

ATTACHMENT E - PROCEDURES TO PREVENT HAZARDS

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1. Procedures to Prevent Hazards

[40 CFR Part 264, Subpart C]

This section describes the procedures and equipment the Facility employs to minimize the possibility of an unplanned release of hazardous waste, or an incident such as a fire or explosion. The equipment and procedures used by the Facility have been designed to prevent conditions in which human health or the environment could be threatened, as well as to minimize the potential adverse effect should these conditions develop. All alarms, communication devices, and emergency equipment are inspected and tested regularly as described in [Appendix E-A](#).

1.1 DESIGN, MAINTENANCE, AND OPERATION OF THE PERMITTED UNITS

[40 CFR 264.31]

The Facility has been designed and is maintained and operated in accordance with standard industry practices as well as applicable building, fire, and electrical codes to minimize the potential for:

- Unplanned releases of hazardous waste or hazardous constituents to air, soil or water;
- Fires; or
- Explosions.

The primary means of achieving such protection to human health and the environment include:

- Protection of ignitable wastes from sources of ignition or reaction;
- Separation of incompatible wastes;
- Provision of adequate safety and emergency response equipment; and
- Comprehensive personnel training and adherence to contingency, inspection, and waste analysis plans.

1.1.1 Aisle Spacing

[40 CFR 264.35]

As indicated, aisle spacing in each room varies based on the types on waste being stored; however, adequate aisle space between drums in every room is maintained for the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment. [See Attachment C Process Information, Section 1.1.11.](#)

1.1.2 Management of Containers

[40 CFR 264.173]

The management of containers (including portable tanks and railcars) is described in detail in the [Attachment D - Waste Storage, Processing, and Tracking Plan](#).

1.1.3 Unloading and Consolidation Operations

Procedures undertaken to prevent spills and releases of hazardous waste during unloading and consolidation operations are described in detail in **Attachment D - Waste Storage, Processing, and Tracking Plan**.

1.1.4 Run-on/Run-off

All hazardous waste activities are conducted indoors, under roof with curbing, or in otherwise contained areas. The Facility has the following controls to prevent run-on/run-off.

1.1.4.1 General Facility Controls

Continuous, soil berms have been constructed along the north, west and south sides of the facility's perimeter fence to mitigate run-on to the facility. These berms also serve as containment to prevent run-off in an emergency if a large spill or release were to occur. A soil berm is also constructed along the perimeter on the east side of the facility, except where access to the facility is required, such as the vehicle access driveway and the rail spur. Stormwater conveyance ditches are also located along the exterior perimeter of the railroad spur, along the west side of East Commerce Drive, and along the southern property boundary to mitigate potential run-on from offsite sources.

The outdoor areas of the Facility have a stormwater management system that includes drainage to retention basins for infiltration.

1.1.4.2 Container Storage Rooms

The waste management and processing building is fully enclosed and roofed to protect the containers from precipitation. The entire building and individual storage rooms are surrounded with containment curbs and the entrances to the building and between rooms are constructed with ramps that prevent the run-on of precipitation and run-off of a spill or release.

1.1.4.3 Exterior Canopy Area

The exterior canopy area is covered to protect the area from precipitation. The area is surrounded with containment curbs and the entrances are constructed with ramps to prevent the run-on of precipitation and run-off of a spill or release.

1.1.4.4 Storage and Treatment Tanks

The secondary containment systems for the storage, fuel blending, and treatment tanks include containment curbs to prevent the run-on of precipitation and run-off of a spill or release. The tank containment systems have been constructed with sufficient capacity to contain the volume of the largest tank plus a 25-year, 24-hour rainfall event.

1.1.4.5 Loading Dock 100

Loading Dock 100 has been constructed of poured, steel-reinforced concrete with an HDPE under liner. The floor is sloped to provide access for to five self-leveling docks. The concrete base of the secondary containment area is sufficiently impervious to contain leak and spills until the collected material is detected and removed. The base is also coated with an epoxy coating to mitigate vertical migration of leaks and spills. The secondary containment is constructed with sufficient volume to contain the entire volume of a single bulk tanker (6,000 gallons) plus sufficient excess capacity to contain any run-on that might enter the loading dock.

1.1.4.6 Railcar Loading/Unloading Area

The containment capacity of the railcar loading/unloading area is the entire volume of a single railcar (30,000 gallons) plus sufficient excess capacity to contain any run-on that might enter the railcar loading/unloading area containment system.

1.1.5 Power Failure

In the event of a power failure, the Facility may have to cease operations, but there would be no threat of a release or endangerment to human health or the environment. Ingress/egress to the Facility is via the electronically controlled gates, which can also be manually opened. Fixed emergency lighting is located throughout the interior of the Hazardous Waste Management and Processing Building and at regular intervals in the exterior areas of the Facility.

1.1.6 Management of Temperature Sensitive Materials

Triumvirate prohibits certain wastes that are considered temperature sensitive from being accepted at the facility when average daily high temperatures in the Phoenix area exceed 100 °F. Wastes that are identified as temperature sensitive, shock sensitive, spontaneously combustible, or requiring temperature controls undergo an additional technical review prior to approval to consider whether or not the materials can be accepted.

Wastes that will normally be prohibited from acceptance to the Facility during months when average daily temperatures exceed 100 °F consist of the following:

- Wastes that are identified on the waste profile as being temperature sensitive, requiring temperature controls, or are shock sensitive with self-accelerating decomposition temperatures that are less than 122°F (50°C). Typically, these materials are azo-compounds, azide- compounds, and organic peroxides.
- Technical/commercial grade formulations of the following compounds or formulations:

dibenzyl	guanyl tetrazene	picramide
peroxydicarbonate	heavy metal azide	picratol
2,5 dimethyl-2,5-	hexanite	picryl fluoride
dihydroperoxy hexane	hexanitrodiphenylamine	polynitro aliphatic compounds

dinitro toluene	hexanitrostilbene	potassium
dry guanyl compounds	hexogen	nitroaminotetrazole
dry lead azide	hydrazoic acid	robenzoic acid
unwetted nitrocellulose	hyrazinium nitrate	silver acetylide
films and similar materials	lead azide	silver azide
unwetted picric acids	lead mannite	silver fulminate
unwetted explosives	lead	silver styphnate
aluminum ophorite	mononitroresorcinate	silver tetrazene
explosive	lead picrate	sodatol
amatol	lead styphnate	sodium amatol
ammonal	magnesium ophorite	syphnic acid
butyl tetryl	mannitol hexanitate	tetranitrocarbazole
copper acetylide	mercury fulminate	tetraze
cyanuric triazide	mercury oxalate	tetrytol
cyclotrimethylenetrinitramine	mercury oxalate	trimethylolethane
	mercury tartrate	trimonite
dinitroethyleneurea	mononitrotoluene	trinitroanisole
dinitroglycerine	nitrated carbohydrate	trinitrobenzoic acid
dipicryl sulfone	nitrated glucoside	trinitrocresol
dipicrylamine	nitrated polyhydric alcohol	trinitro-meta-cresol
erythritol tetranitrate	nitrogen trichloride	trinitronaphthalene
fulminating gold	nitrogen triiodide	trinitrophenetol
fulminating mercury	nitroglycide	trinitrophloroglucinol
fulminating platinum	nitroglycol	trinitrosocinol
fulminating silver	nitronium perchlorate	urea ammonium nitrate
gelatinized nitrocellulose	nitrourea	vinyl chloride
guanyl nitrosamino	organic amine nitrates	vinylidene chloride acetylides

1.2 COMMUNICATIONS

[40 CFR 264.34]

Employees involved in the handling of hazardous waste will have immediate access to communications equipment that will include hand-held, two way radios and telephones.

1.3 ALARM SYSTEM

[40 CFR 264.34]

Employees involved in the handling of hazardous waste have immediate access to the Facility's internal alarm system. Activation switches are located in each area where hazardous waste is handled.

1.4 EMERGENCY EQUIPMENT [40 CFR 264.32]

Employees working at the Facility are trained in the proper use and location of emergency response equipment, safety equipment and personal protective equipment. Brief lists of Facility's emergency equipment are identified in the following sections. A complete list of the equipment, its location and a brief outline of its capabilities are included as [Appendix F-B](#) of the Facility's Contingency Plan provided as [Attachment F](#). The locations of the emergency equipment are depicted on Exhibit F-4.

1.4.1 Safety Equipment

Personal protective equipment (PPE) appropriate for the hazards associated with the waste being handled is determined by the health & safety manager as part of the Job Hazard Analyses (JHAs) that have been completed. Employees are provided with Health & Safety training that includes the review of the JHAs and the proper use, cleaning, and storage of PPE.

Safety equipment is strategically located in the areas of the Facility where hazardous waste is handled, and employees are required to wear the appropriate level of PPE based on the hazards associated with the waste that they are handling. Additional safety equipment available at the Facility includes:

- Safety Showers
- Eye waste stations
- First aid kits
- Full face and ½ mask air purifying respirators (APRs)
- APR cartridges appropriate for the waste that are handled at the Facility
- Particle (dust) masks
- Self-Contain Breathing Apparatus' (SCBAs)
- Chemical safety goggles
- Hard hats
- Face shields
- Rubber boots
- Chemical protective suits
- Light duty protective suits
- Rubber aprons
- Chemical protective gloves

The actual types and amounts of these safety supplies may change based on need and changing demands.

1.4.2 Spill Control Equipment

Spill control equipment is maintained in the areas in which hazardous waste is handled. At a minimum, spill control equipment includes:

- Spill containment pillows and booms
- Bulk absorbent material (e.g., “kitty litter”)
- Neutralizing agents for corrosive spills
- Squeegees
- Brooms
- Mops and mop buckets
- Non-sparking shovels
- Overpack drums

The list of emergency response equipment, including the locations of the spill control equipment are included as [Appendix F-B](#) and [Exhibit F-4](#), respectively, in the Facility’s Contingency Plan provided as [Attachment F](#).

1.4.3 Fire Control Equipment

Fire hydrants are located to the east of the Facility across South Commerce Drive and to the south of the Facility across West Central Avenue. Fire hydrants are also located at strategic positions within the facility. Portable dry chemical fire extinguishers of varying sizes will be located at strategic locations throughout the Facility. The locations of Fire hydrants and fire department connects are depicted on [Exhibit E-1](#).

The container storage rooms, processing areas, hood areas, and covered docks/delivery areas in the waste management and processing building are equipped with sprinkler fire suppression systems based on the 2018 International Fire Code (IFC), which is currently adopted Fire Code by the city of Casa Grande. The facility’s final fire sprinkler design requirements prepared by TLB Fire Protection Engineering, Inc. are provided as [Appendix E-B](#). Fire flow demand is 2,250 gallons per minute for a two hour duration. Letter to AZ water from EJ Engineering provided as [Appendix E-C](#).

The 2018 Edition of the IFC does not contain prescriptive protection criteria specific to the storage of lithium-ion or lithium-metal batteries. The primary fire control measure for the storage of lithium-ion and lithium-metal batteries is an isolated storage unit that is separate from the hazardous waste management and processing building. The recommended fire protection system for this storage unit is discussed on Page 11 of TLB Fire Protection Engineering; Inc.’s report provided as [Appendix E-B](#).

1.5 TESTING AND MAINTENANCE OF EQUIPMENT

[40 CFR 264.33]

Facility emergency communication and fire protection systems will be routinely tested and maintained to ensure proper operation during emergencies. The equipment inspection and maintenance schedule is presented in Table EA-1 in the Facility's Inspection Plan provided as [Appendix E-A](#).

1.5.1 Eyewash and Safety Showers

Eyewash stations and safety showers are tested weekly.

1.5.2 Fire Protection System

Fire extinguishers are located throughout the facility. Fire extinguishers are inspected monthly by Facility personnel and serviced annually by a contracted service provider.

1.5.3 Water Supply

Water is supplied by Arizona Water (AZ Water). Fire sprinkler systems are located in the container storage rooms and the separate storage unit for the lithium-ion and lithium-metal batteries. The sprinkler systems are designed to provide water at adequate pressure and volume for fighting fires. Fire hydrants and fire department connection are depicted on [Exhibit E-1](#). Fire flow demand is 2,250 gallons per minute for a two hour duration. A letter to AZ Water from EJ Engineering is provided in [Appendix E-C](#).

1.5.4 Safety and Spill Control Equipment

Safety and emergency equipment are checked weekly. Packaged, single-use equipment is checked to see that it is present. Reusable equipment is checked for cleanliness and condition.

1.6 ARRANGEMENT WITH LOCAL AUTHORITIES

[40 CFR 264.37]

Organizations with which arrangements have been made to be contacted in the event of an emergency are listed in the Contingency Plan. Copies of the Contingency Plan have been provided to these organizations.

1.7 TRAFFIC PATTERN

[40 CFR 270.14(B)(10)]

1.7.1 Access to the Facility

Vehicle and railcar access to the Facility is gained from South Commerce Drive through access gates on the east side of the Facility. Trucks drive north on South Commerce Drive and turn left into the Facility.

There are no stacking lanes on South Commerce Drive.

1.7.1.1 *Vehicles Around the Facility*

Initially, it is anticipated that as many as twelve to fifteen trucks will enter the facility each day; however, traffic volume may increase as the Facility becomes fully operational. Types of vehicles entering the Facility will be any combination of box vans, 18-wheel tractor trailer dry vans, and 18-wheel bulk tankers, as well as employee vehicles.

1.7.1.2 *Traffic Control Signs and Signals*

One stop sign is located on W. Central Avenue at the "T" intersection of S. Commerce Drive. Vehicles traveling north and south on S. Commercial Drive have the right-of-way.

1.7.1.3 *Characteristics of permanent access roads*

Public streets are constructed of asphalt and/or concrete and are constructed to accommodate industrial vehicles such as 18-wheel tractor trailers. Facility roadways are paved and are constructed to accommodate trucks loaded for legal travel on Arizona highways.

1.7.1.4 *Internal Roads and Vehicle Access Ways*

The internal roads and vehicle access ways of Facility are paved and built to specifications of the American Association of State Highway and Transportation Officials "H-20" which accommodate trucks loaded for legal travel on Arizona roads and highways.

1.8 **PROCEDURES FOR DELIVERIES TO THE FACILITY**

1.8.1 **Use of the Manifest**

1.8.1.1 *Incoming Shipments*

For incoming shipments, the Facility operator inspects the manifests for completeness before accepting the shipment. The Facility operator notes any discrepancies between the manifest and visually apparent aspects of the load, such as number and size of containers. Significant discrepancies, if any, are noted on the manifest. The Facility operator then signs and dates each copy of the manifest to certify receipt of the waste shipment. The copy designated as "Transporter" is given to the hauler before the hauler leaves the Facility. The copy "Designated Facility to Generator" is signed by a representative of the Facility and returned to the generator within 30 days.

1.8.1.2 *Outgoing Shipments*

For outgoing shipments, the Facility operator inspects the manifest for completeness before signing and dating the manifest.

1.8.1.3 *Reconciliation of Discrepancies*

Upon discovering a significant discrepancy, as defined in 40 CFR 264.72, the Facility operator attempts to reconcile the discrepancy by calling or emailing the generator. If the discrepancy cannot be reconciled within 15 days, the facility operator will notify ADEQ of the discrepancy in writing. The notification will include a description of the discrepancy, attempts to reconcile it and a copy of the manifest.

2. Inspection Program

[40 CFR 270.14(b)(5)/40 CFR 264.15]

2.1 STRUCTURES AND EQUIPMENT TO BE INSPECTED

The Facility's written inspection program, inclusive of inspection forms, the identification of each structure and Facility equipment that are subject to inspection, the schedule by their inspection will be conducted are included in the Facility's written Inspection Plan provided as [Appendix E-A](#).

3. Security

[40 CFR 264.14 / 40 CFR 270.14(b)(4)]

3.1 ACCESS CONTROL MEASURES

[40 CFR 264.14(b)(2)]

3.1.1 Access to the Facility

The fence along South Commerce and West Central Avenue is an 8'0" tall steel picket fence. The fence along the north and west sides of the Facility is an 8'0" tall chain link fence. Fencing details are provided in [Exhibit E-2](#).

The main gate is controlled by restricted electronic key access and can be opened/closed from controls inside the office. A gate for railcar ingress/egress located at the northeast corner of the property is kept always locked except with the gate actively being used by railcars arriving at or leaving the Facility. If the railcar gate is unlocked, Triumvirate personnel will be present in the vicinity at all times.

There is a pedestrian ingress/egress gate located at the east side of the property. It is always kept locked. Keys for the locks are maintained by key employees, and spare keys are stored in the office. There is an additional access gate on South Commerce Drive, as well as a gate on West Central Avenue which are normally locked and can be accessed by the Casa Grande Fire Department. These gates are locked with Knox box access maintained by Triumvirate employees and the City of Casa Grande Fire Department.

Triumvirate provides additional security measures that consist of surveillance cameras that record images at strategic locations within active areas of the Facility and other electronic security measures; however, in lieu of security cameras or similar devices, Triumvirate may provide 24-hour onsite security personnel.

The typical operating hours of the facility are, but are not limited to 6:00 A.M. to 5:00 P.M., seven days

per week. In the event of an evacuation, facility personnel will control access to the facility. An automatic gate at the main entrance on South Commerce Drive controls the entrance to the facility. Access to the office building is permitted by the front door, into the reception area. Visitors must sign in the logbook and wait for authorized personnel in the reception area. Any on-site visitors are accompanied at all times by Facility employees. Visitors are required to sign out upon leaving the facility.

Contractors must follow Triumvirate's written program titled "Contractors Safety Guide." Signs are posted at all entrances, and other approachable sides of the facility fence. The signs read "Danger - Unauthorized Personnel Keep Out." The signs are legible from a distance of at least 25 feet. The legend is printed in English and Spanish at the Facility.

3.2 WARNING SIGNS

[40 CFR 264.14(c)]

Warning signs are posted around the perimeter of the Facility at intervals of approximately 100 feet apart. Signs required by 40 CFR 264.14(c) contain letters that are at least 1-inch tall and are legible from a distance of 25 feet.

Warning signs containing the following language or similar in English and Spanish are posted from all approaches to the Facility:

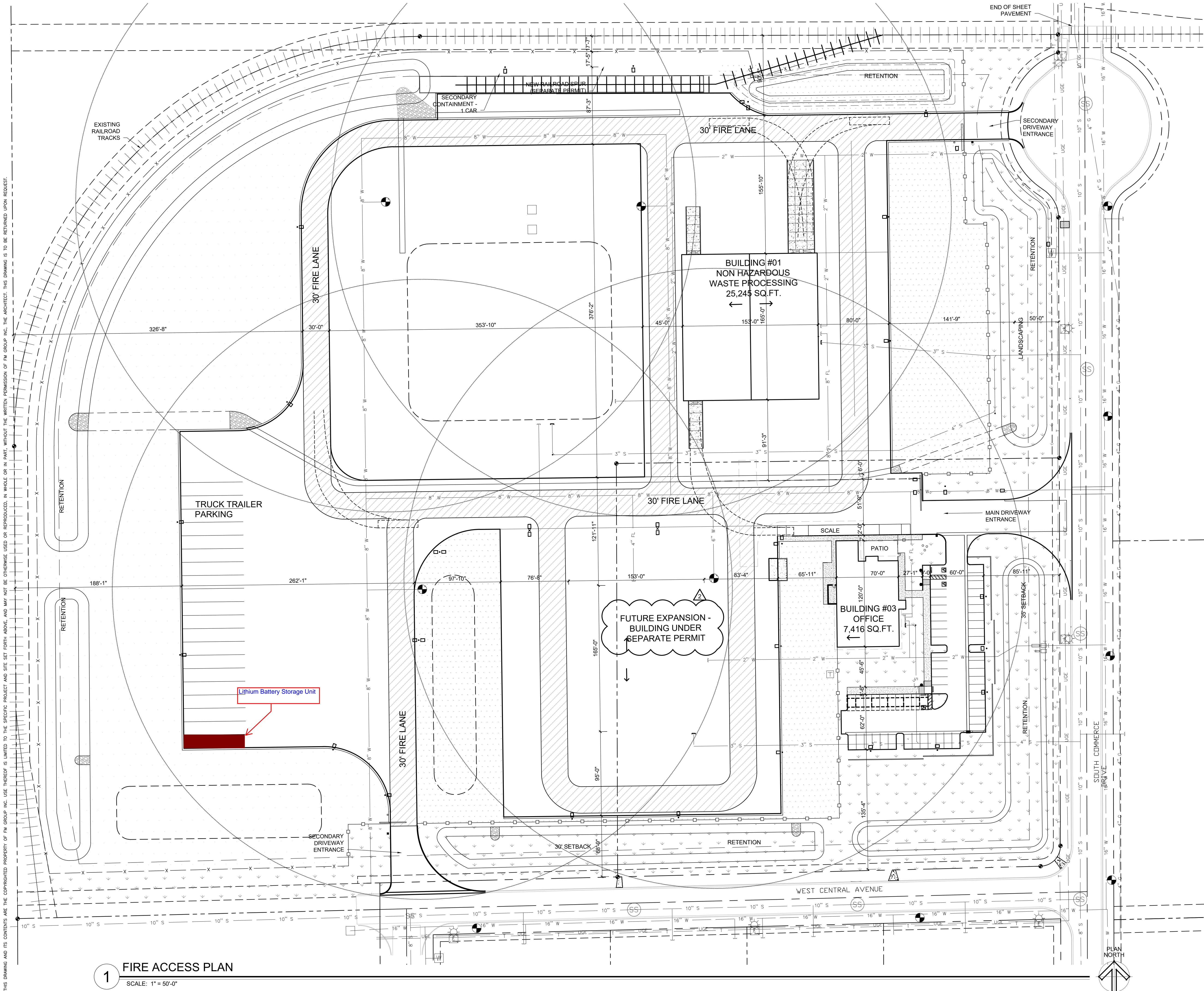
- **Caution -- Hazardous Waste Area – Unauthorized Personnel Keep Out**
- **Cuidado --Zona de Residuos Peligrosos -- Prohibida la Entrada a Personas No Autorizadas**
- **Danger - No Smoking or Open Flame in This Area**

3.3 LIGHTING

Lighting located throughout the facility provides an average of 30 foot candles at the walking surface. The Hazardous Waste Management and Processing Building is equipped with normal lighting and emergency lighting. The lighting photometrics for the building are provided as [Exhibit E-3](#).

Exhibit E-1
Fire Access Plan

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GENERAL NOTES

THE PROJECT REQUIRED FIRE ACCESS BY PROPOSED TRUCK ROUTE AND FIRE HYDRANTS MEET THE MINIMUM DISTANCE REQUIRED FOR COVERAGE.

SYMBOL LEGEND

---	PROPERTY LINE
- - -	PROPERTY SETBACK
---X---	8'-0" SEE DETAIL 6/A5.0 FENCING - SEE DETAIL 7/A5.0
X	8'-0" HIGH CHAINLINK / STEEL PICKET FENCING
[Pattern]	NEW ASPHALT PAVING
[Pattern]	NEW CONCRETE PAVING
[Pattern]	NEW LANDSCAPE AREA
[Pattern]	NEW DECOMPOSED GRANITE DUST COVER / WEED CONTROL
[Symbol]	FIRE HYDRANT
[Symbol]	FIRE HYDRANT COVERAGE
[Symbol]	LIGHT POLE
[Symbol]	FIRE DEPARTMENT CONNECTION
[Hatched]	FIRE TRUCK ROUTE

1 FIRE ACCESS PLAN

SCALE: 1" = 50'-0"

EXHIBIT E-1 FIRE ACCESS PLAN

REVISIONS	
CITY COMMENTS	8.19.22 01
CITY COMMENTS	9.28.22 02
COORDINATION	11.11.22 03
ROOF REVISION	12.16.22 04
SCALE FDN	3.17.23 05

TITLE

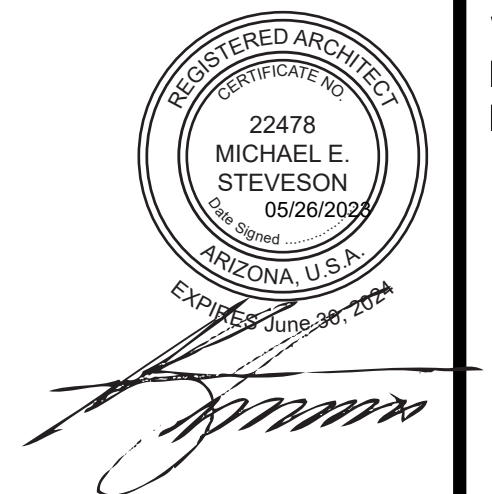
PROJECT ADDRESS
73 S. COMMERCE DR
CASA GRANDE, AZ

G.S.S. Companies Inc.
"Building Arizona Since 1985"

FM GROUP INC
15974 N. 77th ST., STE 100
SCOTTSDALE AZ 85260

TRIUMVIRATE ENVIRONMENTAL

INTEGRATED WASTE MANAGEMENT FACILITY



DATE
8-19-22
PROJECT NO.
20-200

SD2.0

Exhibit E-2 Fencing Details

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9

PARKING LOT SCREEN WALL ELEVATION

SCALE: 1/8" = 1'-0"

7

PARKING LOT SCREEN WALL ELEVATION

SCALE: 1/8" = 1'-0"

5

TRAIN GATE DETAIL

SCALE: 1/4" = 1'-0"

2

STEEL PICKET SECTION - ALONG SOUTH COMMERCE & WEST CENTRAL AVE.

SCALE: 1/4" = 1'-0"

10

PARKING LOT SCREEN WALL ELEVATION

SCALE: 1/8" = 1'-0"

8

PARKING LOT SCREEN WALL ELEVATION

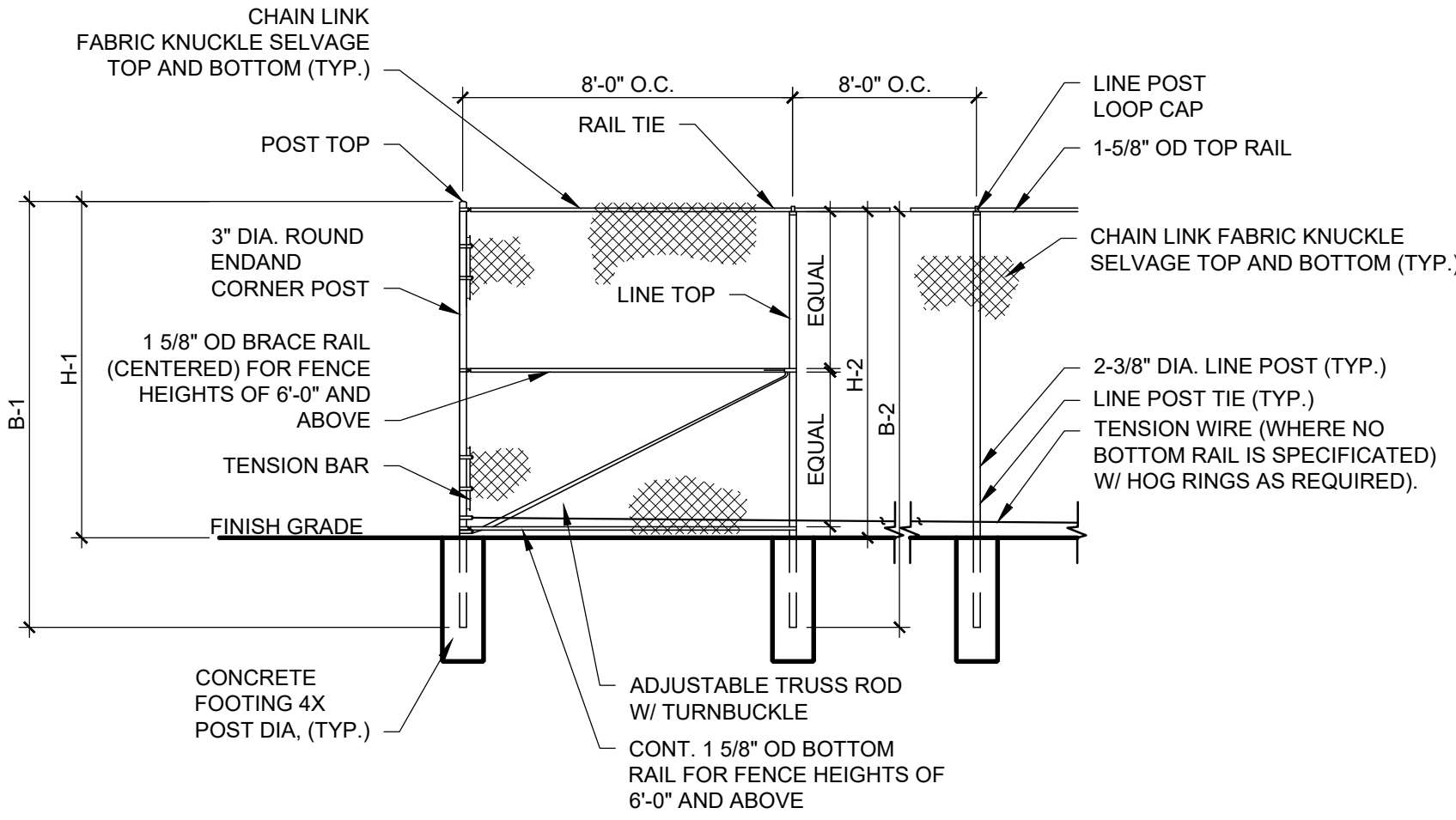
SCALE: 1/8" = 1'-0"

6

PARKING LOT SCREEN WALL ELEVATION

SCALE: 1/8" = 1'-0"

FENCE HEIGHT	END & CORNER POSTS		LINE POSTS	
	B-1 BAR LENGTH	H-1 HEIGHT ABOVE GRADE	B-2 BAR LENGTH	H-2 HEIGHT ABOVE GRADE
NORMAL HEIGHT 8'-0"	11'-0"	8'-0 5/8"	10'-8"	7'- 8 7/8"



4

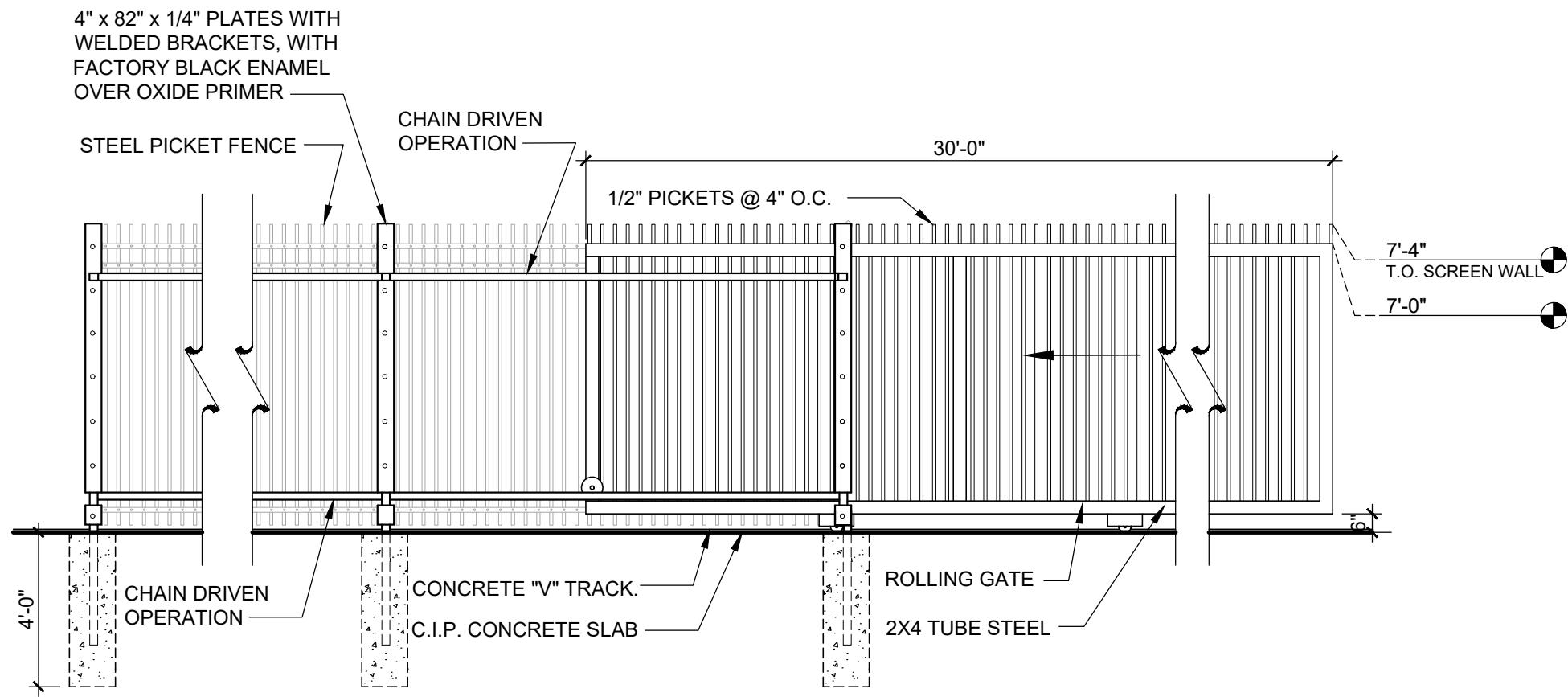
ENLARGED CHAIN LINK FENCE SECTION

SCALE: 1/4" = 1'-0"

3

FENCE SECTION - AT EXTERIOR PATIO

SCALE: 1/4" = 1'-0"



1

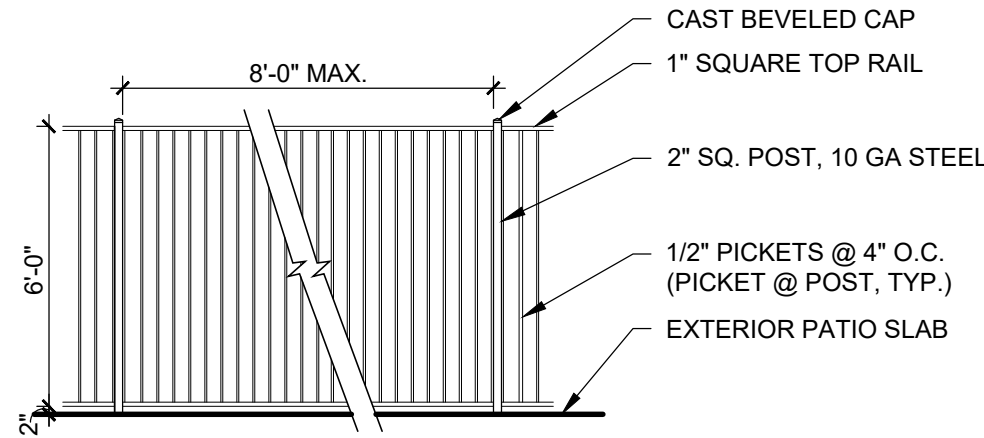
SLIDING GATE ELEVATION

SCALE: 1/4" = 1'-0"

GENERAL NOTES

- A. ALL CMU - HARVEST BROWN W/ CLEAR SEALER FINISH
B. ALL FENCING, GATES & ROLLING GATES PAINTED SW 7069 - IRON ORE
C. REFUSE ENCLOSURE - PER CITY OF CASA GRANDE STANDARDS

- NOTES:
1. GATES TO BE OF SIMILAR CONSTRUCTION.
2. FENCING & GATES SHALL MEET ALL CITY & COUNTY HEALTH DEPT. REQUIREMENTS.
3. WELD & GRIND SMOOTH ALL JOINS. A PRIMER COAT SHALL BE APPLIED TO ALL SURFACES FOLLOWED BY A TOUCH-UP COAT ON ALL CONNECTIONS, WELDS OR ANY DAMAGED OR RUSTED AREAS. A SECOND COAT SHALL BE APPLIED, FOLLOWED BY (2) COATS OF PAINT.
4. PAINTED - SHERWIN WILLIAMS SW 7069



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SCOTTSDALE AZ 85260

TRIUMVIRATE ENVIRONMENTAL

INTEGRATED WASTE MANAGEMENT FACILITY



REVISIONS	
CITY COMMENTS	8.19.22 01
CITY COMMENTS	9.26.22 02
COORDINATION	11.11.22 03
ROOF REVISION	12.16.22 04
SCALE FDN	3.17.23 05

TITLE

SITE DETAILS

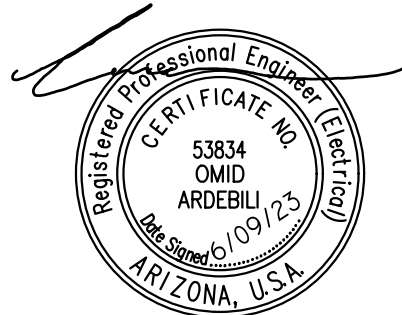
DATE
8-19-22
PROJECT NO.
SD5.0

PROJECT ADDRESS
73 S. COMMERCE DR
CASA GRANDE, AZ

SD5.0

Exhibit E-3
Lighting Photometrics

Statistics						
Description	Symbol	Avg	Max	Min	MaxMin	AvgMin
FC @ 2.5 APP	+	32.5%	62.5%	8.5%	16.3.1	5.3.1
EXTENSION - FC @ 50MM	+	22.5.5%	28.4.5%	12.4.5%	2.7.1	2.5.1



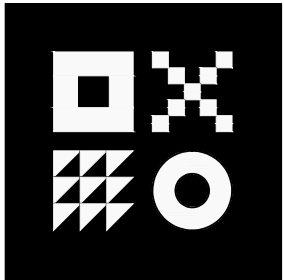
PROJECT ADDRESS
73 S. COMMERCE DR
CASA GRANDE, AZ

DATE
8-19-22
PROJECT NO.
20-200

4E1.2

[illegible]

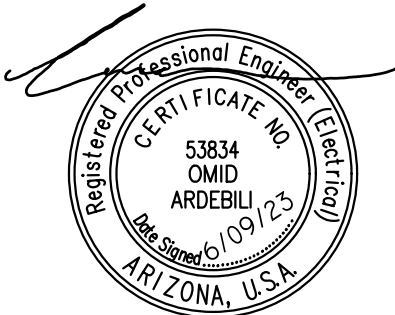
Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
BM / FC @ FLOOR	+	32.2%	35.8%	1.1%	32.5:1	11.1:1
BM / EXTERIOR	+	0.8%	2.1%	0.2%	33.5:1	8.6:1



Scottsdale, AZ 85251
P: 480.626.7072 | ardebilieng.com
Project Number: 20335
Project Manager: JFO



INTEGRATED
WASTE
MANAGEMENT
FACILITY



REVISIONS
CITY COMMENTS 8.19.22 01

PROJECT ADDRESS
73 S. COMMERCE DR
CASA GRANDE, AZ

EXHIBIT E-3 INTERIOR LIGHTING PHOTOMETRICS PLAN EMERG. DATE 8.10.22

4E1.3

Triumvirate Environmental, (Arizona), Inc.

EPA ID Number AZR000526777

Procedures to Prevent Hazards

Triumvirate Environmental (Arizona), Inc.

Appendix E-A Inspection Plan

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Exhibit EA-1

Daily Inspection Form A

Weekly Inspection Form B

Monthly Inspection Form C

Exhibit EA-2 – Locations of Emergency Response Equipment

1. Inspection Plan

1.1 GENERAL

Triumvirate Environmental (Arizona), Inc. (the “Facility”) conducts routine inspections to check for equipment malfunctions, structural deterioration, and other deficiencies that could harm human health or the environment. The inspections are conducted by assigned, trained employees. Observations made and any problems noted during the inspections are recorded on the inspection form along with the name of the inspector and the date and time of the inspection and inspector’s signature. Inspection forms are reviewed by the Environmental Manager (or designee) to verify the completion of the inspection and that actions were taken, or are scheduled to be taken, to correct any identified deficiencies.

This Inspection Plan (“Plan”) identifies all areas and items to be inspected, establishes the minimum inspection frequency and inspection criteria, and defines requirements for corrective measures. The Plan is maintained as part of the Facility’s operating record and is updated as required. Examples of changes at the Facility that would trigger a change in the Plan include:

- Changes in the structure to, or design of the Facility;
- Modifications to the Facility security system; and,
- Additions to emergency equipment items and devices.

1.2 CORRECTIVE MEASURES

Any problems noted during the inspections are addressed in a timely manner such that harm to human health or the environment does not occur. Conditions that pose an imminent hazard, such as active leaks or spills, are corrected immediately. For all other problems identified by the inspections, the Facility prepares a brief corrective action plan that specifies the problem, the specific corrective action required, person or persons responsible to implement the corrective action, and a projected resolution date.

1.3 INSPECTION FORMS

The results of all inspections are recorded on the appropriate inspection form based on the frequency by which the inspections are completed (i.e., daily, weekly, monthly, annually). [Exhibit EA-1](#) provides templates of these inspection forms (Forms A, B, and C). Completed forms are kept at the Facility as part of the Operating Record. The appearance and format of these forms may be revised (e.g., to improve and/or facilitate the inspections) provided that the substantive content (i.e., what is to be inspected and what are the relevant inspection criteria) remains unchanged.

Records of inspections are kept on-site for at least three years from the date of inspection. Records older than three years are archived off-site. All records are maintained until facility closure.

1.4 PERSONNEL AUTHORIZED TO PERFORM INSPECTION

It is the responsibility of the Facility Manager to ensure that the Facility is inspected according to this Inspection Plan. The Facility Manager may assign any trained employee to conduct inspections.

1.5 INSPECTIONS

1.5.1 Tanks and Containment Systems

Tanks and associated containment systems are inspected on a daily basis. Type of problems which are looked for during the inspection include evidence of leaks or spills, corrosion to tanks and structures, inoperable level gauges, and accumulation of rainwater in the containment systems. Observations are recorded on Inspection Form A for daily inspections.

1.5.2 Railcar Staging Area and Bulk Loading/Unloading Area

The Railcar staging area and bulk loading/unloading area are inspected daily. Type of problems which are looked for during the inspection include evidence of leaks or spills, and accumulation of rainwater in the containment systems. Observations are recorded on Inspection Form A for daily inspections.

1.5.3 Other Areas Subject to Spills

Other areas subject to spills when in use include the interior processing areas and the pack/depack areas. These areas are inspected daily. Problem which is to be looked for during the inspection is evidence of leaks or spills.

1.5.4 Emergency Communication Equipment

Emergency communication equipment (e.g., radios, emergency telephones, PA system) are checked and tested on a daily basis to confirm that it is functioning properly. Observations are recorded on Inspection Form A for daily inspections.

1.5.5 Containers and Containment Systems

Containers and containment systems are inspected on a weekly basis. Problems to be looked for during the inspection include evidence of leaks or spills, damaged/deteriorated containers, and tracking labels present and legible. Observations are recorded on Inspection Form B for weekly inspections.

1.5.6 Roll-off Staging Areas and Other Containment Structures

The roll-off staging areas and other containment structures (e.g., drum loading/unloading docks, Dry bulk loading/unloading docks) are inspected on a weekly basis. Problems to be looked for include

evidence of leaks or spills, damaged/deteriorated containers, and tracking labels present and legible (if containers are present). Observations are recorded on Inspection Form B for weekly inspections.

1.5.7 Security Devices

Security devices such as surveillance system, lighting, alarm systems are checked and tested on a weekly basis for proper operation. Observations are recorded on Inspection Form B for weekly inspections.

1.5.8 Other Security Equipment

Inspection of the perimeter security fence, entry gates and warning signs is performed on a monthly basis. Problems to be looked for during the inspection include evidence of damage to perimeter fence, missing warning signs, and improper proper operation, closure, and locking of entry gates. Observations are recorded on Inspection Form C for monthly inspections.

1.5.9 Emergency Showers and Eye Wash Stations

Emergency Showers and eyewash stations are checked and tested on a monthly basis. The checking and testing of the emergency showers and eyewash stations are recorded on inspection tags affixed to the equipment. Verification that the monthly checks and test have been completed are recorded on Inspection Form C for monthly inspections.

1.5.10 Spill Response Equipment

Spill response equipment is inventoried and checked for operation status on a monthly basis. Results of the inspections are recorded on Inspection Form C for monthly inspections.

1.5.11 Fire Suppression Equipment

Fire extinguishers are inspected on a monthly basis. The results of these inspections are recorded on the inspection tags affixed to the fire extinguishers. Verification that the monthly checks and test have been completed are recorded on Inspection Form C.

At least annually, each portable fire extinguisher undergoes an annual maintenance check in accordance with OSHA Standard 29 CFR 1910.157 (e) (3), and NFPA Standard 10, Section 4-4). Each extinguisher is hydrostatically tested in accordance with the schedule set forth in 29 CFR 1910.157 (f) Table L-1 and/or NFPA Standard 10 Table 5-3. These maintenance checks and tests are conducted by a qualified contractor. Documentation of these annual inspections are maintained as part of the Operating Record.

Automatic fire suppression systems are inspected and tested by a qualified contractor according to the manufacturer's recommended schedule. Documentation of these annual inspections is maintained as part of the Operating Record.

1.6 INSPECTION SCHEDULE

Table EA-1 summarizes the schedule by which the Facility conducts inspections. The inspection forms provided in Appendix E-B identify the types of problems which are to be looked for during the inspection.

Table EA-1
Facility Inspection Schedule

Equipment/Area		Minimum Frequency	Inspection Form to Use
Storage Tanks and containment systems		Daily	A
Railcar loading/unloading area		Daily	A
Bulk loading/unloading area – Flammable liquids		Daily	A
Bulk loading/unloading area – Corrosive liquids		Daily	A
Other areas subject to spills	Processing area 122	Daily	A
	Processing area 123	Daily	A
	Hoods 115-119	Daily	A
Emergency Communication Equipment		Daily	A
Containers and containment systems		Weekly	B
Roll-off staging areas		Weekly	B
Loading Dock 100		Weekly	B
Security Devices (e.g., surveillance, lighting, alarm systems)		Weekly	B
Safety Showers and Eye Washes		Monthly	C
Perimeter security fence		Monthly	B
Entry gates		Monthly	C
Warning signs		Monthly	C
Spill Response Equipment		Monthly	C
Fire Extinguishers		Monthly Inspection	C
		Annual service	Operating Record
Fire suppression systems		Annual service	Operating Record

In addition to the inspections identified in Table EA-1, the following monitoring and inspections are conducted according to the Facility's Subpart BB and Subpart CC Monitoring and Inspection Plans.

Subpart BB Pumps	Weekly: Visual; Monthly: Monitoring	Appendix B of Facility's Subpart BB Inspection and Monitoring Plan
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Triumvirate Environmental, (Arizona), Inc.
EPA ID Number AZR000526777
Procedures to Prevent Hazards

Subpart BB Valves	Initial, then Annual	Appendix B of Facility's Subpart BB Inspection and Monitoring Plan
Subpart CC Containers	Initial, then Annual	Appendix B of Facility's Subpart CC Inspection and Monitoring Plan

Exhibit EA-1

Inspection Forms

Daily Inspection Form A

Inspection Form A

Daily Inspection

INSTRUCTIONS

- 1) Record your full name (i.e., do not use initials), date, and time (include am or pm) on each page
- 2) Record your signature on each page
- 3) Inspect each item/area as indicated on Inspection Form A
- 4) Record your observations as either a "Yes" or "No." **Do not substitute with a "Y" or a "N."**
- 5) Immediately notify the Facility Manager of any evidence of a leak or spill. **DO NOT** wait until the inspection is completed to make the notification.
- 6) Use the space provided for "*Describe problem(s) observed and recommended remedial action(s)*" to record identified problem(s) and recommendation(s) for remedial action.

Inspection Form A Daily Inspection

Name of Inspector: _____

Date: _____

Time: _____

Signature: _____

Flammable Liquid Storage/Fuel Blending Tanks

Tank Number	Inspection Element				Describe problem(s) observed and recommended remedial action(s)
	Are there any signs of leakage from the tank?	Is there any structural damage to the tank or its components (e.g., valves, flanges)	Are hose connections on the tank uncapped when not in use?	Is the tank coating worn or damaged?	
101					
102					
103					
104					
105					
106					
107					
108					

Inspection Form A Daily Inspection

Name of Inspector: _____

Date: _____

Time: _____

Signature: _____

Flammable Liquid Storage/Fuel Blending Tanks Containment System and Unloading Area

Area	Inspection Element				Describe problem(s) observed and recommended remedial action(s)
	Are there any signs of damage to the epoxy coating?	Are there any signs of cracks or damage to the concrete?	Is there any damage to the containment curb?	Does the containment system have an of accumulated rainwater?	
Containment System					
Loading/Unloading Area					

Inspection Form A Daily Inspection

Name of Inspector: _____

Date: _____

Time: _____

Signature: _____

Corrosive Liquid Storage Tanks

Tank Number	Inspection Element				Describe problem(s) observed and recommended remedial action(s)
	Are there any signs of leakage from the tank?	Is there any structural damage to the tank or its components (e.g., valves, flanges)	Are hose connections on the tank uncapped when not in use?	Is the tank coating worn or damaged?	
201					
202					

Corrosive Liquid Storage Tanks Containment System and Unloading Area

Area	Inspection Element				Describe problem(s) observed and recommended remedial action(s)
	Are there any signs of damage to the epoxy coating?	Are there any signs of cracks or damage to the concrete?	Is there any damage to the containment curb?	Does the containment system have an accumulated rainwater?	
Containment System					
Loading/Unloading Area					

Inspection Form A Daily Inspection

Name of Inspector: _____

Date: _____

Time: _____

Signature: _____

Railcars

Rail Cars	Inspection Element			Describe problem(s) observed and recommended remedial action(s)
	Are there any signs of leakage from a rail car?	Is there any structural damage to a railcar or its components (e.g., valves, flanges)	Are hose connections on the tank uncapped when not in use?	

Railcar Containment System

Area	Inspection Element				Describe problem(s) observed and recommended remedial action(s)
	Are there any signs of damage to the epoxy coating?	Are there any signs of cracks or damage to the concrete?	Is there any damage to the containment wall?	Does the containment system have an of accumulated rainwater?	
Containment System					
Loading/Unloading Area					

Inspection Form A Daily Inspection

Name of Inspector: _____

Date: _____

Time: _____

Signature: _____

Processing Areas and Hoods

Area	Inspection Element				Describe problem(s) observed and recommended remedial action(s)
	Are there any signs of spills?	Are there any signs of damage to the epoxy coating?	Is there any damage to, or leakage from containers that are present?	Is there any damage to the containment curb?	
Processing Area 122					
Processing Area 123					
Hoods 115 -119					
Exterior Canopy Area 127					

Inspection Form A Daily Inspection

Name of Inspector: _____

Date: _____

Time: _____

Signature: _____

Emergency Communication Equipment

Emergency Communication Equipment	Inspection Element			Describe problem(s) observed and recommended remedial action(s)
	Is equipment misplaced or unavailable?	Is equipment damaged?	Is any equipment malfunctioning or operating incorrectly?	
Radios				
Emergency Telephones				
PA System				

Weekly Inspection Form B

Inspection Form B

Weekly Inspection

INSTRUCTIONS

- 1) Record your full name (i.e., do not use initials), date, and time (include am or pm)
- 2) Record your signature on each page
- 3) Inspect each item/area as indicated on Inspection Form
- 4) Record your observations as either a "Yes" or "No." **Do not substitute with a "Y" or a "N."**
- 5) Immediately notify the Facility Manager of any evidence of a leak or spill. **DO NOT** wait until the inspection is completed to make the notification.
- 6) Use the space provided for "*Describe problem(s) observed and recommended remedial action(s)*" to record identified problem(s) and recommendation(s) for remedial action.

Inspection Form B Weekly Inspection

Name of Inspector: _____

Date: _____

Time: _____

Signature: _____

Container Storage Rooms

Room No.	Inspection Element						Describe problem(s) observed and recommended remedial action(s)
	Are there any signs of spills?	Are any containers damaged or leaking?	Are any container tracking labels missing, incomplete, or illegible?	Is the aisle space inadequate to move emergency equipment between rows of containers?	Are there any signs of damage to the epoxy coating?	Is there any damage to the containment curb?	
102							
103							
105							
106							
120							
121							
124							
Area 126							

Inspection Form B Weekly Inspection

Name of Inspector: _____

Date: _____

Time: _____

Signature: _____

Loading Dock 100 and Roll Off Staging Area

Area	Inspection Element				Describe problem(s) observed and recommended remedial action(s)
	Are there any signs of damage to the epoxy coating?	Is there any damage to, or leakage from containers that are present?	Are any container tracking labels missing, incomplete, or illegible?	Does the truck well have an accumulation of rainwater?	
Loading Dock 100					
Roll Off Staging Area					

Security Equipment

Security Device	Inspection Element		Describe problem(s) observed and recommended remedial action(s)
	Is equipment damaged?	Is equipment malfunctioning or inoperable?	
Surveillance system			
Lighting			
Alarm system			

Monthly Inspection Form C

Inspection Form C

Monthly Inspection

INSTRUCTIONS

- 1) Record your full name (i.e., do not use initials), date, and time (include am or pm)
- 2) Record your signature on each page
- 3) Inspect each item/area as indicated on Inspection Form C
- 4) Record your observations as either a "Yes" or "No." **Do not substitute with a "Y" or a "N."**
- 5) Immediately notify the Facility Manager of any evidence of a leak or spill. **DO NOT** wait until the inspection is completed to make the notification.
- 6) Use the space provided for "*Describe problem(s) observed and recommended remedial action(s)*" to record identified problem(s) and recommendation(s) for remedial action.

Inspection Form C Monthly Inspection

Name of Inspector: _____

Date: _____

Time: _____

Signature: _____

Security Fencing, Gates, and Warning Signs

Equipment	Inspection Element			Describe problem(s) observed and recommended remedial action(s)
	Are warning signs missing, damaged, or illegible, i.e., faded	Is there any damaged to the fence or gates?	Are the entry gates inoperable, not closing properly, or not locking properly?	
Required warning signs			N/A	
Perimeter Fence	N/A		N/A	
Entry Gates	N/A			

Emergency Showers, Eyewashes, and Fire Extinguishers

Equipment	Inspection Element		Describe problem(s) observed and recommended remedial action(s)
	Monthly check and test completed?	Inspection tag affixed to equipment and completed for the current month?	
Emergency Showers & Eyewashes			
Fire Extinguishers			

Inspection Form C Monthly Inspection

Name of Inspector: _____

Date: _____

Time: _____

Signature: _____

Emergency Response and Spill Control Equipment

Equipment	Average Quantity	Location (Refer to Emergency Equipment Location Map Exhibit EA-2)	Inspection Element		Describe Problem(s) observed and recommended remedial action(s)
			Is the Equipment Present?	Is the Equipment in good condition and proper working order?	
Self-contained breathing apparatus (SCBA)	Four each	HWMP building office 113 (Location #7)			
First Aid Kit/Station	1 each	HWMP building office 113 (Location #7)			
Neutralization material -acids	1 each	Location #4			
Neutralization material - caustic	1 each	Location #4			
Photo ionization detector	1 each	HWMP building office 113 (Location #7)			
Decontamination Equipment	1 each	HWMP building office 113 (Location #7)			
Chemical Protective Boots	1 pair	Locations #1- #6			
Chemical Protective Gloves	5 pairs	Locations #1- #6			

Inspection Form C Monthly Inspection

Name of Inspector: _____

Date: _____

Time: _____

Signature: _____

Emergency Response and Spill Control Equipment

Equipment	Average Quantity	Location (Refer to Emergency Equipment Location Map Exhibit EA-2)	Inspection Element		Describe Problem(s) observed and recommended remedial action(s)
			Is the Equipment Present?	Is the Equipment in good condition and proper working order?	
Chemical Protective Tyvek suit	3 suits	Locations #1- #6			
Face Shield	2 each	Locations #1- #6			
Respirator Cartridges	2 spare pair	Locations #1- #6			
Safety Glasses	3 spare pair	Locations #1- #6			
Chemical/oil absorbent	one 30-gallon drum	Locations #1- #6			
Spill containment booms	3 each	Locations #1- #6			
Spill containment pillows	3 each	Locations #1- #6			
Overpack Drum	1 each	Locations #1- #6			
Broom	1 each	Locations #1- #6			
Shovel	1 each	Locations #1- #6			
Dustpan	1 each	Locations #1- #6			
pH paper	1 kit	Locations #1- #6			
Polypropylene liquid hand pump	1each	Locations #1- #6			

Inspection Form C **Monthly Inspection**

Name of Inspector: _____

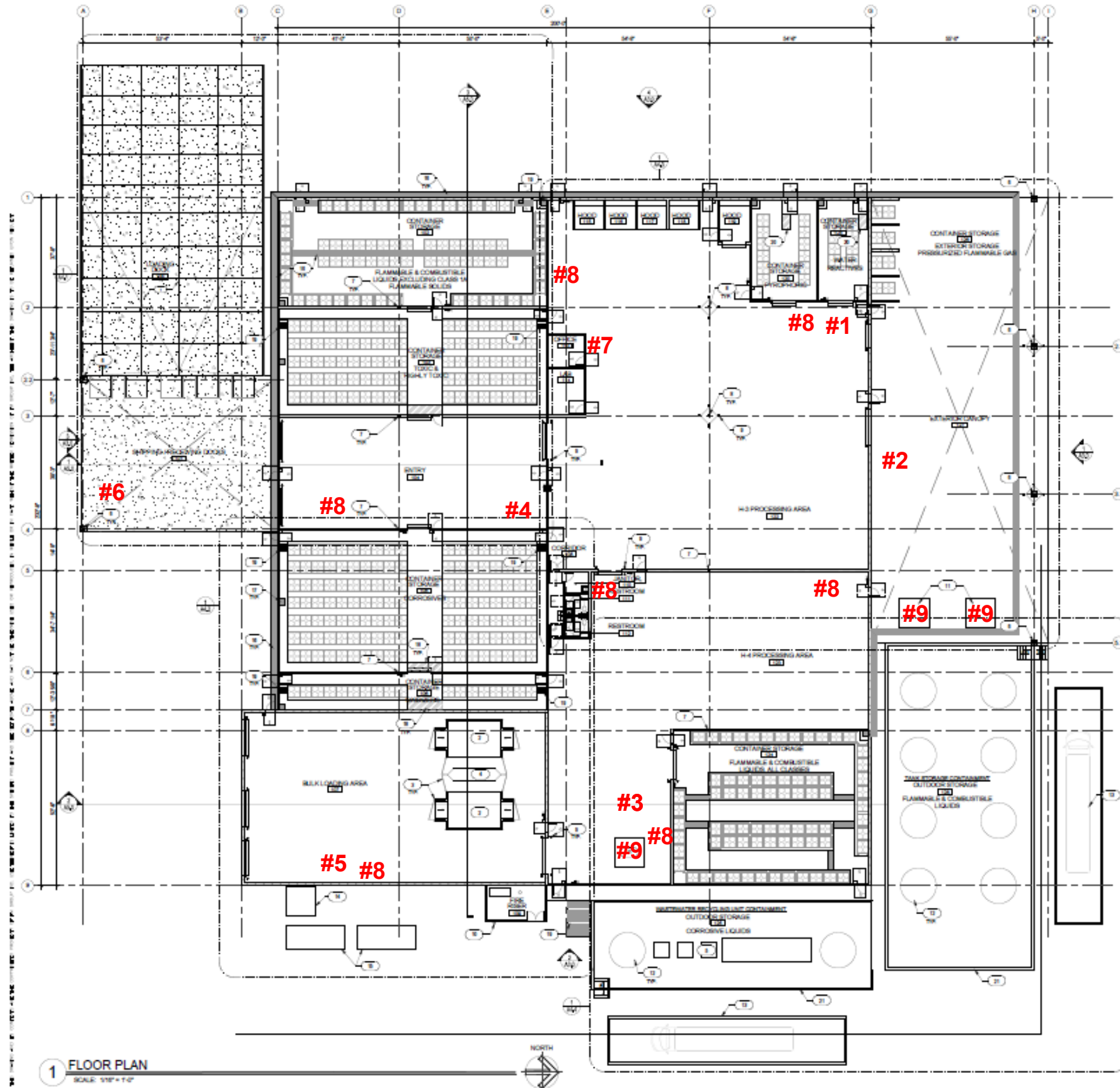
Date: _____

Time: _____

Signature: _____

Emergency Response and Spill Control Equipment

Equipment	Average Quantity	Location (Refer to Emergency Equipment Location Map Exhibit EA-2)	Inspection Element		Describe Problem(s) observed and recommended remedial action(s)
			Is the Equipment Present?	Is the Equipment in good condition and proper working order?	
Tools: pliers, screwdriver, wire cutters, pipe wrench, bung wrench, crescent wrench, socket wrench, torque wrench	1 each	Locations #1- #6			



Locations #1 - #6
List of Emergency Response Equipment at each Location

ITEM	CAPABILITIES	AVERAGE QUANTITY*
Chemical Protective Boots	Protect feet from chemical exposure	1 pair
Chemical Protective Gloves	Protect hand from chemical exposure	5 pairs
Chemical Protective Tyvek suit	Protects body from chemical exposure	3 suits
Face Shield	Protects face from chemical splashes	2 each
Respirator Cartridges	Provides back up supply to air purifying respirators	2 spare pair
Safety Glasses	Provides eye protection from minor impacts and minor chemical splashes	3 spare pair
Chemical/oil absorbent	Facilitates containment and cleanup of small to moderate chemical spills	one 30-gallon drum
Spill containment booms	Contains/absorbs large spills	3 each
Spill containment pillows	Contains/absorbs small spills and leaks	3 each
Overpack Drum	Provides containment for damaged containers of hazardous waste	1 each
Broom	Facilitate the cleanup and removal of used absorbent	1 each
Shovel	Facilitates the cleanup and removal of used absorbent	1 each
Dustpan	Facilitates the cleanup and removal of used absorbent	1 each
pH paper	Provides the capability to immediately check the pH of liquid spills	1 kit
Polypropylene liquid hand pump	Provide the capability to transfer liquids between containers	1 each
Tools: pliers, screwdriver, wire cutters, pipe wrench, bung wrench, crescent wrench, socket wrench,	Facilitate the response and cleanup of spills	1 each

Additional Emergency Response Equipment Located at the Facility

ITEM	CAPABILITIES	AVERAGE QUANTITY*	LOCATION
Self-contained breathing apparatus (SCBA)	Provides supplied air for respiratory protection	four each	HWMP building office 113 (Location #7)
Air Purifying Respirators	Provides respiratory protection from dust, volatile organic compounds, and acid gases.	Provided to authorized hazardous waste personnel only	N/A
First Aid Kit/Station	Provides first aid supplies for minor injuries	1 each	HWMP building office 113 (Location #7)
Fire Extinguishers Class ABC	Controls/extinguishes incipient stage ABC fires	N/A	Located throughout the HWMP building and exterior areas of the Facility
Hard Hat	Provides head protection from minor impacts	Assigned to all authorized personnel	N/A
Plumbed Eye Wash Station	Provides emergency deluge water for eye flushing	7 each	Location #8
Safety Shower	Provides emergency deluge of water for rinsing the body	7 each	Location #8
Neutralization material - acids	Neutralizes small/medium acid spills	1 each	Location #4
Neutralization material - caustic	Neutralization small/medium caustic spills	1 each	Location #4
Photo ionization detector	Provides chemical monitoring	1 each	HWMP building office 113 (Location #7)
Emergency Lighting	Provides illumination during power outages	N/A	Permanent, hardwired fixtures located in the HWMP building and the exterior portions of the facility.
Decontamination Equipment	Facilitates the cleaning of reusable equipment spill response equipment	1 Splash pool, variety of hoses, 2 pump spray bottles	HWMP building office 113 (Location #7)
Drum Dolly	Facilitates the moving of drums	6 each	Varies
Forklifts	Facilitates the moving of palletized drums and individual drums	2 each	Varies
Portable pumps	Facilitates the transfer of liquid wastes to containers or tanks	3 each	Varies
Pump Stations	Facilitates the transfer of liquid wastes to containers or tanks	3 each	Location #9
Vacuum Truck	Facilitates the recovery of medium/large spills of liquid wastes.	1 each	Varies

*The actual quantity may vary depending on usage and time required to restock



NOTE: BASE MAP SOURCE: F. M GROUP INC.



TRIUMVIRATE ENVIRONMENTAL (ARIZONA), INC.
73 SOUTH COMMERCE DRIVE
CASA GRANDE, ARIZONA

LOCATIONS OF EMERGENCY
RESPONSE EQUIPMENT

SCALE: NOT TO SCALE
OCTOBER 2023

EXHIBIT EA-2

Appendix E-B

Fire Sprinkler Design Requirements

**FIRE SPRINKLER DESIGN REQUIREMENTS FOR
PLANNED HAZARDOUS MATERIAL STORAGE AT**

TRIUMVIRATE ENVIRONMENTAL

73 S. COMMERCE DR.

CASA GRANDE, AZ

12/4/2023

Prepared by



TLB Fire Protection Engineering, Inc.

Signature Page

Facility Triumvirate Environmental
Address 73 S. Commerce Dr.
 Casa Grande, AZ
Author Todd LaBerge, P.E.
Signature

Revision Schedule

Date	Rev. Number	Change Summary
12/4/2023	2	Revisions for Battery Storage – New Section Added
5/24/2023	1	Publication
6/09/2022	0	Initial Analysis

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Fire Protection Systems and Equipment

This analysis provides fire sprinkler design criteria for the protection of various hazardous materials storage rooms and processing areas for the planned facility to be operated by Triumvirate Environmental at 73 S. Commerce Drive, Casa Grande, AZ.

The fire sprinkler protection for the areas identified below are based on drawings dated 5-2-22 and provided electronically by FM Group, Inc. via Dropbox link on 5-23-22. The design drawing used for reference is titled "Casa Grande Hazardous BLDG." Additional drawings were provided on 11-29-2023 for the Revision 2 analysis to include the storage of batteries, including lithium-ion and lithium-metal batteries.

Each numbered building area provided on the drawings is prescribed with fire sprinkler protection solely intended for that numbered area unless otherwise noted. The unique nature of this facility warrants precise descriptions of each area.

The 2018 Edition of the International Fire Code (IFC) is the currently adopted Fire Code in the City of Casa Grande and is used in this analysis with the associated referenced Standard NFPA 13 *Standard for the Installation of Sprinkler Systems* being the 2016 Edition. Lastly, NFPA 400 *Hazardous Materials Code* is also referenced for select materials where referenced in the IFC or NFPA 13.

All fire sprinkler protection recommended herein is based on the provision of wet-pipe fire sprinkler systems. Dry-pipe fire sprinkler systems should not be used unless specifically reviewed and analyzed separately. In addition, due to the current regulatory challenges with Aqueous Film Forming Foam (AFFF) fire sprinkler systems at various Federal, State, and local levels, AFFF protection options are not discussed.

It is worthy of note that this design analysis is solely focused on the required fire sprinkler system design density and design area for each class of material, inclusive of required in-rack fire sprinkler protection and hose stream demands.

All other protective measures for the storage of hazardous materials, including building construction features, detection and alarm systems, etc., are expressly excluded from this analysis.

The overall layout, design, installation, and commissioning of the fire sprinkler systems must be provided in accordance with NFPA 13. All plans, calculations, drawings, and equipment must be submitted to the local Fire Code Official for review and permit.



Flammable / Combustible Liquid Storage Rooms 102 and 124

Storage Configuration and Commodities:

This storage includes flammable and combustible liquid storage as identified in Drawing Sheets A4.0 and A4.7.

Room 102 will store Class IB and IC Flammable Liquids and Combustible Liquids and Flammable Solids. Class IA Flammable Liquids are not stored in this room. This room also store flammable solids in 55-gallon metal drums.

Room 124 will store all classes of Flammable and Combustible Liquids, including Class IA Flammable Liquids.

Flammable Liquid Storage:

- Storage includes rack storage of 55-gallon metal drums for all Classes of flammable liquids and all classes of combustible liquids.
- Rack storage is two tiers high.
- **All drum storage must be in metal, non-relieving style drums.** Plastic drums cannot be used without further analysis.
- The total quantity of liquids is shown to exceed 15,000 gallons, which thereby requires that the provisions for a Liquid Storage Warehouse be utilized in accordance with IFC Section 5704.3.8 and IFC Table 5704.3.6.3(3).
- For a Liquid Storage Warehouse, the fire sprinkler protection requirements can be selected from either IFC Chapter 57, or NFPA 30 *Flammable and Combustible Liquids Code* as noted in IFC Section 5704.3.8.4.
 - Section 5704.3.8.4 allows for the application of IFC Tables 5704.3.6.3(4) through 5704.3.6.3(7) and Table 5704.3.7.5.1, - OR -
 - NFPA 30 Tables 16.5.2.1 through 16.5.2.12.
- Given that IFC Table 5704.3.6.3(4) provides criteria for the storage of Class IA Flammable Liquids and NFPA 30 does not, the provisions of IFC Table 5704.3.6.3(6) are used for consistency, ease of design, and ease of plan review by the local Fire Department.

Required Fire Sprinkler System Design:

Room 102 and 124 must be provided with fire sprinkler protection as follows on the next page for the flammable and combustible liquids.

Note about Flammable Solid Storage:

The IFC does not provide prescriptive requirements for fire sprinkler protection for flammable solids, other than a reference in Section 5004.5 which requires a minimum design of Ordinary Hazard Group 2 (OH2), which is below the requirement for the protection of the flammable liquids. Flammable liquids provide a higher hazard than the proposed flammable solids; therefore, the fire sprinkler protection required to protect the flammable liquids is considered adequate for the flammable solids to be stored in the same room.



IFC Table 5704.3.6.3(6) below provides prescriptive language for the rack storage of all classes of flammable liquids to be stored. Items worthy of note from the Table follow:

- There are subtle but distinct differences between the rack storage of Class IA Flammable Liquids and the storage of Class IB/IC Flammable Liquids, with the Class IA Flammable Liquid storage being the more restrictive of the two:
 1. The spacing for the fire sprinklers at the ceiling (80 ft² vs. 100 ft²)
 2. The hose stream requirement (1000 gpm vs. 750 gpm).
- To ensure the maximum flexibility of these two rooms for the life of the building, *it is recommended to protect both Room 102 and Room 124 with the requirements for Class IA Flammable Liquids.*
 1. By replicating this design in the two rooms, the potential for error is reduced.
 2. This further will allow for the storage of Class IA Flammable Liquids in Room 102 if the business needs change for the facility.
- The intent with the in-rack sprinkler protection noted, is to position the heads at the rear of the single-row rack, under the horizontal beam for the second tier, in the middle of the rack bay.
 1. It is worthy of note that the intent is not to position a level of in-rack sprinklers above the top tier of storage in this configuration, as the top tier of storage is protected by the ceiling level sprinkler system.
 - This is discussed in NFPA 30, though not clarified in the IFC.
- Design all fire sprinkler protection for both Room 102 and 124 as shown below in IFC Table 5704.3.6.3(6) for Class IA Flammable Liquids, **highlighted in yellow.**

CLASS LIQUID	CEILING SPRINKLER DESIGN AND DEMAND			IN-RACK SPRINKLER ARRANGEMENT AND DEMAND					MINIMUM HOSE STREAM DEMAND (gpm)	MINIMUM DURATION SPRINKLER AND HOSE STREAM (hours)
	Density (gpm/ ft²)	Area (square feet)		Maximum spacing	On-side storage racks up to 9-foot-deep racks	On-end storage (on pallets) up to 9-foot-deep racks	Minimum nozzle pressure	Number of sprinklers operating		
		High-temperature sprinklers	Ordinary temperature sprinklers							
IA (maximum 25-foot height)	0.60	3,000	5,000	80 ft²/head	1. Ordinary temperature sprinklers 8 feet apart horizontally 2. One line sprinklers above each tier of storage 3. Locate in longitudinal flue space, staggered vertical 4. Shields required where multilevel	1. Ordinary temperature sprinklers 8 feet apart horizontally 2. One line sprinklers above each tier of storage 3. Locate in longitudinal flue space, staggered vertical 4. Shields required where multilevel	30 psi	Hydraulically most remote—six sprinklers at each level	1,000	2
IB, IC and II (maximum 25-foot height)	0.60	3,000	5,000	100 ft²/head	1. See 1 above 2. One line sprinklers every three tiers of storage 3. See 3 above 4. See 4 above	1. See 1 above 2. See 2 above 3. See 3 above 4. See 4 above	30 psi	Hydraulically most remote—six sprinklers at each level	750	2
III (maximum 40-foot height)	0.25	3,000	5,000	120 ft²/head	1. See 1 above 2. One line sprinklers every sixth level (maximum) 3. See 3 above 4. See 4 above	1. See 1 above 2. One line sprinklers every third level (maximum) 3. See 3 above 4. See 4 above	15 psi	Hydraulically most remote—six sprinklers at each level	500	1



Corrosive Storage Rooms 103 and 105

Storage Configuration and Commodities:

This storage includes 55-gallon drums of corrosive liquids as noted on Drawing Sheets A4.1 and A4.3.

It is assumed that the drum construction is plastic, due to the incompatibility between metals and corrosive liquids.

Drum Storage:

- Storage is in 55-gallon drums, two high, in a palletized arrangement.
- The two-drum-high palletized arrangement yields a maximum storage height of approximately 7-ft, including the pallets.
- Per NFPA 13 Table A.5.6.3, storage of noncombustible liquids in plastic containers over 5 gallons in capacity as a Class II commodity as the highest Class, contingent upon the type of plastic used. A Class II Commodity is assigned as a conservative measure.

Required Fire Sprinkler System Design:

- Per NFPA 13 Table 13.2.1, Class II Commodities can be stored up to a maximum of 10-ft high in a palletized arrangement without regard to ceiling height, with an Ordinary Hazard Group 1 (OH1) level of fire sprinkler protection.
- However, IFC Section 5004.5 requires a minimum design of Ordinary Hazard Group 2 (OH2); therefore, the minimum fire sprinkler protection design must be an OH2 design, which must include a 250-gpm hose stream allowance for 90 minutes.



Oxidizer and Organic Peroxide Storage Room 106

Storage Configuration and Commodities:

This storage includes 55-gallon drums of oxidizer liquids and organic peroxides, per Drawing Sheet A4.4.

Per Drawing Sheet A4.4, Class 1 and Class 4 Oxidizers will not be stored in this area. The protection criteria below are designed for Class 2 and Class 3 Oxidizers. In addition, Class II, Class III, Class IV, and Class V Organic Peroxides may also be stored

Fire sprinkler protection is required to be designed per NFPA 400 *Hazardous Materials Code*, as required by IFC Section 6304.1.2 for the Oxidizers. Sprinkler protection for Oxidizer liquids is noted in Chapter 15 of NFPA 400.

The required protection for the Class 3 Oxidizers in excess of 2,700 lbs. of storage exceeds that for the protection of Class 3 Oxidizers; therefore, the criteria for the storage of Class 3 Oxidizers is the most restrictive.

Drum Storage:

- Storage is in 55-gallon drums, two high, in a palletized arrangement for all commodities.
- The two-drum-high palletized arrangement yields a maximum storage height of approximately 7-ft, including the pallets.

Required Fire Sprinkler System Design for Class 3 Oxidizer Liquids:

- Per NFPA 400 Section 15.3.2.4.13.4, the required fire sprinkler protection for palletized storage of Class 3 Oxidizers in excess of 2,700 lbs. is determined in NFPA 400 Table 15.3.2.4.13.4(B).
- The design as noted in the screenshot below, requires a ceiling density of 0.65 gpm/ft² over the most hydraulically remote 5,000 ft².
 - However, as Room 106 is less than 5,000 ft², the density can be applied over the room itself, under the concepts noted in NFPA 13 Section 11.2.3.3.
 - A minimum 500 gpm hose stream demand is required for 2 hours.

Table 15.3.2.4.13.4(B) Sprinkler Protection of Class 3 Oxidizers Stored in Total Quantities of Greater Than or Equal to 2700 lb (1225 kg)

Storage Parameters	Bulk or Pile	Bulk or Pile	Rack
Maximum storage height	5 ft (1.5 m)	10 ft (3 m)	10 ft (3 m)
Maximum ceiling height	25 ft (7.6 m)	25 ft (7.6 m)	NA
Aisles — pile separation	8 ft (2.4 m) min. clear aisles	8 ft (2.4 m) min. clear aisles	8 ft (2.4 m) min. clear aisles
Ceiling design criteria	0.35 gpm/ft ² /5000 ft ² (1.32 L/min/m ² /464.5 m ²)	0.65 gpm/ft ² /5000 ft ² (5.3 L/min/m ² /1000 m ²)	Predominant for other commodities but not less than ordinary hazard Group II
In-rack sprinklers	NP	NP	See 15.3.2.4.13.5
Hose stream demand	500 gpm (1893 L/min)	500 gpm (1893 L/min)	500 gpm (1893 L/min)
Duration	120 minutes	120 minutes	120 minutes



Required Fire Sprinkler System Design for Organic Peroxides:

- Chapter 62 of the IFC does not provide prescriptive guidance to use NFPA 400 for the protection of Organic Peroxides; however, the requirements in IFC Section 903.3.1.1 require an NFPA 13 compliant fire sprinkler system.
- Per NFPA 13 Section 22.37.1.3, the required ceiling sprinkler protection for palletized storage of Organic Peroxides varies contingent upon the Class of Organic Peroxide stored, as noted below in the screenshot from NFPA 13.
 - It is worthy of note that the sprinkler protection requirements of NFPA 13 are reproduced in NFPA 400 Section 14.2.5.1
- Per Drawing Sheet A4.4 Class II, Class III, Class IV, and Class V Organic Peroxides may be stored.
 - Class V Organic Peroxides are a limited hazard for fire sprinkler protection, and as such there are no requirements beyond OH2 protection.

22.37.1.3 General Requirements for Storage of Organic Peroxide Formulations.

22.37.1.3.1 Where required by other provisions of this code, automatic sprinklers and water spray systems shall be designed and installed according to the requirements of NFPA 13 and NFPA 15 and shall provide the following discharge densities:

- (1) Class I — 0.50 gpm/ft² (20.4 L/min/m²)
- (2) Class II — 0.40 gpm/ft² (16.3 L/min/m²)
- (3) Class III — 0.30 gpm/ft² (12.2 L/min/m²)
- (4) Class IV — 0.25 gpm/ft² (10.2 L/min/m²) [400:14.2.6.1]

- The storage of Organic Peroxides at the most restrictive demand is a ceiling level sprinkler density of 0.50 gpm/ft² for the most remote 3,000 ft² for Class I materials
- The protection designed for the Class 3 Oxidizers is more restrictive (0.65 gpm/ft² density) and will provide adequate protection for the Organic Peroxides.



Pyrophoric and Water Reactive Storage Rooms 120 and 121

Storage Configuration and Commodities:

This storage includes 55-gallon drums of solid and liquid pyrophoric materials and water reactive materials as noted on Sheets A4.5 and A4.6. Gaseous pyrophoric materials are not to be stored in either room.

The water reactive materials are noted as Class 3, with detonable water reactive chemicals not allowed.

There are no prescriptive protection criteria for the storage of liquid and solid pyrophoric materials or water reactive materials in either the IFC, NFPA 13, or NFPA 400. The only reference to fire sprinkler protection is from NFPA 400 Section 17.2.5 and Section 20.2.5 to provide adequate protection per NFPA 400 Section 6.2.1.1., which requires a minimum OH2 level of protection, except where a higher hazard requires an elevated level of protection.

It can be assumed that a fire in either the pyrophoric or water reactive chemicals will consume all involved material; therefore, the fire sprinkler protection must consider a method of keeping containers cool and not involved if there is an incident. As such, a high level of fire sprinkler density must be considered, in addition to the k-factor of the fire sprinkler used.

It is our engineering opinion, based upon our experience in the protection of hazardous materials in the semiconductor industry that the following protection measures are expected to provide adequate protection for the storage of pyrophoric and water reactive materials in this facility.

Although these chemicals do pose a significant risk, loss history shows that flammable liquids often pose a higher risk due to the potential for three-dimensional fires. A minimum ceiling density of 0.60 gpm/ft² has proven effective in many fire scenarios, and the maximum 80 ft² spacing and 750 gpm hose demand drawn from the protection requirements of Class IA Flammable Liquids in IFC Table 5704.3.6.3(4) are consistent with a high level of protection for high challenge, high hazard fires.

1. Provide a minimum ceiling density of 0.60 gpm/ft² over the area of the rooms
 - a. Pyrophoric Storage Room 120 is approximately 682 ft² in size.
 - b. Water Reactive Storage Room 121 is approximately 527 ft² in size.
2. The fire sprinklers should be a minimum k-factor 14.0, to ensure a large droplet size and high velocity of water.
3. The maximum fire sprinkler spacing must not exceed 80 ft² per sprinkler.
4. A minimum hose stream demand of 750 gpm for 2-hours should be applied.

The Appendix to NFPA 400 Section 17.2.5 notes that many pyrophoric chemicals are also water reactive, which warrants an elevated level of sprinkler protection and hose demand for a 2-hour duration. With many similar chemicals, the only method of extinguishment is to allow the material to consume itself while providing protection for the other areas of the building.



Processing Areas, Hood Areas, and Covered Docks/ Delivery Areas

Given the transport, processing, and handling of a wide array of chemicals and the potential for flammable liquids, pyrophoric liquids, and water reactive liquids to become involved in an incident, these non-storage areas must be considered a minimum of Extra Hazard Group 2 (EH2) Occupancy per NFPA 13 Section 5.4.2.

The fire sprinkler protection for EH2 locations is as follows, per NFPA 13 Section 11.2.3.1:

- Per Figure 11.2.3.1.2, a minimum ceiling density of 0.40 gpm/ft² must be provided.
- High temperature ($\geq 286^{\circ}\text{F}$) sprinklers should be used, which will allow for the design area to be reduced from 2,500 ft² to 2,000 ft² per NFPA 13 Section 11.2.3.2.6.
- Minimum 500 gpm hose stream demand must be included in hydraulic calculations, for a minimum of 90 minutes, assuming that the fire sprinkler systems will be electronically supervised.



Outdoor Storage of Lithium-Based Batteries in a Prefabricated Structure

The 2018 Edition of the IFC, used for the majority of this analysis document, does not contain prescriptive protection criteria for the storage of lithium-ion and lithium-metal batteries. Similarly, NFPA 13 also does not provide prescriptive criteria for this storage. FM Global does publish recommended sprinkler protection for the storage of lithium-ion and lithium-metal batteries in their Data Sheets 3-26 and 8-1; however, those protection criteria may not be applicable or appropriate for outdoor, remote storage of the used batteries.

The project team for this new facility acknowledges that a fire involving lithium-based batteries is a likely occurrence and has taken this fire hazard into account, based on recent loss history and events. All planned storage of lithium-ion and lithium-metal batteries will be located in 2-hour fire-rated prefabricated storage structure, similar to those used for the storage of hazardous materials. The structure will be placed well over 100-ft from the nearest building, lot line, public way, and other important structure.

Overall fire protection features for the storage of lithium-based batteries can be obtained in Section 322 of the 2021 Edition of the IFC, or in the 2023 Edition of NFPA 855; however, those two guidance documents do not contain language for fire sprinkler protection design criteria. The other parameters for proper protection of the storage of these types of batteries should be evaluated in the totality of the facility design; however, those provisions are not discussed in this sprinkler protection analysis document.

Loss history has demonstrated that lithium-based battery fires are extraordinarily difficult to extinguish, and the more likely source of extinguishment has been the complete consumption of the fuel (i.e., the battery burnt itself out and self-extinguished).

As the Codes and Standards change and evolve to meet this emerging and changing hazard, many of the fire suppression response tactics have shifted to simple exposure protection while allowing the fire to burn itself out (where safe to do so). From a fire sprinkler perspective, acknowledging that a standard fire sprinkler system is often ineffective to extinguish a lithium-based battery fire, our recommendations for fire sprinkler and water intervention are as follows, based on an exposure-protection strategy to be employed by the local Fire Department after the appropriate size-up measures have been completed, and only if it is deemed necessary to apply water to the fire rather than letting the fire self-extinguish:

1. Provide fire sprinklers internally to the planned prefabricated storage container, in an open-head deluge-style arrangement.
2. Supply the fire sprinklers from a dedicated fire department connection (FDC) located at least 30-ft from the prefabricated structure, at a location and distance approved by the local Fire Department.
3. Provide minimum k-8.0 open-head pendent fire sprinklers in the container, spaced no more than 5-ft on-center, in the middle of the long-axis of the structure.
4. Provide a fire hydrant in a location approved by the Fire Department, for use in supplying the FDC.



Appendix E-C

Fire Water Flow Requirements

ARIZONA WATER COMPANY

3805 N. BLACK CANYON HIGHWAY, PHOENIX, AZ 85015-5351 • P.O. BOX 29006, PHOENIX, AZ 85038-9006
PHONE: (602) 240-6860 • FAX: (602) 240-6874 • TOLL FREE: (800) 533-6023 • www.azwater.com

February 23, 2021

Mike Farell
Triumvirate Environmental, Inc.
200 Inner Belt Road
Somerville, MA 02143

PROJECT: NAME / DESCRIPTION Triumvirate Environmental, Inc	
SYSTEM: Pinal Valley	
CONTRACT NO.:	
P.E. NO.:	W.A. NO.:

Dear Mr. Farell:

Arizona Water Company ("Company") received the Water Service Information Request form for the above referenced project. The legally recognized public fire protection agency that has the responsibility for fire protection must specify the minimum required fire flow rate (GPM) and flow duration (hours) for your project. The public fire protection agency may specify a minimum flow rate from a fire hydrant or fire sprinklers or a combination of both. The public fire protection agency may also allow for a reduced flow rate if the building is equipped with fire sprinklers.

Please have the public fire protection agency specify the minimum fire flow rate for this project by completing the table on page 2 and return a completed copy of this letter to my attention. The method of service will be determined based on the required fire flow rate for this project.

If you have any questions, please feel free to contact me at the number above.

E-MAIL: developmentsservices@azwater.com

Very truly yours,

Tanya Castro
Engineering Development Coordinator
developmentservices@azwater.com

sla

Fire hydrant(s)	GPM: 3,000	Duration: 3-hour
Fire hydrant(s) reduced GPM if equipped with fire sprinklers:	GPM: (25% Reduction) 2,250	Duration: 2-hour

(Public Fire Protection Agency Signature)

By: _____

Title: _____

Date: _____

Fire sprinklers Preliminary/ Estimated Demand	GPM: 2,250	Duration: 150 minutes
Sprinkler demand: Preliminary/Estimated Demand	GPM: 1,750	
Hose demand: Preliminary/Estimated Demand	GPM: 500	

(Fire Sprinkler Design Engineer Signature)By: Cesar Reyna - EJ Engineering, Inc.Title: Chief DesignerDate: 03.08.2021