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Subject SCTP Phase 5B Project: Package 1—Odor Control/Existing Facilities Improvements Site Perimeter Fence Recommendations

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Copies to Jamie Dooley/Jacobs

1. Purpose and Summary of Recommendations

This memorandum is intended to serve as basis of design for site security improvements at the Salmon Creek Treatment Plant (SCTP).

Site entrance gate security improvements are identified and proposed in the Phase 5B Project: Package 1—Odor Control/Existing Facilities Improvements (Package 1) design. These include actuation/automation, keypad and card reader access, intercom, and video link from the operations room to observe occupants desiring access.

Site perimeter fence improvements are identified, which will be implemented outside the Phase 5B Project.

2. Background and Site Observations

The SCTP is located adjoining a recently-developed residential area and bounded by wooded areas to the southwest and Salmon Creek to the north.

The wooded area is in a hilly area, with blackberry bushes and brush, along with tall conifer trees. A subdivision of private residences is located to the southwest above the treatment plant, and a Burlington Northern Santa Fe railroad right-of-way is to the west of the property. See Figure 1.



Figure 1. Salmon Creek Treatment Plant (Google Earth Aerial Image)

On the west side, a dual fence arrangement exists. Close to the plant is a 6-foot-high chain-link fence with 3-strand barbed wire topping. This fence is galvanized steel in acceptable condition. Some vegetation pruning is necessary to prune back brambles, but overall the fence is in acceptable shape. See Figure 2.



Figure 2. View Looking West of 6-Foot-High Perimeter Fence

Near the western property line, a 3-strand barbed wire livestock fence is in place, approximately 4 feet high. This fence is mostly overgrown and hidden from view. This fence is in poor shape, and it is uncertain whether the fence follows the actual property line boundary because it is not believed to have been surveyed before it was installed. See Figure 3.



Figure 3. View Looking West, Outer Property Boundary Fence with 3-Strand Barbed Wire

Exterior facing signs are placed approximately every 100 feet; these state “No Trespassing – Violators Subject to Prosecution” or “No Admittance – Authorized Personnel Only.” An example is shown in Figure 4.



Figure 4. Example “No Trespassing” Signage

At the upper entry to the plant, a manual swing gate, made of 7-foot-high wrought iron exists. A Knox box for emergency access by the Fire Department exists, but no automation, electronic gate controls, security intercom, or camera units exist at this location. See Figure 5.



Figure 5. Upper Entry Gate

3. Desired Goals

The security goals for the facility are as follows:

- Recognize and implement appropriate site security to respond to the changing land use in the neighborhood around the treatment plant. The plant has operated for 40 years in a rural setting and now has immediate residential neighbors adjacent to this large operating regional wastewater treatment facility.
- Provide a clear and identified demarcation of the property boundary, and to inform trespassers that they are trespassing and will be prosecuted.
- Provide an effective deterrent and barrier to unauthorized entry, including potential malicious trespassing but also to reduce risk of trespassing that could lead to injury to “curious” visitors when accessing an operating treatment facility with open water surfaces, stairs, ladders, deep tanks, rotating mechanical equipment, and electrical equipment.
- To be cost effective at meeting the above goals.

4. Industry Standards for Security

Industry standards for security protection of wastewater treatment facilities typically reference two security resources:

- *The Protection of Assets*, published by the American Society of Industrial Security (ASIS), Alexandria, Virginia, 2009
- *Guidelines for the Physical Security of Wastewater/Stormwater Utilities*, American Society of Civil Engineers (ASCE)/American Water Works Association (AWWA)/Water Environment Federation (WEF), published December 2006 (WEF Security Guidance)

4.1 Fencing Improvements

For fencing improvements, a baseline standard chain-link fencing (see Figure 6) would consist of the following:

- The minimum standard for general perimeter fencing is minimum 8-foot-high, polyvinyl-chloride-coated, chain-link fencing. Six-gauge mesh, non-climb fabric (1-inch by 1-inch) or tighter. (Maximum gate under fences is 2 inches.)
- Post foundations: cast-in-place, pre-mixed Portland cement concrete, 3,000 pounds per square inch minimum compressive strength @ 28 days.

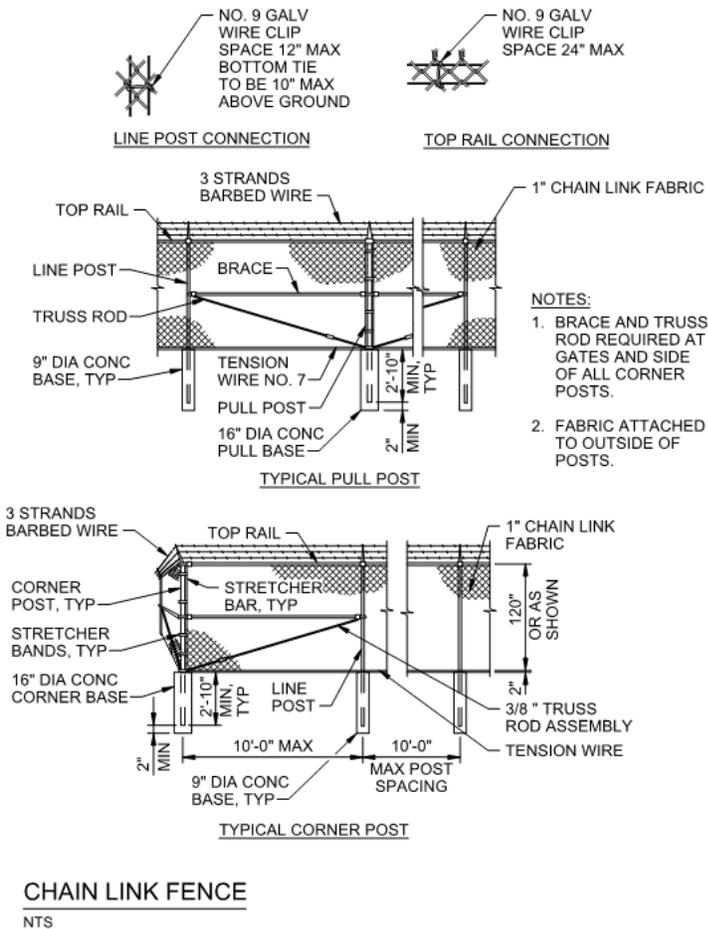


Figure 6. Suggested Fence Standard

4.2 Motorized Vehicle Gates and Entry Protocol

The entry protocol for the primary entry into the site is recommended to be via a motorized gate with card access control and intercom. The secondary gate below the operations center building would remain but would primarily remain open unless closed for emergency purposes.

For motorized vehicle gates, typically the gate assembly would consist of the following;

- Vehicle gates:
 - Swing Gate Option: 2-inch welded pipe framework with intermediate vertical members and mid rails; truss assemblies as needed to prevent racking. Swing gates shall be fabricated using 2-inch square by 11-gauge rail, 2-inch square by 11-gauge gate ends, and 2.75-by-0.75-by-0.075-inch pales. Gates that exceed 6 feet in width will have a 2-inch square by 11-gauge intermediate upright. All rail and upright intersections shall be joined by welding. All pale and rail intersections shall also be joined by welding. (Maximum space under gates is 4 inches to prevent crawling access from under the gate.)
 - Vertically Rotating Gate Panel Option: To accommodate the space constraints of the entry drive, a vertical rotating gate panel option is possible. This configuration would be similar to that shown in Figure 7. This configuration utilizes a hydraulic lift actuator to raise and lower the gate. Depending on the unit selected and the gate configuration, the gate assembly can raise

approximately 16 feet in about 14 to 16 seconds. Figure 7 is from AutoGate; it is their Ohioian gate model.

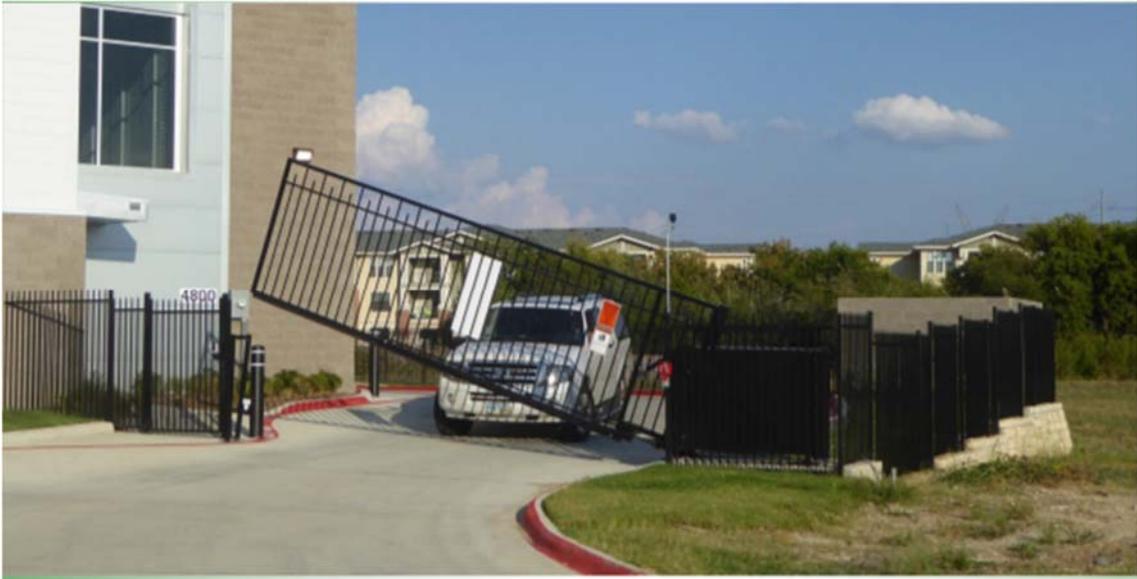


Figure 7. Vertical Rotating Gate Panel Option

- Electrical operator: 480-volt alternating current, 3 phase, typically 1 to 2 horsepower, depending upon the gate configuration.
- Standby power: Use generator backed standby power for withstanding power drops. If necessary, a standby uninterruptible power source can be provided, although this is typically not required. Also, a mechanical crank can be used to open the gate from inside the facility if necessary, in the event of a total power loss and no generation capability.
- Card-reader controls with auxiliary keypad would be provided, mounted on a dual height pedestal. The gate controls can be programmed to require either keypad entry, card reader, or both (requiring both card reader and keypad for higher security requirements).
- Intercom access, with pushbutton dialing to the control room so that two-way communication is possible. Current digital intercom systems are available with mobile functionality, which allows authorized staff to view and communicate with incoming entering vehicles, and staff members to open the gate remotely through their smartphones. This provides greater efficiency, such that if an operator is away from the control room, he/she can still observe incoming vehicles and speak with them, and remotely open the gate.
- Entrapment protection (electric eye to prevent gate closure when object is within gate path).
- Exit detector loop for vehicle exiting. Preferred location, per operations staff, is toward bottom of hill inside plant to avoid large trucks from having to stop/start on incline. This would initiate the gate opening earlier so that trucks can smoothly proceed up to the gate and exit, without stopping to wait for the gate to fully open. Some initial training and coordination would be required so that the truck drivers can master the timing of the gate opening sequence.
- Timer-based gate closure, following opening. Alternatively, a detector loop behind the gate can be provided to confirm the vehicle has passed, following gate opening.
- Knox box for Fire Department access. The Knox box would contain a special purpose access card programmed for access by emergency agency use (Fire Department). The Knox box would be monitored for an open condition by the security system.

- Small person-gate near the gate, secured with card access with electrified lock or chain and padlock for entry when the vehicle gate is inoperable.
- Overview camera.
- Driver face camera.

The operation at motorized vehicle gates would typically be as follows for visitor entry mode:

- Initial conditions: Vehicle gate is closed.
- Vehicle approaches vehicle gate.
- Vehicle driver speaks via intercom to control room to speak with utility personnel.
- If entry deemed acceptable:
 - Utility personnel acknowledges vehicle and presses “Open Gate” from touchscreen workstation or mobile application.
 - Gate opens from closed position and vehicle passes through. Vehicle enters and passes over safety loop, which prevents inadvertent gate activation while the vehicle is in contact with the gate.
 - Once the vehicle is clear of the gate, the gate system closes automatically.
- If entry deemed not acceptable:
 - Utility personnel acknowledges vehicle, directs them to wait for further instructions.
 - Utility personnel meets vehicle and speaks with driver to determine next steps.
 - Once entry gate reaches a fully secure position the system is reset for the next operation.
- Site specific roadway dimensions make it difficult for a vehicle that unintentionally approaches gate to turn around. It is recommended to implement signage or consider gate relocation farther uphill (to south), which may reduce likelihood of vehicles having to back up the hill under dark conditions that may be unsafe. Note that moving gate uphill may conflict with preferred location for card reader assembly on driver’s side of vehicle, on “left” side of road, due to conflict with intersection to south.

The operation at motorized vehicle gates would typically be as follows for automated (card access) entry mode:

- Initial conditions: Vehicle gate is closed.
- Vehicle approaches the card reader pedestal.
- Driver presents credential to card reader. If reader finds card valid and deems entry acceptable:
 - Gate opens from the closed position via the access control system.
 - Vehicle enters and passes over safety loop, which prevents inadvertent gate activation while the vehicle is in contact with the gate.
 - Once vehicle is clear of the gate, the gate automatically closes into the secure position.
- If invalid card read and entry deemed non-acceptable;
 - Utility personnel acknowledges vehicle, directs them to wait for further instructions.
 - Utility personnel meets vehicle and speaks with driver to determine next steps.

4.3 Additional Precautions for Deliveries

Deliveries pose a special risk to utilities. Whether deliveries are made to the Administration Building, or through the existing secondary vehicle gate, the following recommendations are made (extracted from the WEF Security Guidance) and applicable to both conditions:

- Maintain detailed logs of deliveries and pick-ups, including driver information, vehicle tag number, description of shipped item, and source location or destination.
- Adopt a procedure that requires faxed or electronically transmitted copies of delivery bills-of-lading information and driver identification to be sent to the facility before the truck arrives on site.
- Implement a procedure for ensuring that a driver who regularly picks up or delivers hazardous materials, such as hazardous chemicals, is previously cleared for access, given a proper identification badge, and trained properly in the facility security requirements.

5. Options for Security Improvement

Three options have been identified; for improving the security at SCTP. These options are described below. Each option describes means of implementing upgraded fencing and improvements at the entry gate. Costs are preliminary budgetary costs that align with a Class 4 estimate as defined by the Association for the Advancement of Cost Engineering International. The selected option will be incorporated into the 90 percent design and 90 percent cost estimate.

5.1 Option 1 – Add New Full-Height Fence at Property Line, Leaving Existing Interior Fence As-Is

This option would replace the outer 3-strand barbed wire livestock fence with a full-height 8-foot chain-link fence (located on or adjacent to south perimeter property line), with 3-strand barbed wire along the western perimeter of the property. Included with this would be “No Trespassing” signage, placed approximately 100 feet on center, and a landscape clear zone requiring brush and tree removal for a distance of 15 feet on either side of the fence. The existing interior fence that is adjacent to the plant would remain as-is. This option is estimated to cost \$302,000, as itemized in Table 1.

Table 1. Option 1 Cost Estimate

Line	Area	Timeline	Category	Improvement Description	Unit Cost	Unit	Qty	Extended Cost
Security Upgrades								
1	Property Boundary	Short-Term	Delay	Replace existing 3-strand livestock fencing along property boundary with 8-foot chain link fencing material. Assume 3000 feet of fencing at \$100 per lf.	\$ 100	LF	3000	\$ 300,000
2	Property Boundary	Short-Term	Deterrence	Add no trespassing signage to perimeter fence which includes ordinance(s) for prosecution of trespassers and include mention of continuous video surveillance on the premises. Assume 20 signs at \$100 each.	\$ 100	EA	20	\$ 2,000
					TOTAL			\$ 302,000

5.2 Option 2 – Add New Motorized Gate Entry

This option would add a new motorized swing entry gate at the plant access road, complete with card reader access, an intercom station dialing to the control room (with mobile phone answering capability), and video cameras viewing the driver and front of vehicle. This option is estimated to cost \$73,000, as itemized in Table 2.

Table 2. Option 2 Cost Estimate

Line	Area	Timeline	Category	Improvement Description	Unit Cost	Unit	Qty	Extended Cost
Security Upgrades								
1	Gate Entry	Short-Term	Delay	Upgrade entry gate to motorized unit. Assume lump sum estimate of \$40,000 for electrical power and motorized operators.	\$ 40,000	LOT	1	\$ 40,000
2	Gate Entry	Short-Term	Delay	Add card reader access to entry gate, assume lump sum cost of \$10,000.	\$ 10,000	LOT	1	\$ 10,000
3	Gate Entry	Short-Term	Delay	Add intercom unit to entry gate, reporting back to Control room. Assume lump sum cost of \$7500.	\$ 7,500	LOT	1	\$ 7,500
4	Gate Entry	Short-Term	Assessment	Install fixed, high resolution cameras at entry gate; for driver and for front of vehicle. Assume 2 cameras at \$4000 each.	\$ 4,000	EA	2	\$ 8,000
5	Gate Entry	Short-Term	Assessment	Provide recording and playback means for video system; assume small 2TB storage and local display. Assume \$7500 lump sum.	\$ 7,500	EA	1	\$ 7,500
					TOTAL			\$ 73,000

See Figure 8 for an illustration of Options 1 and 2.

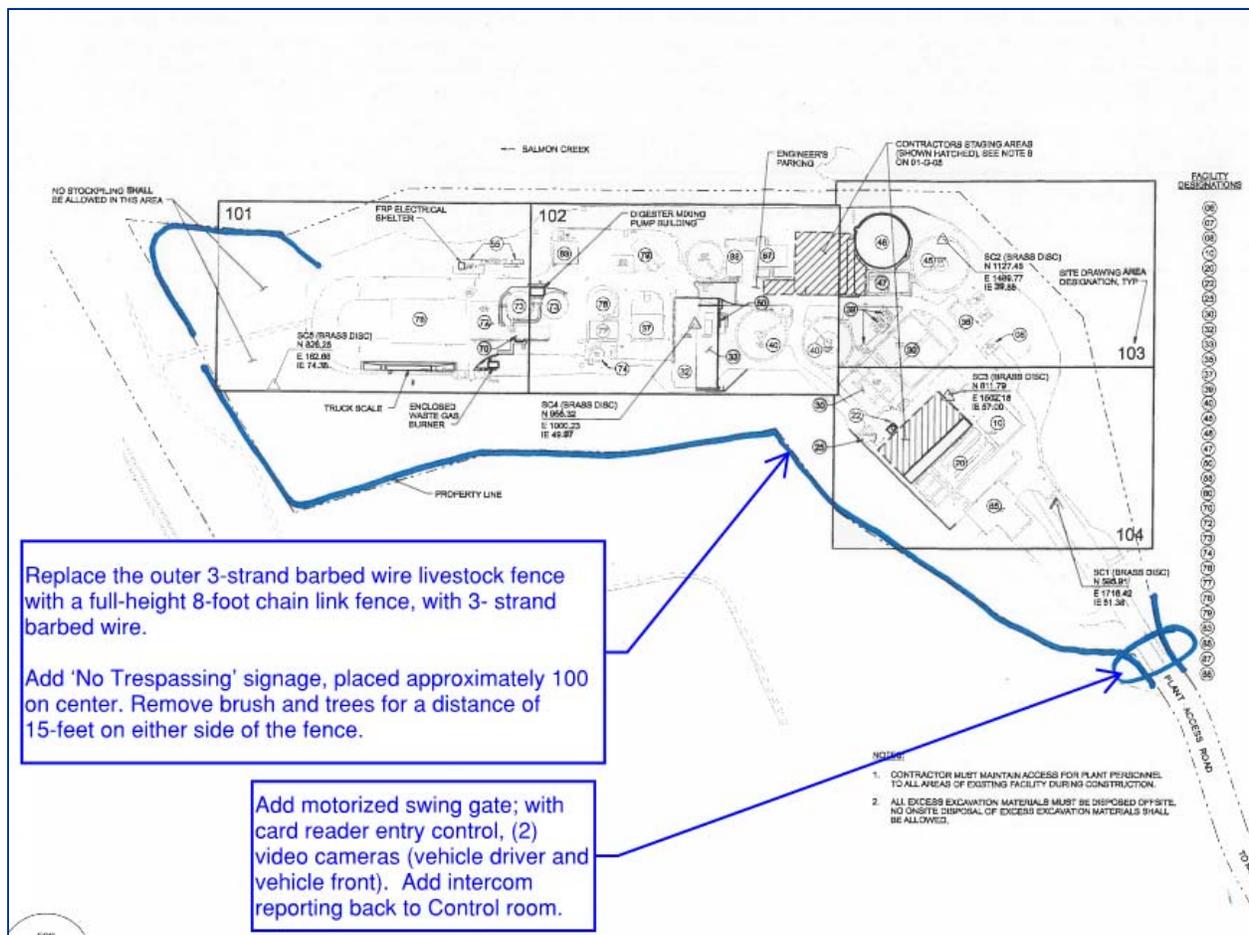


Figure 8. Options 1 and 2 Fencing and Gate Upgrade

5.3 Option 3 – Add New Full-Height Fence at Property Line, Remove Existing Interior Fence, Add New Motorized Gated Entry

This option combines Options 1 and 2 but also with the removal of the existing interior fence. The existing interior fence is demolished and removed. Benefits of removing the interior fence may include improved site maintenance access, but the disadvantages of this option are increased cost and reduced protection of trespassers from potential hazards. This approach is not recommended.

As with Option 1, the property line fence is replaced with a new 8-foot-high fence, and as with Option 2, a motorized gate operator with cameras, card reader access, and intercom would be added at the main gated entry. This option is estimated to cost \$395,000, as itemized in Table 3. See Figure 9 for an illustration of this option.

Table 3. Option 3 Cost Estimate

Line	Area	Timeline	Category	Improvement Description	Unit Cost	U	Q	Extended Cost
Security Upgrades								
1	Property Boundary	Short-Term	Delay	Replace existing 3-strand livestock fencing along property boundary with 8-foot chain link fencing material. Assume 3000 feet of fencing at \$100 per lf.	\$ 100	LF	3000	\$ 300,000
2	Property Boundary	Short-Term	Deterrence	Add no trespassing signage to perimeter fence which includes ordinance(s) for prosecution of trespassers and include mention of continuous video surveillance on the premises. Assume 20 signs at \$100 each.	\$ 100	EA	20	\$ 2,000
3	Gate Entry	Short-Term	Delay	Upgrade entry gate to motorized unit. Assume lump sum estimate of \$40,000 for electrical power and motorized operators.	\$ 40,000	LOT	1	\$ 40,000
4	Gate Entry	Short-Term	Delay	Add card reader access to entry gate, assume lump sum cost of \$10,000.	\$ 10,000	LOT	1	\$ 10,000
5	Gate Entry	Short-Term	Delay	Add intercom unit to entry gate, reporting back to Control room. Assume lump sum cost of \$7500.	\$ 7,500	LOT	1	\$ 7,500
6	Gate Entry	Short-Term	Assessment	Install fixed, high resolution cameras at entry gate; for driver and for front of vehicle. Assume 2 cameras at \$4000 each.	\$ 4,000	EA	2	\$ 8,000
7	Gate Entry	Short-Term	Assessment	Provide recording and playback means for video system; assume small 2TB storage and local display. Assume \$7500 lump sum.	\$ 7,500	EA	1	\$ 7,500
8	Interior Boundary	Short-Term	Delay	Remove existing 6-foot chain link. Assume 2000 feet of fencing removed at \$10 per lf.	\$ 10	LF	2000	\$ 20,000
9								
10								
11								
12								
13								
14								
TOTAL								\$ 395,000

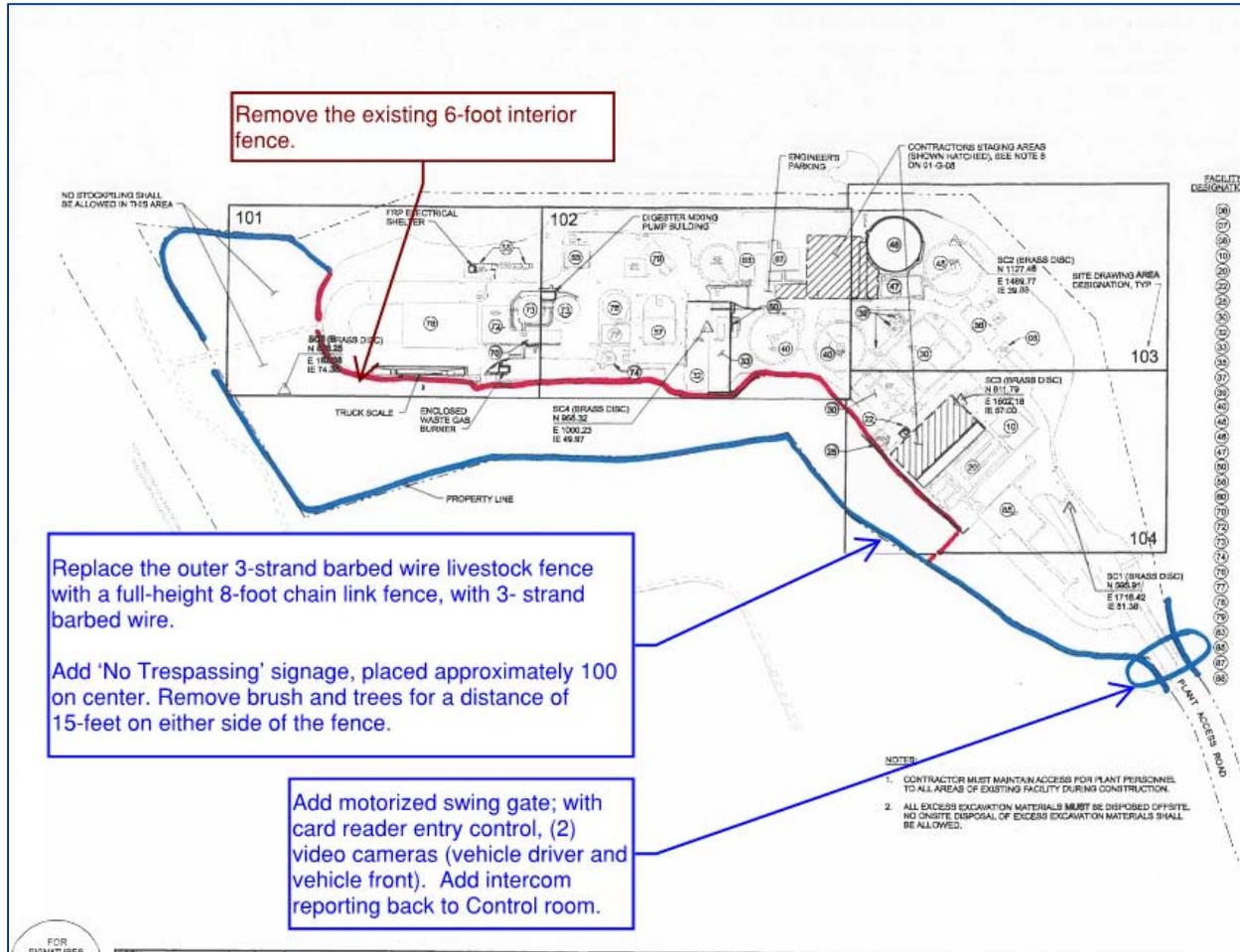


Figure 9. Option 3 Fencing Upgrades and Gate Upgrade

5.4 Items not Included in Options

Not included in Options 1, 2, and 3 is a means of perimeter intrusion detection. This is deemed not necessary at this time due to the low incidence of intrusion. However, if this is desired, it can be added at a later date with minimal impact. Should intrusion detection be desired, a ground-based radar system is recommended, viewing the south, west, and north areas.

Also, not included in these options are additional cameras for perimeter surveillance. This is recommended, but not part of a fence upgrade, and can be added at a later date. Six, ultra-low-light digital, fixed-position cameras and two low-light digital pan/tilt/zoom cameras are recommended for a total of eight cameras. These items are estimated to cost \$107,000, as itemized in Table 4.

Table 4. Cameras for Perimeter Surveillance Cost Estimate

Line	Area	Timeline	Category	Improvement Description	Unit Cost	Ur	Qt	Extended Cos
Security Upgrades								
1	Video	Short-Term	Assessment	Install fixed, high resolution cameras to view perimeter areas of property. Assume 6 cameras at \$4000 each. Building mounted.	\$ 4,000	EA	8	\$ 32,000
2	Video	Short-Term	Assessment	Install pan/tilt/zoom high resolution cameras for surveillance of property; assume north and south locations. Assume 2 cameras at \$7500 each. Building mounted.	\$ 7,500	EA	2	\$ 15,000
3	Perimeter Intrusion Detection	Long-Term	Detection	Provide perimeter intrusion detection at fenceline. Assume ground-based radar system incorporated with new perimeter pan/tilt/zoom cameras. Assume lump sum estimate of \$60,000.	\$ 60,000	LOT	1	\$ 60,000
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
TOTAL								\$ 107,000

5.5 Entrance Gate Security Features

5.5.1 Intercom Station: Zenitel Stentofon, Model TCIV-3 (or Approved Equal)

The proposed intercom provides high voice quality, two way speaking, active noise cancellation, with integrated microphone, video camera, and internal amplifier. The camera unit is configured with a wide field of view video, recording at 25 frames per second (FPS), with 480 pixel resolution. It is a digital pan, tilt, zoom, and supports H.264 or MJPEG video files. Figure 10 shows the proposed intercom unit (Stentofon TCIV-3).



Figure 10. Zenitel TCIV-3 Field of View

5.5.2 Keypad & Card Reader: AAS, Model 23-206kp (or approved equal)

The proposed keypad with card reader unit features a stainless-steel faceplate with powder coated metal enclosure. Mounted to the faceplate is a card reader, with the control board mounted inside the enclosure. Figure 11 shows Model 23-206kp. As an option, a small card reader system that can

eventually serve the site buildings and operations center control room can be provided. Such a system could start small with a location just at the entry gate, and grow to accommodate the critical doors and other entry areas. Such a system (for example, those manufactured by Lenel or other systems) can be described if this option is of interest.



Figure 11. AAS 23-206kp Keypad

5.5.3 Stanchion: Pedestal Pro, 42-3-12 (or Approved Equal)

The recommended stanchion for the proposed card reader, intercom, and keypad devices is shown in Figure 12: the Pedestal Pro model 42-3-12. Figure 12 depicts a single height unit, where the suggested option is a dual height unit (to accommodate passenger vehicles/pedestrians and taller freight trucks).



Figure 12. Pedestal Pro 42-3-12

5.6 SCADA Integration

The new security system is envisioned as being independent of the existing supervisory control and data acquisition (SCADA) system. The new security system would receive a small server unit that serves the video and access control systems and a storage unit for the video system (which is typically integrated with the video server).

No SCADA integration is envisioned.

6. Recommendations

Site Entrance Gate: The site entrance gate modifications are being incorporated into the Package 1 design. District/County input on these features is requested.

Perimeter fence improvements: Perimeter fence improvements are being deferred out of the Package 1 design.

Option 2 is recommended for use on the SCTP project. It accomplishes the goals of providing a clear and identified demarcation of the property boundary and provides an effective deterrent and barrier to unauthorized entry. Additionally, it enables potential use of the property up to the boundary of the perimeter.

The camera additions at areas other than the entrance gate could be implemented at a future date as site risk assessments periodically occur. These cameras would provide the benefit of adding surveillance capability of the property and, if combined with a radar unit, could identify intruders or trespassers approaching or entering the site.

The perimeter fence improvements are understood to be implemented as a repair and replacement project, rather than a capital program.