4-2. The status of all species with potentially suitable habitat in the project vicinity is reported in Section 4.4. Protections are suggested based solely on the presence of potentially suitable habitat, even where it is of relatively low quality. All sensitive habitat and wetland areas that could be avoided during construction would be identified for avoidance during project design. The following preventive measures would adequately address construction-related impacts to wetland areas and special-status species. These measures will be reviewed by all appropriate agencies, including the USFWS, CDFG, and the ACOE.

5.2.4.2 MITIGATION MEASURES

Construction impacts would be minimized through the use of Best Management Practices and procedures that have been established for the construction of large-scale public works projects. Procedures pertinent to biological resources include the following:

- Precautions to prevent pollution of streams, waterways, and other bodies of water during construction;
- Dust control through watering of appropriate surfaces;
- Clearing and grubbing procedures that specify that only trees and plants designated for removal shall be removed;
- Excavation techniques to ensure the stability of subsurface materials as well as retention of excavated materials within the construction areas;
- Construction within wetlands would be avoided during the rainy season to prevent excess siltation and sedimentation;
- Materials and fluids generated by construction activities would be placed at least 100 feet from wetland areas or drainages until they could be disposed of at a permitted site;
- After construction activities are complete, any temporary fill or construction debris shall be moved and disturbed areas will be restored to their pre-project conditions;
- All natural communities and wetland areas located outside the construction zone that could be affected by construction activities will be temporarily fenced off using high visibility fencing and designated as Environmentally Sensitive Area(s) (ESAs) to prevent accidental intrusion by workers and equipment. The fencing shall be inspected and maintained on a regular basis throughout the construction process and will only be removed when construction of the project has been completed;
- A USFWS-approved biological monitor will inspect construction-related activities at the project site where threatened and endangered species may occur to ensure that no unauthorized take of federally listed species or destruction of their habitat occurs. The monitor will have the authority to stop construction activities that may result in unauthorized take of federally listed species or destruction of their habitat until appropriate corrective measures have been completed. The monitor will be responsible for immediately reporting any unauthorized impacts to the USFWS.
- An environmental awareness program will be developed and implemented for construction personnel, including contractors. The training will include information on special-status species that may occur within or adjacent to work areas (e.g., giant garter snake), the required avoidance and minimization

measures to avoid take of these species and their habitats, and potential penalties for not complying with the requirements; and

- The number and size of access roads and staging areas, and the total area of project activities will be restricted to the minimum necessary for the duration of the project construction activities. Stockpiling of construction materials, portable equipment, vehicles, etc. will be confined to the construction staging areas. Movement of heavy equipment to and from the project area will be restricted to established roadways to minimize disturbance. Project-related vehicles shall observe a 20-mile per hour speed limit within construction areas, except on City and County roads and on County, State, and Federal highways. All heavy equipment, vehicles, and supplies will be stored at the designated staging area at the end of each work period.

Prevent the Introduction or Spread of Noxious Weeds

The contractor will be responsible for avoiding the introduction of new noxious weeds and the spread of weeds previously documented at the project area. The following measures will be implemented during construction.

- Minimize surface disturbance to the greatest extent possible.
- Seed all disturbed areas with certified weed-free native and non-native mixes, as provided in the revegetation pan developed in cooperation with CDFG. Mulch with certified weed-free mulch. Rice straw may be used to mulch upland areas.
- Clean equipment before entering or exiting the project area.
- Use native, non-invasive species or nonpersistent hybrids in erosion control plantings to stabilize site conditions and prevent the colonization of invasive species.
- Provide all seed mixes to be used on SRCSD property to SRCSD Bufferlands staff for review and approval prior to use.

Special-Status Plant Species:

Special-status plant surveys were conducted within the project area during May 18 and June 27, 2006, during which no special-status plant species were observed. Special-status plant surveys are valid for a period of three years (USFWS 2000). If construction of the proposed project is not initiated within 3 years from the date of the special-status plant surveys, additional surveys may be required. As no special-status plants were observed on-site, no specific avoidance, minimization, or mitigation measures are recommended.

Special-Status Wildlife:

Vernal pool fairy shrimp, Midvalley fairy shrimp, Vernal pool tadpole shrimp, and California linderiella

- Where possible, vernal pool fairy shrimp, Midvalley fairy shrimp, vernal pool tadpole shrimp and California linderiella habitat will be protected by a 50-foot buffer zone (ESA) with exclusionary fencing to make it easily avoided by construction crews. The fencing shall be inspected and maintained on a regular basis throughout the construction process and will only be removed when construction of the project has been completed.

Valley Elderberry Longhorn Beetle

- Project construction shall be prohibited within 100 feet of the elderberry plants during the beetle emergence and matting period (e.g., March 15 through June 30) to eliminate any indirect effects of construction on the beetle or its eggs.
- No application of herbicides, insecticides, and/or other chemical agents shall occur within 100-feet of the elderberry plants or where they might drift or wash into the area of elderberry plants.
- Protective fencing shall be established around all shrubs that are not to be removed prior to initiating any construction activities on the site. Protective fencing will be established a minimum of 20 ft (6 m) outside the perimeter of the driplines of these elderberry plants. Signs will be posted every 50 ft along the edge of the elderberry avoidance area(s), stating that the area(s) is protected habitat. The buffer areas shall be protected from adverse effects resulting from the project. There will be no physical alterations of any type within the area enclosed by the fencing. The fencing shall be inspected and maintained on a regular basis throughout the construction process and will only be removed when construction of the project has been completed.
- A post-construction walk through will be conducted to assess whether any damage occurred to vegetation within the buffer areas. If damage is observed, vegetation within the buffer areas will be restored with appropriate native plant species. Erosion control measures and exotic weed abatement measures shall be implemented. If unanticipated damage is done to elderberry shrubs, the USFWS will be notified and appropriate compensation will be implemented.

Western Pond Turtle

- A qualified biologist shall conduct a pre-construction survey of all project affected aquatic habitats no more than 24 hours prior to instream construction or disturbance of riparian vegetation. If western pond turtles are found to be present within the immediate construction area, on-site monitoring and possibly relocation shall be implemented to ensure that no western pond turtles are injured during the construction phase. Plans for on-site monitoring and/or relocation shall be submitted to the appropriate agencies (e.g., CDFG) for approval prior to implementation.

Giant Garter Snake

- Where possible, giant garter snake habitat will be protected by a 200-foot buffer zone (ESA) with exclusionary fencing to make it easily avoided by construction crews.
- Best management practices for water quality will be implemented during construction.
- Construction in areas containing giant garter snake habitat shall occur preferably during the snake's active period (May 1 and October 1). If construction must occur between October 2 and April 30 the USFWS Sacramento office will be contacted to determine if additional measures are necessary to minimize or avoid take.
- Aquatic habitat will be dewatered 15 days prior to the initiation of construction activities. If complete dewatering is not possible, potential prey items (e.g., amphibian larvae and fish) will be removed, to the extent feasible, so that snakes and other wildlife are less attracted to the construction area.
- Within 24 hours prior to commencement of construction activities, a qualified biologist will survey the project area for the presence of giant garter snakes. If a lapse in construction activity of two weeks or greater occurs, the survey of the project area will be repeated.
- A qualified, USFWS-approved biological monitor shall be present during construction activities within suitable habitat. If a snake is encountered during construction, the biological monitor will have the authority to stop construction activities in the immediate area until appropriate corrective measures

have been completed or it has been determined that the snake will not be harmed. The biological monitor will redirect construction activities away from the snake, so that it will be allowed to move away from the work area on its own volition. Capture and relocation of trapped or injured individuals can only be attempted by personnel or individuals with current USFWS recovery permits pursuant to section 10(a)(1)(A) of the Endangered Species Act. All sightings and any incidental take will be reported to the USFWS immediately by telephone and by written letter addressed to the Chief, Endangered Species Division, within one working day.

- Clearing will be confined to the minimal area necessary to facilitate construction activities.
- Following completion of construction activities, all temporary fill and construction debris will be removed from the project area and disturbed areas will be restored to pre-project conditions. Commercially available seed mixes containing native grasses and herbs will used during this process.

Nesting Migratory and Special-Status Birds, Including Raptors

Several non-special-status migratory birds, including common raptors, and special-status birds could potentially nest in riparian communities and isolated trees throughout the project area, as well as in annual grasslands. Adverse impacts to these species, will be avoided by conducting pre-construction surveys and implementing the following measures if active nests are found.

- If construction or tree removal will occur between February and August, pre-construction surveys will be conducted each year of project construction to locate all active nests within 0.25 mile (0.4 km) of the project area. Surveys shall be conducted by a qualified wildlife biologist.
- Surveys shall be conducted no more than 30 days prior to the initiation of construction activities.
- Direct disturbance (e.g., removal of nest trees and activities in the immediate vicinity of an active nest), will be avoided during the breeding season, where feasible. No-disturbance buffers will be established around each active nest, to the extent feasible. The project proponent will contact CDFG to determine the need to monitor the nest and/or the size and configuration of buffers, based on existing disturbance levels, topography, sensitivity of the species, and other factors on a case-by-case basis.
- If necessary, nest trees shall be removed outside of the nesting season (February through August), or after a qualified biologist verifies that the nest is empty and the nest tree is no longer used by the adult and young birds. If tree or shrub removal is required during the breeding season, the project proponent will hire a qualified biologist before removal to conduct surveys for active nests. If active migratory bird, raptor, or special-status bird nests are found in the trees/shrubs proposed for removal, the project proponent will consult with the USFWS and CDFG before removal to develop an MOU.
- In addition, all natural communities and wetland areas located outside the construction zone that could be affected by construction activities will be temporarily fenced off using high visibility fencing and designated as ESAs to prevent accidental intrusion by workers and equipment. The fencing shall be inspected and maintained on a regular basis throughout the construction process and will only be removed when construction of the project has been completed.

Swainson's Hawk

- During the year(s) of project construction, a qualified raptor biologist will survey the project area and surrounding area to determine if any active Swainson's hawk nests occur on-site or within a 0.5 mile of the project area. Surveys are to take place during the breeding season of the Swainson's hawk

(March-August 15) every year of project construction. If Swainson's hawk nests are discovered, a consultation with CDFG will be necessary to evaluate and prescribe avoidance measures.

Western Burrowing Owl

- In accordance with the *Staff Report on Burrowing Owl Mitigation* (CDFG 1995) the following should be considered impacts to the species:
  - Disturbance within 160 ft (50 m) of an occupied burrow, which may result in harassment of the owls;
  - Destruction of occupied natural and artificial burrows (e.g., culverts, concrete slabs, and debris piles); and
  - Destruction and/or degradation of foraging habitat adjacent (within 330 ft [100 m]) of to an occupied burrow(s).
- To avoid impacts on western burrowing owls, a qualified biologist shall conduct a pre-construction survey for burrows and burrowing owls along the project alignment plus a 100 m (330 ft) buffer on each side of the construction area. If western burrowing owls are observed in the project area, the following measures will be implemented.
- If active burrows are located on or immediately adjacent to the project area, a no-disturbance buffer will be established around each active burrow. The size of the buffer will be determined through coordination with CDFG. The *Staff Report on Burrowing Owl Mitigation* (CDFG 1995) recommends a buffer zone with a radius of 160 ft (50 m) during the non-breeding season (September 1 through January 31) and 250 ft (75 m) during the breeding season (February 1 through August 31). Avoidance also requires that a minimum of 6.5 acres of foraging habitat be permanently preserved contiguous with occupied burrow sites for each pair of breeding burrowing owls (with or without dependent young) or single unpaired resident bird. The configuration of the protected habitat should be approved by CDFG.
- If adverse effects to occupied burrows (direct removal or construction within the buffer zone) are unavoidable, the owls shall be passively relocated using techniques approved by CDFG (install one-way doors on burrows) to avoid the loss of any individual owls. However, occupied burrows are not to be disturbed during the nesting season unless a qualified biologist approved by CDFG verifies through non-invasive methods that either: the birds have not begun egg-laying and incubation; or that juveniles from the occupied burrows are foraging independently and are capable of independent survival. To offset the loss of foraging and burrow habitat on the project site, a minimum of 6.5 acres of foraging habitat per pair or unpaired resident bird, should be acquired and permanently protected (CDFG 1995). The amount of foraging habitat to be acquired and protected will be determined through coordination with CDFG. The protected lands should be adjacent to occupied burrowing owl habitat and at a location acceptable to CDFG (CDFG 1995).

5.2.5 Cultural Resources

As described in Section 4.5, Cultural Resources, no archaeological or historic architectural resources have been identified in the project Area of Potential Effects (APE). Section 4.5 addresses the potential for previously unidentified cultural resources to exist in portions of the APE that are covered over with pavement or other obstructions.

5.2.5.1 MITIGATION MEASURES

It is not anticipated that construction activities associated with either the TSM or LPAP2 alternative would disturb buried cultural materials. If such materials are unearthed during construction, work in the vicinity of the find would be halted until a qualified archaeologist can assess their significance. If human remains are unearthed during construction, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to Public Resources Code 5097.88. In either instance, RT shall be immediately notified.

If unanticipated archaeological resources are encountered during construction, they would be addressed in consultation with the Office of Historic Preservation (OHP)/or in accordance with an archaeological treatment plan to be developed in consultation with OHP.

5.2.6 Employment

Given the size of the Sacramento economy, neither the TSM Alternative nor the LPAP2 Alternative would result in permanent changes to regional socioeconomics beyond currently planned and forecasted growth.

5.2.6.1 METHODOLOGY AND IMPACTS

Table 5.2-5 provides an estimate of the number of positions and level of economic activity created by the expenditure of construction funds for the TSM and LPAP2 alternative. Estimates are based in part on an input/output study of construction activity in Texas by the Federal Highway Administration (Politano and Roadifer, 1989). Funds created in economic output include the multiplier effect of direct construction being re-spent in service or other sectors of the economy. Economic activity generated by the proposed project is anticipated to benefit the Sacramento region and would also follow the labor and material markets for transportation-related construction.

Table 5.2-5: Impacts from Construction Investment in the South Sacramento Corridor Phase 2 Project (Millions of 2005 dollars)*

Alternative	Construction Value*	Regional Economic Output	Total Earnings	Job Creation (Person Years of Employment)	
				On-Site	Total
No-Action Alternative	N/A	N/A	N/A	N/A	N/A
TSM Alternative	$16.9	$21.6	$6.1	90	150
LPAP2	$157.5	$201.6	$56.7	900	1,400

* Construction impacts are based on preliminary estimates for construction value and exclude purchase of rolling stock, and right-of-way costs, but include administration costs.

N/A = Not Applicable

Sources:

A.L Politano and Carol J. Roadifer, *Regional Economic Impact Model Analysis for Highway Systems (REIMHS)*, Transportation Research Record 1229, Transportation Research Board, Washington, DC, 1989. (Model adjusted to reflect inflation.)

Source: Parsons, February 2006.

With respect to job creation, FHWA found nationally in the early 1980s that a one million dollar investment in transportation construction would directly generate 10 on-site, full-time construction jobs (person years of employment [PYE]). This number has been adjusted to 5.6 PYE positions to reflect inflation through 2005. When off-site, construction-related and service-industry-related jobs and related increases in consumer demand (direct, indirect, and induced effects) are considered, the total number of full time PYE positions created rises to about 8.9, adjusting for inflation, for each one million dollars investment. Data on the impact of bridge construction, adjusted for inflation, have been used as a best approximation for rail construction.

Compared with the No-Action Alternative, the TSM Alternative would invest $16.9 million in capital costs for construction, not counting vehicle and right-of-way costs, and would generate 90 on-site full-time construction positions (PYE) and 150 total positions (PYE). The LPAP2 would invest $157.5 million in capital costs for construction, not counting vehicle and right-of-way costs, and would generate 900 on-site full-time construction positions (PYE) and 1,400 total positions (PYE), as compared to the No-Action Alternative. The impact of this direct and indirect employment added to the regional economy would be positive.

5.2.6.2 MITIGATION MEASURES

As the impacts are beneficial, no mitigation is proposed.

5.2.7 Geology, Soils and Seismicity

5.2.7.1 IMPACTS

The impacts identified below could occur under either the TSM or LPAP2 Alternative, except as specifically indicated.

Although no unstable slopes are apparent in creek channel banks in the vicinity of the LPAP2, proposed construction of the LPAP2 may impose additional loads on existing slopes, potentially resulting in slope instability. Slope instability could adversely affect constructed facilities on or adjacent to slopes and off-site properties.

Weak and/or compressible soils may be present at various locations affected by construction of either build alternative, particularly at shallow depth in or along creek channels and possibly in areas of existing fill. Such soils are a potential source of excessive settlement for structures and areas of fill, and in some cases their presence can also adversely affect construction operations.

Soils at and near ground surface along much of the study area are expected to exhibit medium to high expansion potential. For such soils, changes in soil volume and strength are associated with changes in moisture content. The presence of expansive soils can adversely affect the service of pavements and slabs on grade. Where exposed in slopes, such cyclic changes in soil volume and strength are commonly associated with the down-slope creep of near-surface soils and shallow slumping. Such impacts could adversely affect either the TSM or LPaP2 Alternative.

Shallow groundwater would be present at some locations, either as a part of the “water table” or as a local and seasonal “perched” condition. Where present, shallow groundwater would affect earthwork and construction and can adversely affect the service of floor slabs and roadbed/hardscape subjected to traffic load. These impacts could adversely affect either build alternative.

It does not appear likely that dewatering that is extensive in depth, volume and/or duration would be required. Therefore, dewatering activities are not expected to (temporarily or permanently) modify the level of groundwater sufficiently to induce settlement on the LPAP2 LRT alignment or adjacent properties.

Soil exposed at ground surface can be subject to erosion. Soil erosion can damage existing structures and can discharge sediment to waterways. The effects of construction-phase erosion on waterways are addressed in Section 5.2.9.

5.2.7.2 MITIGATION MEASURES

The extent of hazards or other impacts – including slope instability, weak and/or compressible soils, expansive soils, shallow groundwater, and erosion – will be defined by geotechnical studies during final design of either the TSM or LPAP2 Alternative. Design requirements to address seismic hazards are discussed in Section 4.7.3.

Design requirements to address the above-identified impacts will be incorporated into the final design and construction specifications. Design requirements that would likely be implemented for either build alternative include: excavation and replacement or lime-treatment of weak or expansive soils, and/or the use of synthetic materials to reinforce or partly replace weak soils and deep foundations. Design requirements specific to the LPAP2 are likely to include: modification or re-grading of slopes, increased set-backs and clearance from slopes, vegetation of slopes, lining channels, excavation and replacement or lime-treatment of weak or expansive soils, and/or the use of synthetic materials to reinforce or partly replace weak soils and deep foundations.

5.2.8 Hazardous Wastes

5.2.8.1 IMPACTS

The potential for encountering pre-existing hazardous waste is present during any construction project, particularly within a developed area such as the project corridor. Impacts would occur if construction workers or members of the public were exposed to hazardous materials during grading and construction activities or if the likelihood of hazardous waste migration were increased by construction activities.

For the TSM and LPAP2 alternatives, there is likelihood that hazardous waste may be encountered at the locations identified in Table 4.8-1. Contaminants at these sites may include but are not limited to aerially deposited lead, lead-based paint, MTBE, and ACMs.

5.2.8.2 MITIGATION MEASURES

Impacts of the TSM Alternative and the LPAP2 will be mitigated by implementing the following measures:

- **Walking reconnaissance.** Walk-through site reconnaissance will be conducted for the known hazardous waste site to identify any additional evidence of contamination.
- **Confirming the Status of Remediation Activities.** A review will be conducted of the remediation status of the site shown in Table 4.8-1. If remediation activities will be complete before construction of the project, then no further mitigation will be necessary. If remediation would not be completed prior to project construction, then an alternate mitigation plan will be prepared and implemented.
- **Site Evaluation**. A Phase 2 site-specific evaluation will be made of any known and suspected contaminated sites that would be disturbed by construction operations before any soil is removed

from affected areas for construction, using the following procedure: 1) implementation of a Worker Health and Safety Plan; 2) preparation of a site-specific work plan specifying the proposed location for surface samples or soil borings or trenches; 3) soil boring or trenching and sample collection; 4) laboratory analysis of samples; and 5) preparation of a findings and recommendations report. If the site-specific evaluations determine that contaminants are present, RT will determine the type and extent of contamination and will prepare and implement a remediation plan to avoid risks to public health and safety.

- **Worker Health and Safety Plan & Training**. To avoid health effects on construction personnel, all personnel who may come in contact with contaminated soil or groundwater would be trained in accordance with the OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) standard (29 CFR 1910.120). A site-specific worker health and safety plan defining potential contaminants and, where appropriate, proper personnel protective equipment would be employed. Proper decontamination procedures for workers and equipment would be followed. When such measures are in place to protect those in closest contact with hazardous substances, impacts to surrounding populations would be avoided.
- **Notify Appropriate Regulatory Agencies and Enact Specific Mitigation Plans**. RT will notify the State Department of Toxic Substances Control, Sacramento County Environmental Health Department and the local fire department of any contaminants encountered during construction.

5.2.9 Hydrology, Floodplain, and Water Quality

5.2.9.1 IMPACTS

The impacts identified below could occur with construction of either the TSM Alternative or LPAP2, except as specifically indicated.

Construction activities of either build alternative would increase the sediment load in stormwater during rainfall events. Sediment sources created during construction include soil stockpiles, soil tracked across construction areas, and soil transported by wind.

Either build alternative would disturb one or more acres of land, and therefore a Stormwater Pollution Prevention Plan (SWPPP) will be required, in accordance with Section 402 of the federal Clean Water Act. The purpose of a SWPPP is to reduce the amount of construction-related pollutants that are transported by stormwater runoff to surface waters.

Groundwater is generally 15 feet below ground surface or deeper. Construction excavation for either the TSM or the LPAP2 Alternative is expected to be limited and very localized. Although it is not anticipated that groundwater would be encountered, it cannot be ruled out, particularly in localized areas where deeper excavation is required, such as Meadowview Road under the depressed roadway design option.

The LPAP2 would require modification of the berm of the detention basin in the vicinity of the proposed Franklin Station. This detention basin is on property owned by the Sacramento Regional County Sanitation District (SRCSD), but is operated by the City of Sacramento. This could result in the temporary loss of flood storage during this phase of construction. Long-term effects of the modification of the detention basin are addressed in Section 4.9.2.1.

The following design requirements/best practices and mitigation measures will be implemented for either the TSM or LPaP2 Alternative, except as noted below.

5.2.9.2 MITIGATION MEASURES

The following mitigation measures will be applied for hydrology, floodplain, and water quality impacts due to construction.

- The contractor will prepare a SWPPP and will identify construction-period Best Management Practices to reduce water quality impacts. The SWPPP will emphasize standard temporary erosion control measures to reduce sedimentation and turbidity of surface runoff from disturbed areas, and will be submitted to the Regional Water Quality Control Board.
- For the LPAP2, RT will coordinate with SRCSD and the City of Sacramento regarding construction-period impacts to the bufferlands detention basin. RT will work with these agencies to ensure that adequate flood storage is maintained during the construction period.
- In the event groundwater is encountered during construction, dewatering would be conducted locally. Dewatering effluent would be tested for contamination. Contaminated effluent would be disposed of in accordance with applicable federal, state and local regulations.

5.2.10 Land Use

There would be no construction-related land use effects associated with either the TSM or LPAP2 Alternative. Permanent changes in land use that would occur as a result of the project alternatives are described in Section 4.10.

5.2.11 Mineral and Energy Resources

5.2.11.1 MINERALS

No significant minerals have been identified in the project area. Construction activity is not anticipated, therefore, to adversely affect mineral resources.

5.2.11.2 ENERGY

Various types of equipment would be used to construct transportation improvements. Energy of various forms, but primarily fossil fuels, would be consumed during the operation of this equipment. Energy use would be proportional to the level of construction activity and end when the proposed facilities are completed. Increased energy consumption for equipment operations during the construction phase is therefore a temporary impact.

Materials used in the construction of transportation facilities require energy to manufacture and to deliver to the work site. This “embedded” energy can be substantial for certain materials, for instance steel and other processed materials. If materials are manufactured or assembled before on-site construction begins, the energy for these processes is actually consumed prior to the local construction period. If manufactured or assembled outside the area or region in which the transportation improvements are to be made, the energy requirements do not affect the local or regional energy economy. Materials energy, like construction equipment energy, is also a temporary energy requirement

Because the LPAP2 proposes the most extensive facilities improvements, its construction energy impacts would be greater than those of either the TSM Alternative or the No-Action Alternative. The No-Action Alternative includes improvements contained in the 2002 Metropolitan Transportation Plan. The TSM Alternative would add to those improvements by expanding park-and-ride lots in the SR 99 corridor and

adding additional express and feeder routes and extending some existing bus services. The duration of construction for most of the proposed improvements would be short, lasting no more than several weeks or several months. The LPAP2 would take approximately 2½ years to construct and would use energy, often intensively, throughout that period. Nonetheless, construction energy requirements are not considered substantial for the LPAP2 LRT or the other project alternatives. Energy use would represent a small portion of the total energy consumed in the region for the construction of other facilities and for the ongoing operation of commercial, industrial, and residential activities.

5.2.12 Neighborhoods and Businesses

Characteristics of neighborhoods and businesses in the South Sacramento Corridor and long-term impacts of project implementation and operations, including permanent displacement effects, are described in Section 4.13. This section focuses on the short-term temporary effects of project construction activities on neighborhoods and businesses in the study area. In general, these are the indirect effects of construction air and noise emissions, traffic and visual disruptions. These construction impacts are discussed in their own right in their respective subsections of this chapter.

5.2.12.1 Impacts of the TSM Alternative

Traffic in the vicinity of the PNR lot at Cosumnes River College could be temporarily disrupted by construction equipment and vehicles. Grading and paving of this TSM Alternative facility would also result in temporary intrusions of construction noise and vibration, air emissions, and visual changes. These impacts are expected to be very localized and none would have substantial impacts on the ability of neighborhoods to function cohesively or would result in substantial loss of revenue to existing businesses.

5.2.12.2 Impacts of the Light Rail Transit Alternative

Construction of the LPAP2 LRT alignment, station facilities, PNR lots and the optional shuttle lot would temporarily affect study area neighborhoods due to street closures, rerouting of transit and vehicular traffic, and movements of construction equipment, materials and vehicles. These impacts would occur in different locations along the corridor at different times and would be of relatively short duration in each location. Most likely most if these impacts would occur at night or on weekends. None would be anticipated to have substantial impacts on the ability of neighborhoods to function cohesively, would affect the viability of community facilities or services delivery, or would result in substantial loss of revenue to existing businesses.

The LPAP2 would also result in temporary intrusions of construction noise and vibration, air emissions, and visual changes. These impacts would also be localized, temporary and intermittent; none would be anticipated to substantially affect neighborhood cohesion or viability, or threaten the continued viability of local businesses.

5.2.12.3 Mitigation Measures

A variety of mitigation measures are proposed to address the direct effects of construction activities – air, noise and vibration emissions, traffic disruptions and visual changes; see their respective subsections of this chapter. Since no substantial adverse impacts to neighborhoods and businesses are anticipated, no additional mitigation is proposed.

5.2.13 Noise and Vibration

5.2.13.1 IMPACTS

Construction noise varies greatly depending on the construction process, type, and condition of equipment used, and layout of the construction site. Many of these factors are traditionally left to the contractor's discretion, which makes it difficult to accurately forecast levels of construction noise. Overall, construction noise levels are governed primarily by the noisiest pieces of equipment. For most construction equipment, the engine, which is usually diesel, is the dominant noise source. This is particularly true of engines without sufficient muffling. For special activities such as impact pile driving and pavement breaking, noise generated by the actual process dominates.

Temporary noise during construction of the PNR lot associated with the TSM Alternative has the potential to intrude on residents near the PNR site. Most of the construction would consist of site preparation and paving and would occur only during daytime hours.

Temporary noise during construction of demolition, utilities relocation and protection, grading and tracks, LRT systems, stations and PNR lots associated with the LPAP2 also has the potential to intrude on residents near the construction sites. Most of the construction would consist of site preparation and laying new track and would occur only during normal daytime hours. The “worst case” scenario for noise and vibration impacts would occur if construction of the LPAP2 was concurrent with the Cosumnes River Boulevard widening and extension projects.

Construction activities that could cause intrusive vibration under the TSM or LPAP2 alternatives include vibratory compaction, jackhammers, and use of tracked vehicles such as bulldozers. The most serious sources of construction vibration are blasting and pile driving. There will be no blasting for either alternative and only limited, if any, pile driving under the LPAP2.

The TSM and LRAP2 alternatives are subject to the same noise restrictions as any other construction project in the South Sacramento area. The noise ordinances of both the City and County of Sacramento would be applicable to these alternatives. The ordinances have specific property line noise limits; however, construction from 6 am to 8 pm on weekdays and 7 am to 8 pm on Saturday and Sunday is specifically exempted from these limits.

5.2.13.2 MITIGATION MEASURES

In addition to the restrictions in the City and County noise ordinances, the mitigation measures would be applicable to construction of either the TSM or LPA Alternative:

- Include specific residential property line noise limits in construction specifications for this project, and
- Perform noise monitoring during construction to verify compliance with the limits. This approach allows the contractor flexibility to meet the noise limits in the most efficient and cost effective manner.
- Assure that a complaint resolution procedure is in place to rapidly address any problems that may develop.

Vibration impacts will be mitigated by including numeric limits in the construction specifications, monitoring vibration, and requiring the contractor to follow the specified limits.

5.2.14 Parks and Recreation

5.2.14.1 IMPACTS

TSM Alternative. The construction of a PNR lot for the TSM Alternative would have no impact on park and recreational facilities in the area.

LPAP2. The construction of the LPAP2 could involve temporary detours or street closures in the vicinity of the project. These are expected to have little or no effect on the ability of the public to access local parks and recreational facilities within the study area. Construction of the LPAP2 LRT facilities at the berm of the northeast corner of the Cosumnes River College Stadium would not affect access to or operations of the recreational facility. Construction detours and road closures are described in Section 5.2.17, Transportation/Traffic.

5.2.14.2 MITIGATION MEASURES

Mitigation measures to minimize effects due to street closures, rerouting of transit and vehicular traffic, noise and vibration intrusion, air emissions, and visual changes as a result of construction are identified in their respective sections in Chapter 5.

5.2.15 Public Services and Facilities

5.2.15.1 IMPACTS

TSM Alternative. The construction of a PNR lot with the TSM Alternative would have no impact on public services and facilities in the area.

LPAP2. The construction of the LPAP2 could involve temporary detours or street closures in the vicinity of the project. These are expected to have little or no effect on the ability to access public services and facilities within the study area. The primary effect would be the need for emergency vehicles to observe any short-term road closures and temporary construction detours. Construction detours and road closures are described in Section 5.2.17, Transportation/Traffic.

5.2.15.2 MITIGATION MEASURES

The following mitigation measures would address impacts on public services and facilities:

- RT will coordinate with local emergency service providers in developing detour plans during the project's final design.
- Emergency service providers would be provided advance notice of road closures and detour routes during construction.

5.2.16 Safety and Security

5.2.16.1 IMPACTS

The security setting and evaluation of long-term project impacts on the safety and security of corridor residents and workers and LRT patrons are presented in Section 4.16, Safety and Security. This section focuses only on the short-term safety and security impacts of construction activities. Impacts could occur

to workers on the job and/or others in the vicinity of construction activities. Also, please see Section 5.2.8, Construction Phase Hazardous Wastes, regarding the use and disposal of hazardous materials during construction.

5.2.16.2 MITIGATION MEASURES

The following mitigation measures would address safety and security impacts.

- RT will require the contractor submit a safety plan in advance of construction to ensure procedures for the safety of construction workers, local residents, and employees during construction of either the TSM or LPAP2 Alternative.
- Fencing and lighting of construction and staging areas, and recognized safety practice requirements for the utilization of heavy equipment and the movement of construction materials would be implemented to contain construction activities and avoid accidents.

5.2.17 Transportation Impacts

5.2.17.1 CONSTRUCTION IMPACTS ON RAIL AND BUS TRANSIT

The TSM Alternative and the LPAP2 both include new transit facilities. Construction of a TSM PNR lot would not affect transit service during the construction period. LPAP2 LRT facilities construction would potentially affect transit service temporarily during the construction period.

TSM Alternative. Cosumnes River College would have a new PNR lot under the TSM Alternative. Structures and bus parking areas would be constructed off-street, and their construction would require minimal street closures at nights or weekends for special limited construction operations such as making traffic signal modifications. Because bus service to the park-and-ride lot would begin only after construction was complete, no impacts on transit services are anticipated.

LPAP2. Construction of the LPAP2 would potentially affect light rail and bus services. Table 5.2-6 provides a summary of the streets that would be closed for installation of overhead catenary or construction/reconstruction of at-grade crossings of the freight and/or LRT tracks, the number of times and duration that they would be closed, and the transit services and traffic affected.

> **Rail Service Impacts.** The LPAP2 LRT Project would involve connecting existing LRT tracks with new LRT tracks south of the Meadowview Road Station. Construction of these new connections has the potential to affect on-going revenue service. To avoid significant disruption of current LRT operations, construction of the connection to the existing track would be scheduled during non-revenue hours.
>
> **Bus Service Impacts.** Construction of grade crossing improvements would involve partial or complete closure of individual cross streets at night and/or on weekends, so bus services and street traffic would not be substantially affected. Table 5.2-6 lists the street locations requiring closure. Construction impacts would be minimized wherever possible by working on one grade crossing at a time and implementing traffic control measures, such as flagging and detours.

Table 5.2-6: Street Closures Due to Construction of the LPAP2

Street	Location (From/To)	Construction Activity	Duration	Impact Area		
				Transit	Traffic	Parking
Meadowview Road	UPRR Crossing	Freight track & New LRT Grade Crossing or Grade Separation	Off-peak including possible night time – est. 8 to 10 hrs per closing.	No	Minimal	
Franklin Boulevard	North of CRB	New LRT Grade Crossing or Flyover	Off-peak including possible night time – est. 8-10 hrs per closing	No	Minimal	
Center Parkway	South of Folsom Blvd.	New LRT Grade Crossing	Off-peak including possible night time – est. 8-10 hrs per closing	No	Minimal	
Cosumnes River Blvd.	East of Center Parkway	New LRT Grade Crossing	Off-peak including possible night time – est. 8-10 hrs per closing	No	Minimal	
Cosumnes River Blvd.	West of Bruceville Road	New LRT Flyover	Off-peak including possible night time – est. 8-10 hrs per closing	No	Minimal	

** LRT service on the existing Phase 1 LRT line could be affected by constructing the at-grade junction with the South Line just north of Meadowview Road. Transit impacts otherwise refer to bus services that use the affected street either currently or in the future.

Source: Parsons Corporation, December 2002.

5.2.17.2 MITIGATION MEASURES

The following mitigation measures would reduce rail and bus transit impacts while constructing the LPAP2:

- RT will coordinate construction with other major public or private construction projects within a one-mile radius of its project and schedule its construction contracts to minimize combined project impacts to the surrounding community while at the same time trying to reduce the combined schedule for construction activities.
- Grade-crossing construction that requires street closure will be scheduled so only one crossing in an area is affected at one time; crossings serving as alternate bus travel routes will remain open.
- RT will provide the public and transit users advance notice of proposed transit reroutes and any other changes in stops and service; Bus route detours will minimize the number of bus stop changes.
- Construction of at-grade crossings will take place during non-peak periods whenever possible, including at night. In residential areas, major activity will be limited to normal work hours whenever practicable, to avoid noise and related impacts to the local population.
- RT will notify local residents and businesses in advance of proposed construction activity using a variety of techniques including signage, electronic media, community newspapers, and other techniques identified in the project's public involvement program.

5.2.17.4 CONSTRUCTION IMPACTS ON VEHICULAR TRAFFIC

Similar to impacts on transit services, the construction of major facilities for the TSM Alternative and the LPAP2 would potentially affect vehicular traffic on adjacent streets.

TSM Alternative. Traffic in the vicinity of the proposed park-and-ride lot at Cosumnes River College could be disrupted by construction equipment and traffic. With proper traffic handling procedures and the scheduling of major traffic generating activities in non-peak periods, the impacts would be minimized.

LPAP2. Traffic in the vicinity of the proposed park-and-ride lots at Franklin, Cosumnes River College, and Calvine/Auberry could be disrupted by construction equipment and traffic. With proper traffic handling procedures and the scheduling of major traffic generating activities in non-peak periods, the impacts would be minimized. Construction of LPAP2 LRT improvements would require night time street closures for 8 to 10 hours at several locations and rerouting of vehicular traffic. Additionally, street closures at similar times may be needed to carry wires over streets at grade crossings or to install falsework or erect bridge elements at flyovers or underpass (an option at Meadowview). This work could be done at night.

Table 5.2-6 lists the streets along the South Sacramento Phase 2 Corridor that would be closed for the construction or reconstruction of at-grade crossings of the LRT and freight tracks, the number of times and duration they would be closed, and the traffic and transit services potentially affected. As part of the construction contracts, RT would require that the contractor schedule full closures during night-time periods and implement proper traffic handling procedures to minimize construction impacts; some crossings may be constructed by closing only half the crossing at a time, with the work being performed during other off-peak times.

The closures of Cosumnes River Boulevard listed in Table 5.2-6 presume that this street is widened prior to LPAP2 LRT construction. If the LPAP2 LRT project precedes the widening project, there would be less

disruption of Cosumnes River Boulevard because only one crossing of the street would be required instead of two. All street crossings except Bruceville Road have planned or optional flyovers that would require more limited closure than the base-case at-grade crossings.

If Cosumnes River Boulevard is widened prior to the LPAP2 construction, construction of the LRT tracks in the median of Cosumnes River Boulevard between Center Parkway and west of Bruceville Road would require construction barricades and potentially narrowed travel lanes to accommodate the construction activities. Traffic on Cosumnes River Boulevard might be interrupted occasionally to permit access to the construction area in the median.

5.2.17.5 MITIGATION MEASURES

The same mitigation measures for bus transit impacts are proposed to address vehicular traffic impacts with two additions:

- As part of their contracts, contractors will be required to prepare and implement traffic handling plans approved by the City of Sacramento, the City of Elk Grove, or Sacramento County, as appropriate. Plans will identify detour routes, signing and barricade locations, turnarounds at street closures, and other traffic control elements.
- As part of their regular project planning meetings with neighboring jurisdictions, RT will coordinate with the City of Sacramento, the City of Elk Grove, and Sacramento County to provide the public advance notice of proposed traffic detours and their duration.

5.2.17.7 CONSTRUCTION IMPACTS ON PARKING

Construction activities for the TSM or LPAP2 Alternative are not expected to have any substantial impact on availability of parking. Construction workers for the TSM PNR lot would be expected to park on-site. The on-site jobs creation potential of the TSM Alternative is estimated at about 90 total jobs. Not all of these workers would be on the site at the same time.

Similarly, the major streets that would be affected by LPAP2 LRT station construction, such as Folsom Boulevard, Center Parkway, Cosumnes River Boulevard, and Bruceville Road, do not provide on-street parking in the vicinity of the proposed LRT crossings. Construction workers would park on-site in designated areas of the right-of-way or proposed station and park-and-ride lot areas. Where the construction site would not accommodate worker parking, there would be some minor temporary inconvenience to local residents from the additional parking demand in their neighborhoods. Total on-site jobs creation potential of the LPAP2 is estimated at 900 person years of employment, but this number would be spread over the 5-mile length of the alignment and almost three years of construction, and not all of these workers would be on site at the same time.

5.2.17.8 MITIGATION MEASURES

Provisions will be incorporated into the construction contracts to avoid parking impacts to residential areas or businesses requiring on-street parking.

5.2.18 Utilities

5.2.18.1 IMPACTS

Locations of existing utilities, design treatments and construction procedures are described in Section 4.17, Utilities, and shown on the strip maps of the LPAP2, Figures 2.4-2 through 2.4-17. RT will coordinate with all utility providers during the design phase of the project to identify any additional subsurface and overhead utilities so that design treatments and construction procedures can be developed to avoid adverse impacts to existing utilities and prevent disruptions in service. The potential exists, nonetheless, for construction activities for the TSM or LPAP2 Alternative to encounter unexpected utilities within the project right-of-way. Relocations of affected utilities in the corridor or at LRT station or PNR lot locations will be the responsibility of RT and may require short-term, limited interruptions of service. No interference with existing utility service is anticipated during installations of connections to existing high-voltage power transmission facilities because the utility will put customer loads on alternate feeders during the connection activity.

5.2.18.2 MITIGATION MEASURES

To avoid or minimize disruptions in service and inconvenience to customers, the following mitigation measures will be implemented:

- RT will continue close coordination with all utility providers during the construction stages of the project to identify any potential conflicts and formulate strategies to overcome potential problems.
- A set of detailed plans will be submitted to utility providers for their review and comment prior to the onset of any relocation work.
- Any short-term, limited service interruptions would be scheduled well in advance and appropriate notification provided to users. These interruptions would be discussed and planned at the regular planning meetings between RT and neighboring jurisdictions.

5.2.19 Cumulative Construction

5.2.19.1 CUMULATIVE CONSTRUCTION PHASE IMPACTS

In the event that construction of any or all of the related projects occurs simultaneously with the construction of the TSM or LPAP2 Alternative of the South Sacramento Corridor Phase 2 project, cumulative construction phase impacts could result. Many categories of impact that have been evaluated for the present project have relatively minor construction-period impacts or can be addressed through design requirements, best practices, and mitigation measures. Such categories include aesthetics, agriculture, cultural resources, geology and soils, construction employment, hazardous wastes, water quality, land use, energy, public services and facilities, parks and recreation, safety and security, and utilities. Neighborhoods and businesses may, however, experience cumulative or continuing construction-related effects in the areas of traffic detours, air quality, and noise. Also, there may be cumulative effects of temporary disturbances of habitat areas or increased risk of incidental takes of special status wildlife and plant species with multiple construction projects taking place in the same general area.

For some related projects, advantages to concurrent construction may outweigh the disadvantages of cumulative construction impact. For example, were the CRB Extension and Widening projects and the LPAP2 constructed at the same time, RT and the City of Sacramento would coordinate design and

construction decisions, streamlining the construction process along the CRB alignment and ensuring mutually compatible project design. In addition, concurrent construction would decrease the duration of time over which residents of neighborhoods along CRB would experience the inconvenience of traffic detours and noise and vibration impacts caused by construction in the CRB right-of-way. Also, impacts to the SRCSD bufferlands would be limited to a one-time construction period for the simultaneous construction of the CRB and LPAP2 LRT extensions along the bufferlands, and thus the bufferlands would not be subject to repeated disturbance by sequential construction projects.

Concurrent or closely coordinated construction of the Sacramento Streams Project with the LPAP2 in the Union House Creek segment would facilitate construction of combined flood/sound walls, if this approach is confirmed during preliminary and final design of both projects.

RT will continue to coordinate with the proponents of the related projects to identify the potential for concurrent construction benefits and impacts. Particular attention will be paid to potential traffic operations impacts of simultaneous construction on contiguous projects or projects affecting related parts of the transportation network. Temporary detours and notifications to emergency service providers and the traveling public will be worked out in coordination with all other projects in the vicinity.

Coordinated implementation of air quality and noise mitigation measures as identified in Sections 5.2.3 and 5.2.13 will reduce impacts of the South Corridor and related projects. It is anticipated that all of the related projects will also implement mitigation measures to reduce the impacts experienced by people living, working, traveling, or attending school in the vicinity. It is also anticipated that each project with potential to affect habitat areas during construction will implement measures – such as pre-construction surveys, identification of environmentally sensitive areas (ESAs), biological monitoring, and worker training – to minimize harm to special status wildlife and plants. RT will continue to work with SRCSD bufferlands staff and City staff to identify opportunities for coordinated surveys and/or monitoring.

The LPAP2 and TSM alternatives would each require the relocation of various utilities, as identified in Section 4.17. Some related projects would also need to relocate utilities, as is the case with the Cosumnes River Boulevard widening and extension and Bruceville Road widening projects. The Cosumnes River Boulevard Extension project and the College Square Marketplace development would involve the extension of utilities to new areas. RT is committed to working with the affected utility companies to minimize any interruptions in service. This is standard practice for construction projects, and each of the related project proponents can be expected to make a similar commitment.

5.2.19.2 MITIGATION MEASURES

The following mitigation measures will address cumulative construction phase impacts: If construction of the TSM or LPAP2 Alternative occurs concurrently with construction of related projects, RT will coordinate with the other project proponents, as necessary to:

- Develop traffic handling plans to minimize impacts to the traveling public.
- Develop traffic handling plans and detour routes in coordination with emergency service providers to prevent adverse impacts to emergency service delivery.
- Coordinate with other project proponents, as necessary, in the development of public information messages regarding the timing and location of construction activities, temporary detours, and specific measures to be undertaken to reduce construction impacts.
- Continue to coordinate with all utility providers during the construction stages of the project to identify any potential conflicts and formulate strategies to overcome potential problems.

- Submit a set of detailed plans to utility providers for their review and comment prior to the onset of any relocation work.
- Schedule any short-term, limited service interruptions well in advance and with provision of appropriate notification to users.
- Apply mitigation measures for fugitive dust and PM_{10}, listed in Section 5.2.3.3, in overlapping or adjacent construction areas.
- Apply mitigation measures for construction noise and vibration, listed in Section 5.2.14.2, in overlapping or adjacent construction areas.