Technical Memorandum

Date:	December 17, 2021, updated June 29, 2022
Project:	Chehalis River Basin Flood Damage Reduction Project
To:	Chehalis Basin Flood Control Zone District
From:	HDR – Luke Grebe, Verena Winter, Justin Williams
Subject:	Access Road Update and Best Management Practices
Attachment:	Attachment A. Figures

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1.0 Introduction and Purpose

The Draft Environmental Impact Statements (EISs) prepared by the Washington Department of Ecology (Ecology); pursuant to the State Environmental Policy Act) and the U.S. Army Corps of Engineers (USACE); pursuant to the National Environmental Policy Act) evaluate anticipated impacts associated with construction and operation of a proposed Flood Retention Only - Expandable (FRE) facility (i.e., the Chehalis River Basin Flood Damage Reduction Project

[proposed project]) in the Chehalis Basin, Washington State. The Chehalis Basin Flood Control Zone District (District) is the project proponent. During development of the Final EISs, Ecology and USACE requested additional information to inform their assumptions regarding the location, extent and configuration of access roads necessary for the project construction and operation. This memorandum describes existing forest roads that could be used as alternative access routes around the active construction area and quarry access, and it includes best management practices (BMPs) to reduce impacts of sedimentation from the use of existing roads during construction. Permanent access roads are intended to be used mostly for forestry practices, recreation, as well as access to the facilities (FRE facility, debris management site, and fish trap and haul operation sites.)

At this stage in the project design, the configuration, location, and usage of access roads is approximated based on a general understanding of construction processes and accompanying BMPs for environmental protection. During the final design phase, a road analysis and design, geotechnical field work and testing, access road related specifications and layout drawings, and materials quantities will be further refined and more detailed plans for the access roads developed. The rough order of magnitude (ROM) estimates provided herein reflect the current conceptual level of design for the FRE facility and assumptions regarding the requirements for access road design. HDR has used professional judgement to provide the recommended guideline values for the project description to be evaluated in the EIS.

The District's proposed approach for access road construction is to minimize disturbance by using existing roads to provide permanent access around the flood inundation area and temporary access to and around the FRE construction site. Existing roads used for project purposes will be improved and maintained using BMPs. The access roads can be categorized as follows:

- Access roads used during construction of FRE facility:
  - FRE construction site temporary roads
  - Haul roads from quarries and staging areas
- Access roads used during operation of FRE facility:
  - During a flood event
  - After a flood event
  - Debris management after a flood event
- Access for commercial forestry practices
- Access to recreation sites

Existing roads would be improved to provide safe temporary and permanent access during construction and operations of the FRE facility. Improvements to existing roads will range from minor surfacing repair and vegetation trimming to roadbed widening or reconstruction in areas with steep grades or sharp corners. Many sections are expected to require new or additional aggregate base to be placed on the road as an improved wear surface and grading to reshape the driving surface and provide positive drainage. Improvements will focus on improving mobility and safety for the type of vehicles that will be travelling the roads. Some access potentially may have to be established or relocated. In this case, new roads would have to be built. Minimizing the length as much as possible to avoid impacts should be the priority. Most of these new roads

would be around the immediate construction area. Within the inundation area, new roads are not anticipated at this time.

Attachment A includes four figures that depict the associated access roads to the FRE facility:

- Figure A-1: FRE Facility Site Vicinity Existing Access Roads – Provides an overview of the area and existing access roads
- Figure A-2: FRE Facility and Access Roads around the FRE Facility – Shows the road network and potential alternate routes
- Figure A-3: FRE Facility and Access Roads around the Inundation Area – Shows the roads directly affected by the FRE facility and inundation area
- Figure A-4: Location of Debris Management Yard and Access Roads – Shows the access roads around the area where the debris after a flood event will be sorted

This memorandum provides the agencies with ROM estimates of the location and extent of access roads to be used for construction and long-term operation of the project. Further, the quantity of materials for existing road improvements will be assessed. Finally, a ROM of the estimated number of truck loads for improving roads and that affect roads during construction will be provided.

2.0 Access Roads Used During Construction

Roads associated with the FRE site construction are temporary for the duration of the construction. Access to the FRE construction site would be provided coming from Pe Ell and then on Forest Road (FR) 1000 (Figure A-3). FR 1000 to the FRE construction site would be used for construction equipment, materials, and supplies. The District anticipates that construction workers would park off-site in existing lots and be shuttled to the construction area to limit construction-related traffic and vehicles. Construction worker access is part of the means and methods by the contractor and cannot be estimated by the engineer. At this time, no new parking areas are anticipated; however, this would be confirmed during future design phases.

During the approximately 5-year construction period, a bypass would be necessary around the construction site for vehicle and truck use not associated with construction. Alternative access around the site is known to exist, and discussions with the existing landowner regarding bypass routes around the site and improvements to existing roads would be conducted. All road improvement activity would include the use of appropriate BMPs for resource protection. Some bypass and access road improvements may be located in the 100-year floodplain of the Chehalis River.

2.1 Temporary Construction Access Roads

Narrower, temporary roads for construction access within the actual construction zone of the FRE structure and the quarry site would be constructed. Potential conceptual access roads for the FRE structure construction zone are shown on Figure A-2 (labeled: Temporary FRE Construction Access Roads). These roads are used to place concrete and other materials during the construction process and are means and methods of the construction operation by

the contractor. Temporary roads within the active construction site would be removed or abandoned after construction.

2.2 Haul Roads from Quarries and Staging Areas

Access from the FRE facility to the proposed quarries (See HDR memorandum "Quarry Operations" Dec. 2021) is anticipated to be provided by existing roads. Figure A-1 shows the North and South quarry sites and existing access roads leading to these sites. The entry area to the quarries may have to be established with a portion of new road alignment. Further analysis of the existing roads is necessary. Also, further analysis of the quarries itself, if the material is suitable, is necessary before determining road access.

Conceptual access roads within the quarry site to cut rock and transport it away from the quarry site have not yet been developed and are also means and methods of the contractor.

Other roads that are considered temporary construction roads are access to the staging areas and spoil areas. Use of existing roads to these areas is anticipated. Those roads may be removed or abandoned after construction.

3.0 Access Roads Used During Operation of the FRE Facility

This section describes roads that are being used after the FRE facility has been constructed and is in operation.

3.1 Access around Temporary Inundation Area

To the extent possible, the District proposes to use existing roads to provide permanent access around the temporary inundation area. FR 1000 is the main route into the area from the town of Pe Ell. Up to 6 miles of FR 1000 would occasionally be inundated during FRE operations during a flood event, at which time a detour could be used consisting of FR A-line, FR F-line, and FR 2000 to rejoin FR 1000 upstream of the temporary inundation area footprint (Figure A-2). Future analysis and designs would inform the nature of proposed detours and long-term vehicular access.

3.2 Access after Inundation Events

After an inundation event the road network within the inundation area may exhibit saturation, siltation and shallow landslides may be mobilized during draw down of the reservoir and block or undermine access roads. To minimize the potential damage to the roads, an operations and maintenance plan that includes measures to protect vulnerable areas of the road network will be developed as part of the overall design of the FRE facility. A site investigation will be necessary to inspect the current conditions of the existing roads that will be inundated during operation of the FRE facility. The inspection will focus on how the roads were constructed and the current condition of the roads. Some geotechnical shallow drilling or potholing might be necessary to investigate the current configuration of the roads and relevant slopes above or below the roads. The assessment of current conditions will determine to what extent the existing roads are resistant to the effects of flooding or will have to be improved, or reconstructed, as part of the construction phase of the proposed project. The location of road improvements will be

determined by the outcome of a drawdown analysis that includes the potential washout, undermining or blocking of the roads within the inundation area. These effects can be minimized by reducing the rate of draw down. A hydraulic analysis is expected to be completed to determine project effects during drawdown (including the roads upstream of the facility) and this will be used along with other factors associated with project to achieve a balanced approach to reduce overall project impacts.

Once the FRE facility is operational, the roads will be inspected periodically for damage, fallen trees, or erosion. A road inspection plan will be part of the operation and maintenance of the FRE facility. If a road is determined to be damaged, it is recommended that it will be repaired prior to the next flood event. The operations plan for the FRE facility will provide a maximum drawdown rate of the reservoir. The drawdown rate be determined by the hydrology upstream and downstream of the FRE facility and balancing the various project effects associated with inundation, drawdown and return from flood retention to natural stream flow.

After a flood event, roads will be inspected to assess damage and repairs implemented to return the access roads to a usable condition. Until returned to service, damaged roads will be blocked with traffic control devices to prevent vehicles from traveling on them while alerting drivers to detour routes. Inspections will be performed immediately after an inundation event when conditions on affected roads permit safe travel. Inspectors will access the site by foot, ATV, or other vehicle depending on the integrity of the road and document road conditions. Following inspection, recommended repairs to return the damaged roads to a safe and usable condition will be implemented. The goal of the initial assessment and improvement of roads prior to the project operational phase will be to avoid and minimize damage during inundation, however HDR anticipated that bridges, culverts, or abutments may require some maintenance following inundation. There may be some impacts to the road network from flood flows that include erosion to the roadbed, loss of roadbed to sliding, landslide or rockslide blockage, or debris left behind by receding water. Areas where the driving surface has been washed away will have gravel imported and bladed onto the roadbed to re-establish the driving surface. It is anticipated that the draw down rate of the reservoir would minimize washouts. However, alternative design strategies can be explored to minimize sedimentation in the river. Strategies may include hardened overflow paths, riprap stabilized embankments, or alternative driving surfaces such as larger rock that would be less susceptible to erosion. Roads with debris scattered on their surface will be cleared and then bladed to restore the driving surface. Existing structures such as bridges, road approaches, and culverts will be inspected for integrity and cleaned or repaired to restore function.

3.3 Debris Management after a Flood Event

The Vegetation Management Plan identifies a location for debris (logs and large wood materials) that might remain after a large flood event. This debris management area will be used to collect floating debris from the reservoir as it is being dewatered. Figure A-4 shows the proposed location of the debris management sorting yard and the access roads around it. The location of the proposed debris management staging yard will be inundated during the flood event but with the lowering of the reservoir will become exposed for debris management

operations. The road leading to this location will also be initially inundated during the flood event and inspected and repaired as necessary before use.

4.0 Access for Commercial Forest Practices

Currently, the area around the FRE facility is mostly owned and used by commercial forest practices. This route will be affected by the FRE Facility during construction and after construction when the FRE facility is in operation. The main haul route for the logging company from the town of Pe Ell is FR 1000 (Figure A-3) of which parts will be eliminated by the FRE facility. A permanent bypass may be required for FR 1000. Figure A-3 shows a potential re-route option along FR 1010 which connects to the existing main route past Hull Creek on the east side. The west side may be accessed through Highway 6. Existing roads being considered as a bypass option will include some longer hauling times and potentially adverse terrain for the logging traffic.

The District's proposal is to maintain existing roads within the inundation area for forestry use. Exact hauling routes that need to be relocated will have to be determined and coordinated with the forest practice companies once the rezoning of these lands has been fully established and the operational requirements of these roads evaluated.

5.0 Access Roads to Recreation Sites

The District is committed to pursuing the development of public recreational access and sites that would support recreational uses largely consistent with those currently provided in the project area. These uses include day uses such as fishing, hiking, biking, whitewater boating, and horseback riding. The District is interested in also potentially providing developed recreation uses such as picnicking, scenic overlooks, interpretive and educational, trail, and developed camping opportunities, where appropriate, which do not currently exist in the project area.

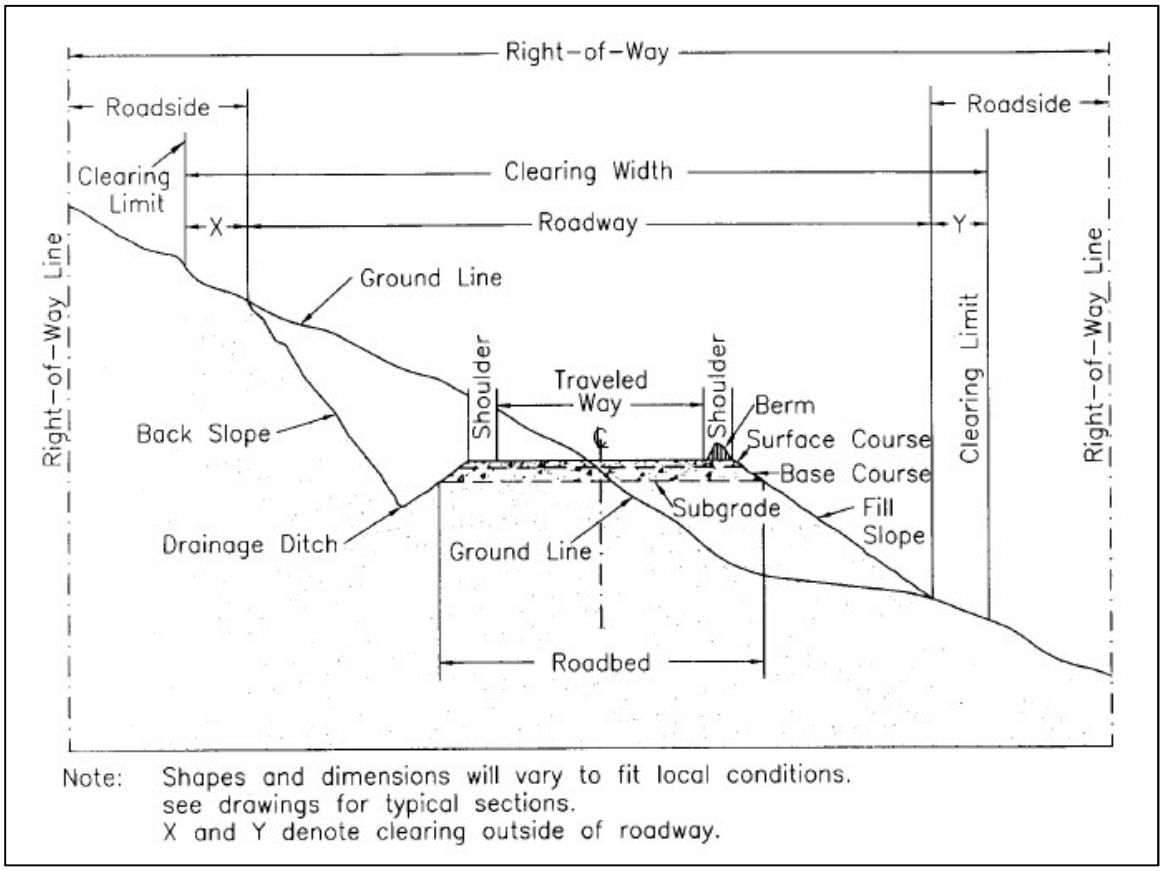
Access roads within the temporary inundation area would remain open for public access to any of the recreation improvements discussed in FRE Facility – Conceptual Level Recreational Improvement Options Memo. Further, following flood events when the temporary inundation area is utilized, the access roads that were inundated will be evaluated and maintenance may be required before public use of the roads is permitted and safe, as described in this memo. The inundated roads will remain open to public access as long as they are safe and have not been damaged by operation of the FRE facility during a flood event.

6.0 Access Road BMPs

To the extent possible, the District will minimize disturbance of surfaces by using existing roads to provide access to and around the construction site and during operation of the FRE facility. However, some permanent road improvements will be necessary to provide sufficient load-bearing capacity for construction equipment. Improvements likely would include amendment with quarry spoils and subsequent long-term maintenance activities. Designed improvements would require implementation of applicable BMPs to minimize erosion and sediment inputs to

the river and its tributaries. Road improvements will be subject to the appropriate regulatory requirements of the owners of the roads. A typical forest service road cross-section is provided on Figure 1. The precise dimensions of the roadway are expected to vary depending on location and will be determined during the subsequent design and permitting phase for the project. At this time, HDR assumes the dimensions of the improved roads will match the existing roads.

Figure 1. General Cross-Section of a Typical Forest Service Road



Source: National Road Construction Specifications EM-7720-100, Revised August 1996 Division 100 General Specification

6.1 General Construction Best Management Practices

The District will adhere to Construction BMPs for the improvement of existing roads, construction of new roads, and ongoing maintenance of all roads. At a minimum, BMPs and other resource protection actions would include:

- All new and improved roads would be constructed to conform to regulatory guidelines that apply to each set of roads at the time of permitting. In some cases, Washington State Forest Practices Rules (Title 222 Washington Administrative Code) standards may apply to road construction. As applicable, these standards would be considered during future design of permanent and temporary access roads or existing road improvements.
- Installation of high-visibility fence to define construction limits.

- Maintenance of access to private properties to the extent possible by installing signs, marking detour routes, flagging, and providing information to property owners, including notification in advance of construction activities.
- Development of traffic control plans.
- Stabilization of construction entrances.
- Implementation of a spill prevention control and countermeasures plan for temporary fuel tanks, construction equipment, and on-site diesel generator, including identified refueling locations, spill control measures, and necessary containment equipment and materials.
- Compliance with dust control policies and plans, including the use of water trucks.
- Stabilization of construction access roads and parking areas.
- Implementation of adaptive management for stormwater control during construction.
- Measurement of identified pollutants such as turbidity and pH during construction at identified permit-required compliance points.

6.2 Erosion Control Best Management Practices During Construction

During construction, the District will require its contractors to comply with the National Pollutant Discharge Elimination System (NPDES) permit, Washington Administrative Code 173-201A: Water Quality Standards for Surface Waters of the State of Washington, and other federal, state, and local codes and regulations as incorporated into an NPDES permit issued for the project. BMPs would be implemented in accordance with Ecology's *Stormwater Management Manual for Western Washington*, current Washington State Department of Transportation's *Standard Specifications for Road, Bridge, and Municipal Construction* and *Standard Plans*, and Lewis County standards.

As part of the construction contract, the District would require the contractor to prepare and implement a temporary erosion and sediment control plan for all aspects of construction, including clearing and grading within the FRE facility construction footprint, temporary access road, and improvements to existing access roads (e.g., to selected quarry site). Implementation of the plan would minimize stormwater impacts, such as high storm flow runoff, soil erosion, waterborne sediment from exposed soils, and degradation of water quality from on-site pollutant sources. All sub-contractors will be required to comply with the temporary erosion and sediment control plan.

At a minimum, and for consideration as part of the proposed project, the following BMPs would be implemented to minimize the potential for erosion and sediment production:

- Using straw bales, silt fencing, vegetation strips, brush barriers, or other suitable sedimentation control or containment devices.
- Washing truck tires to reduce tracking of sediments and aquatic invasive species from construction sites.
- Covering exposed soil stockpiles and exposed slopes using mulch, nets and blankets, plastic coverings, temporary seeding and sodding, and compost blankets.
- Using straw mulch (certified free of noxious weeds and their seeds) and erosion control matting to stabilize graded areas where appropriate.
- Retaining vegetation where possible to minimize soil erosion.

- Seeding or planting appropriate vegetation on exposed areas as soon as possible after work is completed.
- Constructing temporary sedimentation ponds to detain runoff water where appropriate.
- Using Baker tanks, sediment traps, flow control structures, oil/water separators, ditches, and level spreaders to control erosion.
- Using berms, ditching, and other on-site measures to prevent soil loss.
- Monitoring downstream turbidity during construction to document the effectiveness of implemented measures.
- Visually monitoring for signs of erosion and implementation of additional erosion control measures, as required.
- Relative to excavated slopes that may be prone to bank instability during construction:
    - Excavation would begin from the upper portion of the slope first to avoid stability issues.
    - Steep rock slopes would include pattern rock bolts for stability.
    - Over-steepened slopes included as part of the permanent design would be stabilized to meet slope design criteria. Options include:
        - Introduction of horizontal drainage into vulnerable slopes to improve stability
        - Berms placed at the toes of steep slopes
        - Introduction of tieback walls to retain slopes

- The District will require its contractor and sub-contractors to comply with all permit requirements and monitor erosion during construction.

7.0 Quantity Estimates for Access Road Usage and Improvements

7.1 Construction Vehicle Quantity Estimate Using the Access Roads

During construction of the FRE facility, the access roads will be used by construction vehicles from and to the FRE Facility and quarries. At this stage in the design, the exact number of vehicle trips and vehicle types cannot be determined and a rough estimate will be provided. To determine the final selection of the quarry site and other construction materials, additional geotechnical explorations and material testing, as well as structural analysis will have to be completed during subsequent phases of work.

HDR's December 2021 Quarry Operations Technical Memorandum listed the estimated material quantities needed to construct the FRE facility. Based on the memorandum, the FRE facility would require development of about 900,000 cubic yards (CY) or 1.7 million tons of aggregate materials (based on a bulking factor of 1.25 resulting from laboratory testing of the basalt with a density of 162 pounds per cubic foot [pcf] and assumed in place bulk density of 130 pcf). A quarry capable of generating up to two times the aggregate required for the FRE facility is expected to provide a sufficient margin of safety needed for the combined aggregate, road base, and riprap with a suitable allowance for waste associated with unacceptable rock such as weathered basalt or interbedded siltstone materials. The quarry rock may not be suitable for conventional concrete and material would need to be furnished from off-site. HDR's December

2021 Quarry Operations memorandum provides details about the number of truck loads needed to establish the quarries and transport quarry material.

Considering a base aggregate material quantity of 1.7 million tons. Each off-road dump truck is assumed to carry a payload of 85,000 pounds, with an expected 40,500 load count. Once the aggregate material is delivered from the quarry to the roller-compacted concrete (RCC) processing area, it will be loaded into the RCC plant to produce the RCC for the dam structure.

It is likely that the RCC will be conveyed directly from the batch plant down into the valley for placement. The RCC placement operations may require some localized dump trucks to move the RCC material for the conveyor discharge point to the final placement location. A bulldozer can also be used to push the RCC materials to the final placement location. The equipment required to handle the RCC material is assumed to only work within the RCC footprint, would not be traveling on any haul roads, and may be considered incidental to the work required to construct the RCC dam.

7.2 Quantity Estimate for Re-Grading and Surface Treatment for Existing Access Roads

Existing roads may need surface treatment and re-grading to accommodate heavy vehicles during construction and after a flood event. Some limited new road construction may be required to provide ongoing access for the adjacent landowners, recreation use, and access to the FRE facilities. A field assessment will have to be completed in the future to determine current road conditions and assess the extent of necessary improvements.

FR 1000 is currently being used by heavy logging trucks, can withstand the traffic loading and increased frequency of use, and will not require any major improvements. Anticipated required work to this road is assumed to include adding a 12-inch layer of road base to the existing surface. This work would require truck delivery to the site from an approved sourcing location, which at this time has been assumed to be the North and South quarries. Dump trucks, front end loaders, bull dozers, road graders, compactors, and water trucks will likely be required to perform the road re-surfacing work. This may require multiple crews working at the same time. The estimated material required to resurface FR 1000 has been calculated by applying a 30-foot-wide by 12-inch-thick layer for 12 miles, which equals a base value of 70,400 CY. Assuming a road base unit weight of 1.6 ton/CY, the base aggregate material weight equals 113,000 tons. Each off-road dump truck is assumed to carry a payload of 42 tons with a 2,700 load count.

All other roads within the footprint of the FRE location, the inundation area, and to the quarries measure approximately 50 miles in total length and are considered unimproved roads. This will have to be verified as the design develops. Those roads will require upgrades to be suitable for the project. To determine road upgrade impacts, it is assumed the improvements will consist of increasing the width from 20 to 30 feet wide. Dump trucks, front end loaders, bull dozers, road graders, compactors, and water trucks would be required to perform the road improvement work and may require multiple crews working at the same time. A formal design and supporting design drawings of the roadway improvements have not been developed but are expected as the design advances. The estimated material required for the road embankments has been

calculated by assuming only imported embankment materials will be used. Without a horizonal and vertical profile of the existing and proposed improved roadway and geotechnical design for slope stability, it is not possible to estimate the balanced cut and fill operation. This work would require dump truck delivery to the site from an approved sourcing location. At this stage, sourcing locations are assumed to be any of the staging areas, dam excavation, quarry overburden, or use of any spoils. This equates to an additional 5 CY per linear foot. The estimated base value is 1,320,000 CY. Considering an embankment unit weight of 1.65 tons/CY base embankment material quantity of 2,178,000 tons. Each off-road dump truck is assumed to carry a payload of 85,000 pounds/42 tons with a 52,000 load count.

The unimproved roads also need to be resurfaced. Road base materials would require dump truck delivery to the site from an approved sourcing location, which is assumed to be the North and South quarries. The estimated material required for re-surfacing has been calculated by applying a 30-foot-wide by 12-inch-thick layer for 50 miles. This equates to a base value of 293,300 CY. Considering a base aggregate material quantity of 470,000 tons. Each off-road dump truck can carry a payload of 85,000 pounds/42 tons with an 11,200 load count.

8.0 Conclusions

This memo clarifies construction and operation of the proposed FRE facility assumptions for using existing access roads between the FRE facility and quarries and access around the temporary inundation area. This information is intended to refine the assumptions regarding access roads for development of the Final EISs. Most traffic during construction of the FRE would be in the general area between the FRE site and quarry areas. The existing road system including FR 1000 to the FRE construction site would be used for transporting construction equipment, materials, personnel, and supplies.

A rough number of truck loads has been estimated for the FRE facility construction and operation for access road improvements. Table 1 summarizes the estimated numbers.

Table 1 : Summary of Estimated Quantities and Truck Loads

Construction Materials	Base Quantity Weight	# of Truck Loads
Production of RCC	1,700,000 tons	40,500
Road FR 1000 Improvements 912 miles)	113,000 tons	2,700
Unimproved Roads Upgrades (50 miles)	2,178,000 tons	52,000
Unimproved Roads Resurfacing (50 miles)	470,000 tons	11,200

Furthermore, BMPs will be utilized for potential new access roads at the FRE construction site and quarries, and for the existing U.S. Forest Service roads between the construction site and quarry, and for modifications of existing roads to mitigate construction disturbances. All BMPs will be designed to meet permit requirements.

Attachment A. Figures