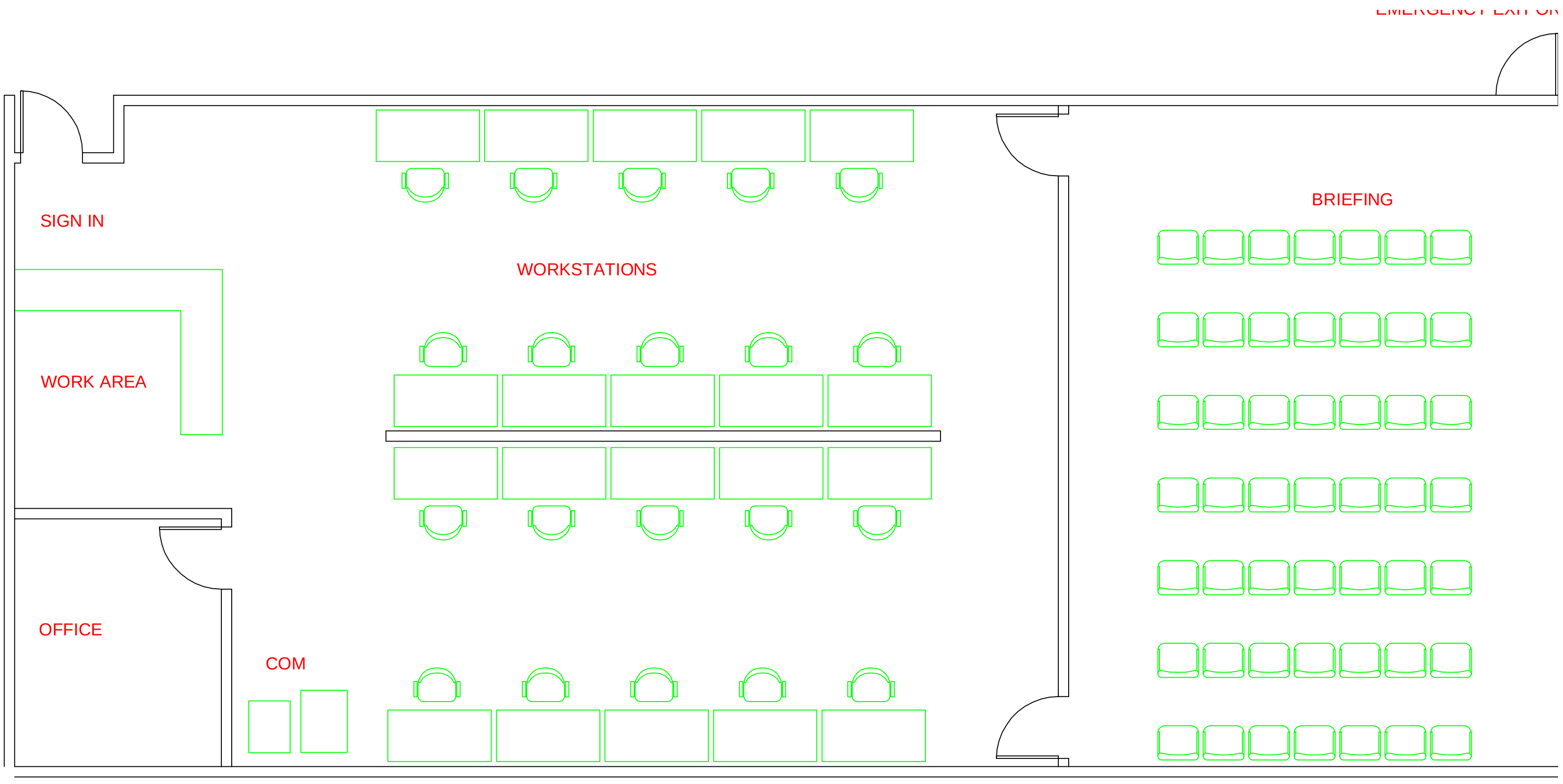
SIPRNET Sample Plan



Engagement Skills Trainer (EST) 2000 Facility Notes

Engagement Skills Trainer (EST) 2000
Facility Notes

Oct 2010

This document was prepared by the US Army Program Executive Office, Simulation, Training and Instrumentation (PEO STRI), ATTN: Product Manager, Ground Combat Tactical Trainers (PM GCTT), Materiel Developer of the EST 2000 System.

Engagement Skills Trainer (EST) 2000 Facility Notes

FACILITIES OVERVIEW

This document was prepared by the US Army Program Executive Office, Simulation, Training and Instrumentation (PEO STRI), ATTN: Product Manager, Ground Combat Tactical Trainers (PM GCTT), Materiel Developer of the EST 2000 System. This document is provided as a guide for designing/preparing an EST 2000 training area. Guidance and specific details are provided to ensure all aspects of the room are suitable and will not impact the operation of the EST 2000.

Prior to modifying a training area or building an EST 2000 classroom, installations are welcome to forward their facilities plans to PEO STRI, ATTN: PM GCTT for review. Call (407) 384-3899, Gary Stevenson, Acquisition Logistics, (gary.p.stevenson@us.army.mil) to arrange for facilities plan review.

ROOM LOCATION, SIZE AND CONFIGURATION

The EST 2000 training area should be situated in a location that provides easy access for potential users. The location should be noise isolated (system firing noise may be objectionable for nearby office spaces), with controlled lighting (see Lighting).

An interior (windowless) room is preferable so the environment may be developed to optimize all aspects of the EST 2000 system capabilities. Room size will vary depending on training usage, number of subsystems networked and space availability. A typical full featured fixed room for a three (3) subsystem configuration will require more floor space than a room optimized for a single subsystem.

The EST 2000 facility area is best configured as two separate rooms. The rooms include the EST 2000 training room with a small adjacent room (such as a closet) dedicated for storage of weapons and transportable cases. The recommended room configuration size provided includes room for access to equipment for daily readiness checks.

LIGHTING

Proper lighting is one of the most important elements for optimizing the room for the EST 2000 use. All light should be extinguished from beyond the firing line and all windows should be blocked to prevent the entry of light from washing out the projection screen and interfering with the hit detect system camera.

Incandescent directional lighting controlled by a dimmer switch, such as tract lights located above the firing line, can be used without system interference. The dimmer allows for the adjustment of ambient light levels such that the weapon front sight post is adequately illuminated without interfering with the clarity of distant targets on the screen. Additionally fluorescent lights with dimmers or zoned with multiple switch controls can be used.

Excessive ambient light levels make detection of distant targets on the projection screen difficult. No mercury vapor lighting fixtures can be used. Therefore the EST 2000 room may need wall and floor surfaces treated or covered to reduce reflection and reduce levels of ambient light on the projection screen. If available, camouflage-netting on the floor between the firing line and screen adds to realism and diffuses ambient lighting reflected by the floor.

SYSTEM ACOUSTIC & MECHANICAL VIBRATION NOISE PRODUCTION AND ISOLATION

The EST 2000 is capable of producing noise levels up to 107 dB when firing machine guns. Speaker volume is adjustable by the instructor but sound and vibration due to weapon mechanical movements is not. The room should be located in a space such that the sound and mechanical vibration of simulated weapon fire does not interfere with other activities in adjacent office spaces. If sound spillover into nearby areas is unacceptable, then sound-proofing techniques should be employed.

EST 2000 HVAC ISSUES

The EST 2000 is designated by the Operation Requirements Document (ORD) to be operated in a military classroom environment. The Heating, Ventilation and Air Conditioning (HVAC) system must be

adequate to handle the equipment and body heat load of the space. The EST 2000 is particularly susceptible to heat related failures if operated without a properly designed and operating HVAC system to regulate the operational classroom environment.

Supply air into the space should be directed in the back of the room closest to the firing line. Supply air should not be directed to the front of the room because air movement could cause screen movement (i.e. rippling effect), which could degrade system accuracy.

The system should provide adequate heat load compensation with a continuous exchange of fresh air being desirable. A 20 percent air exchange per hour is desirable. Supply chilled air must be capable of compensating for the body load of meeting participants and heat dissipation of the lighting and electronic equipment.

As a general guide, 640 BTU should be added to normal calculated heat load for the space per person per the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) guidelines (Example: 21 people times 640 equals an extra 13440 total supply BTUs of cooling). The total power draw to compensate for equipment should be calculated by totaling the power draw in watts and multiplying the result times 3.14 to yield the additional BTU loading compensation required.

Typical power load for a three (3) subsystem EST 2000 equipment is about 4500 watts or 14,130 BTUs. A typical three (3) subsystem EST 2000 would require approximately (27,570 BTUs) 2.3 Tons of cooling in addition to capacity based on facility room size, lighting load and construction. Operation of the EST 2000 outside of the identified temperature and humidity parameters can result in equipment failures that may not be covered by vendor warranty.

The EST 2000 is capable of operation in a facility with the following climatic conditions:

- Operating temperature of $+60^0$F to $+95^0$F
- Storage temperature of $+5^0$F to $+95^0$F
- Relative humidity (non-condensing) between 20% - 80% for both operation and storage

The EST 2000 Instructor/Operator System, being comprised of commercial computer and electronic equipment requires reasonable care. The HVAC system must be operational year round to properly regulate the classroom environment.

ELECTRICAL REQUIREMENTS

The electronic equipment used in the EST 2000 system is not sensitive to normal line voltage fluctuations and is minimally conditioned to protect the equipment and limit network interference. Adequate electrical outlets are required to accommodate equipment and support components.

Each IOS subsystem requires at least one (1) outlet be provided in the training room on a separate circuit. Each IOS is capable of operation on a 15 Amp circuit with the outlet located within 20 feet of the IOS location. Each compressor requires two (2) separate dedicated power outlets to operate. Each outlet requires a dedicated 20 Amp circuit with the outlets located within six feet of the compressor location:
5 lane – two 110 VAC, 60 HZ, 20 Amp circuits. Installed as a pair of identical circuits.
10 lane – four 110 VAC, 60 HZ, 20 Amp circuits. Two pairs of identical circuits.
15 lane – six 110 VAC, 60 HZ, 20 Amp circuits. Three pairs of identical circuits.
Unused outlets on a duplex receptacle where electronic equipment is attached should not be utilized for such items as vacuum cleaners, floor polishers, microwave ovens and coffee pots, because of facilities circuit breaker overload or damaging electrical transients

For optimum operation IO subsystem power circuits should be connected only to a well balanced load center with a maximum neutral elevation referencing earth ground of .5 volts. This is important as the National Electric Code allows neutral elevation with in a range of three percent of the nominal circuit supply voltage. This is suitable for code compliance but can cause induced hum in the audio system.

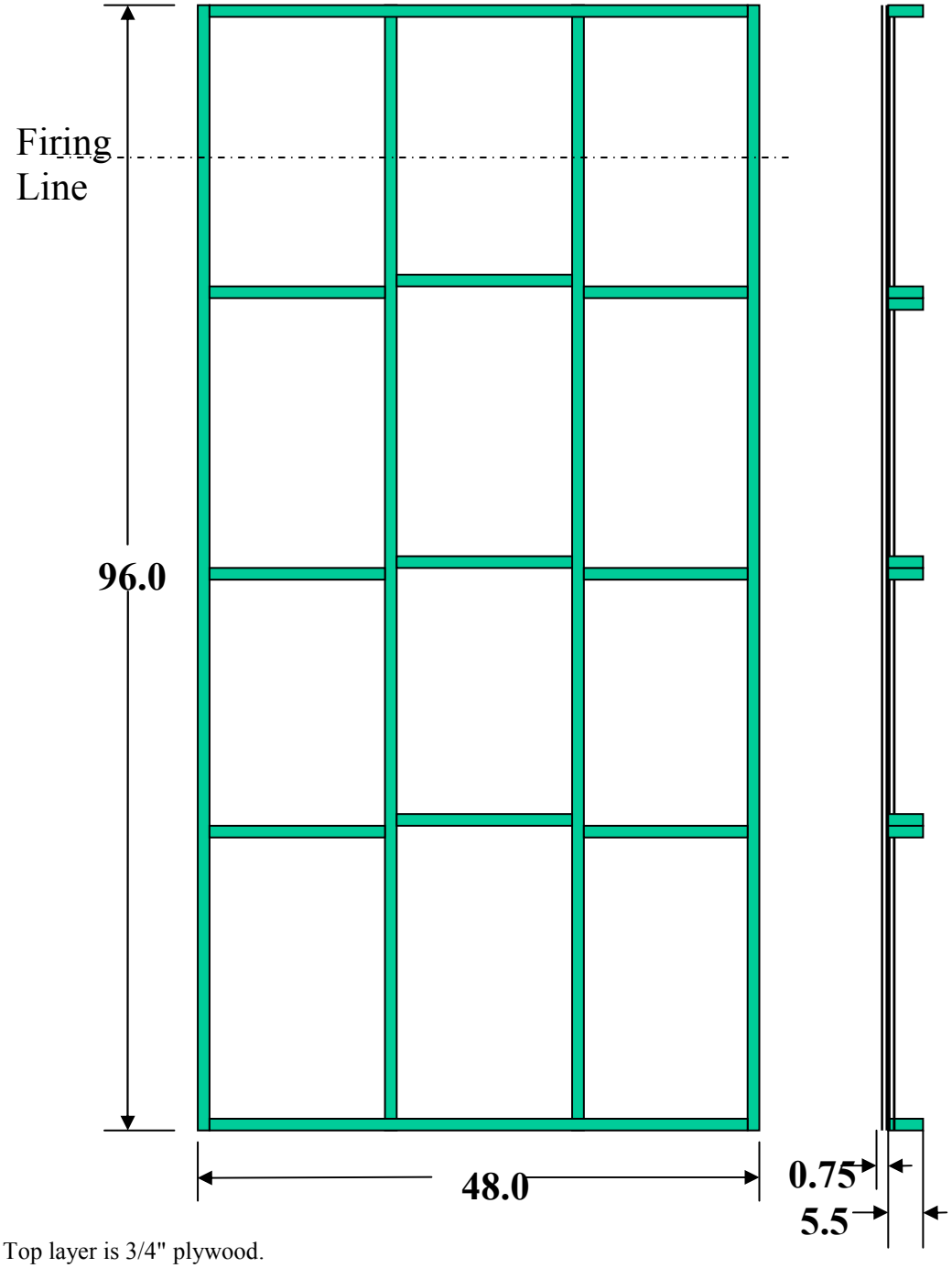
TELECOMMUNICATIONS SERVICE
The EST 2000 training room should have a minimum of two (2) voice grade telephone lines. One line is required for connection to the PC modem attachment in order to take advantage of remote diagnostics. The other is for the Instructor Operator to use to communicate with the 24-hour help desk service provider during the course of setup, Line Replaceable Unit (LRU) swap-out or trouble shooting. Note: the modem line should be connected to the left most networked subsystem for the diagnostics to remotely access all subsystems.

OTHER CONSIDERATIONS
The EST 2000 room, if carpeted with heavy carpet or thick padding may cause excessive projector movement during training. This can be corrected by isolating the projector on a suitably sized square of 3/4" plywood placed on top of the carpet. Minimum size of this plywood should be 2' X 3'.

Shooting platforms can be utilized if desired. The use of a shooting platform will more accurately reflect conditions at a shooting range. The attached sketch has been included to aid you in constructing your own platforms.

Warning: Operating the EST 2000 in a facility that does not conform to the environmental parameters may result in equipment failure that will void the system warranty. Repair costs associated with equipment failures, determined to be the result of such operator negligence, will be the responsibility of the receiving units.

This shooting platform is suggested, but not required and is not part of the delivered system. This sketch has been included to aid you in constructing your own platforms.



1. Top layer is 3/4" plywood.
2. Support bracing is 2X6 wood.
3. Screw and glue all together.
4. Three platforms required per each 5 lane EST 2000 subsystem.

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DA PAM 350-9: Engagement Skills Trainer (EST) 2000

ENGAGEMENT SKILLS TRAINER (EST) 2000

Training Category/Level Utilized:
Small Arms/Level 3

Logistic Responsible Command, Service, or Agency:
PEO-STRI, Orlando FL

Source and Method of Obtaining:
Available through local TSC

Purpose of Trainer:
The Engagement Skills Trainer (EST) 2000 is used as a unit and institutional, indoor, multipurpose, multilane, small arms, crew served and individual antitank training simulator. The EST is an industry proven, commercially available, computer operated simulator. The EST provides audio and visual presentations and feedback during training scenario exercises simulating the operation of a variety of small arms weapons. The EST simulator utilizes visual display systems, audio system(s), aiming detection system(s), pseudo or modified real weapons with weapon power source interfaced by computer to provide Marksmanship, Shoot/Don't Shoot decision training, and Unit Collective Squad Level training scenarios. These trainers safely replicate weapon training events which lead to live fire individual and weapon crew qualification and that contribute to increased weapon, crew, fire team, and squad combat effectiveness training in Army defined scenarios. The EST is used primarily to:

a. Train and evaluate individual marksmanship training for initial entry soldiers at the Army Training Centers.
b. Provide active and Reserve Component unit sustainment training in preparation for individual and crew small arms live fire weapons' qualification.
c. Provide Active and Reserve Component units a capability to train in Shoot/Don't Shoot situations currently not resourced.
d. Provide unit collective gunnery and tactical training for static dismounted Infantry, Scout, Engineer, Military Police Squads, and Combat Support/Combat Service Support (CS/CSS) elements.

Functional Description:

The EST system deploys three configurations: a stand-alone five (5) lane system, when networked, a ten (10) lane system and a fifteen (15) lane system. Dependent upon the lane correlation, the following modes of training are supported:

a. Collective training for an Infantry Squad of nine soldiers,

b. Collective training for a Scout Squad of five soldiers,

c. Collective training for an Engineer Squad of nine soldiers,

d. Collective training for a Military Police Squad of ten soldiers,

e. Collective training for a Combat Support/Combat Service Support (CS/CSS) element of up to ten soldiers.

f. Marksmanship training ten or more soldiers

The hardware for each EST 2000 system consists of an Instructor Operator Station (IOS), modified weapons, floor boxes, high-resolution projector, speakers, camera-detection system, air compressor, screen, and associated cabling and hoses. Weapon modifications include an eye-safe laser; sensors to measure trigger pressure, cant and ammunition magazine/belt status (as well as status of on-off or selector switches); and a compressed air operating system. The Rack Distribution Unit (RDU) located in the IOS serves as the main signal interface between components. Modified rifles, pistols, machineguns, and shotguns are modified to work with the systems and rendered incapable of firing live ammunition. Shoot/Don't Shoot, Collective, and Marksmanship scenarios are pre-loaded onto each I/O station that will be delivered with each subsystem.

Physical Information:

The EST 2000 components are of different sizes and weight. All components are protected during transit by transit cases. Facility size limit for the EST 2000:

5 Lane	10 Lane	15 Lane
35.0' length	35.0' length	35.0' length
17.5' width	35.0' width	52.5' width
8.0' height	8.0' height	8.0' height

The EST 2000 fields three (3) weapons suites to support individual weapon, crew, fire team, and squad level training modes of operation: Light, Heavy and Hybrid weapons suites.

Weapons:
M16A2, 5.56mm Rifle.
M16A4, 5.56mm Rifle
M4, 5.56mm Carbine.
M9, 9mm Pistol.
M249, 5.56mm Machine Gun
M60, 7.62mm Machine Gun.
M240B, 7.62mm, Machine Gun.
M2, Heavy Barrel Caliber .50 Machine Gun.
MK19 MOD3, 40mm Grenade Machine Gun.
*M320, 40mm Grenade Launcher.
M136, Launcher and Cartridge, 84mm, HEAT.
M1200, Winchester Shotgun, 12 gauge.
*M320 will replace the M203

EST 2000 Heavy Suite

28 Weapons

M9 Pistol - 2

M16A4 - 2

M4 - 8

M320 GL - 2

M4/320 - 2

M249 SAW - 2

M240B MG - 2

M136 AT4 - 2

M1200 - 2

MK19 GMG - 2

M2 HBMG - 2

M16/M203

M4/M203

EST 2000 Hybrid Suite

38 Weapons

M9 Pistol - 6

M16A4 - 6

M4 - 10

M320 GL - 2

M4/320 - 2

M249 SAW - 2

M240B MG - 2

M136 AT4 - 2

M1200 - 2

MK19 GMG - 2

M2 HBMG - 2

M16/M203

M4/M203

Equipment Required, Not Supplied:
CCO Close Combat Optics
MGO Machine Gun Optics
PVS-4 Night Vision Scope
TVS-5 Night Vision Scope
M3 Tripod and pintle with Traverse and Elevation Mechanism Weapons interface mounting hardware.

Special Installation Requirements:
Facility AC

Power Requirements:
The EST 2000, and its separable systems, operate on available power in both Continental United States (CONUS) and Outside CONUS (OCONUS), on either 110/220 volts, alternating current, at 50/60 hertz. Safeguards are incorporated to prevent attachment to mismatched power supply. All trainer equipment incorporates safeguards to prevent damage to equipment or personnel

Power requirements for each EST 2000 5 lane subsystem:

IOS:
110vac, 60 Hz, 15 Amps circuit or, 220vac, 50 Hz, 7.5 Amps circuit.
Outlet located within 20 ft. (6m) of IOS.
Compressor:
110vac, 60 Hz, 20 Amps circuit or, 220vac, 50 Hz, 10 Amps circuit.
Outlet located within 8 ft. (2.5m).

Applicable Publications:
Engagement Skills Trainer (EST) Operator's Manual TM 07-6920-704
Engagement Skills Trainer (EST) System Maintenance Manual (SMM) - SMM 07-6920-704
Engagement Skills Trainer (EST) COTS Manuals (As Required) - TD 07-6920-704
What Training Manuals are use in order to operate this device?

Reference Publications:
None

Training Requirements Supported:
Initial Entry Training & Unit Training Individual. The EST 2000 is capable of producing and storing training feedback on simulated fire scoring. The system provides for: Boresighting and Zeroing, Weapon Recoil, Ballistic Simulation, Simulated Weapon System Accuracy, Ammunition Basic Loads, Magazines and Ammunition Belts, Simulation of Shooting Positions and Targetry.

Unit Training Collective. The EST supports training of dismounted, squad missions, specifically, squad defense and ambush in support of train up for low intensity conflict, Military Operations in Urban Terrain (MOUT), special operations, anti-terrorism, support and stability operations, and mid to high intensity conflict. The EST simulates a variety of combat and combat related scenarios to reduce the likelihood of replication of scenarios. Scenarios are life like, true to size, coloration, probable surroundings, compatible with mission areas of responsibility, progressive, and engage the soldier in a realistic response to a perceived realistic situation. The scenarios include appropriate battlefield conditions and terrain depicting snow, desert, MOUT (indoor and outdoor), jungle, forest, day, night (both unaided and aided with binoculars, optical sights, and night vision equipment), smoke, ground fog, and MOPP level 4. The device has the capability to "stop action" and "replay action" at normal, slower than normal, and faster than normal speeds. In the playback mode, the device displays individual soldier shot groups as they respond to specific squad leader communications. Playback is audio and visual (on command) and provides a printout for the squad and teams, as well as, the individual members. The device also has the capability to store and retrieve squad, team, and individual data from one scenario to the next for comparative purposes.

Maximum realism and resolution is provided that enables the following tasks to be performed:

a. Friend and Threat personnel recognition and identification.

b. Recognition and identification of fleeting and stationary threat personnel partially obscured by objects.

c. Recognition and identification of all personnel depicted in the scenario (Friend, Threat, Allied, Civilian Personnel.)

d. Recognition and identification of Threat or Civilian Personnel that may or may not be armed with concealable weapons such as knives and pistols.

e. Recognition and identification of personnel in low light and other marginal conditions.

f. Recognition and identification of facial expressions on selected personnel.

g. Recognition and identification of a variety of combat and non-combat vehicles.

EST 2000 Site Preparation Checklist

CUBIC
DEFENSE APPLICATIONS
Simulation Systems Division

EST 2000 Site Preparation Checklist

General Construction:

☐ The distant from the front wall to the rear wall is at least 35 feet.
☐ The width of the room is at least 17.5 feet for 5 lanes, 35 feet for 10 lanes, or 52.5 feet for 15 lanes.
☐ There is sufficient light to work in the Range.
☐Yes ☐ No Are you using a stage or platform? If YES, see below. If NO, then ignore next question.
☐ Is there at least 21 feet of space between front wall and front of platform or stage?
☐ If windows are installed in the room insure they are covered.
☐ HVAC is complete and range temperatures remain between 15 and 35 degrees Celsius.

Ceiling:

☐ Minimum 8 ft. clearance from floor.

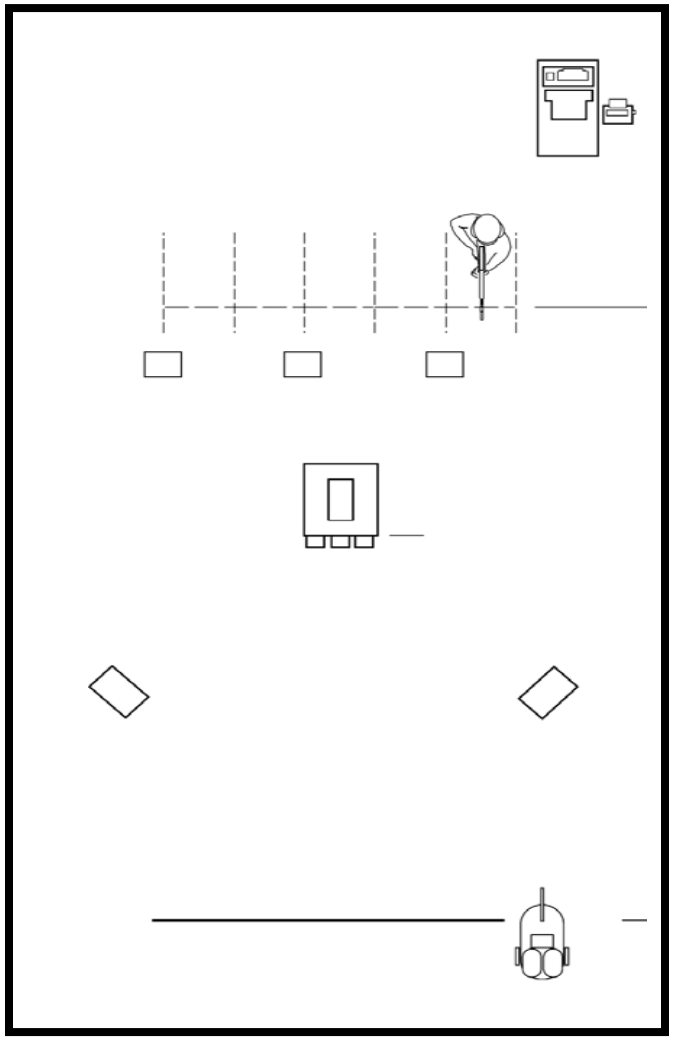
Electricity:

☐ Ability to eliminate direct light onto projection screen.
☐ Electric wiring is complete and has power.
☐ One outlet has been installed for each IOS.
5 lane- one 110 or 220 VAC dedicated power source
10 lane- two 110 or 220 VAC dedicated power sources
15 lane- three 110 or 220 VAC dedicated power sources
☐ Outlets are wired and powered for the IOS and located within 20 feet (6 m) of IOS
110 VAC, 60 Hz, 15 Amp circuit
or 220 VAC, 50 HZ, 7.5 Amp circuit
☐ Outlets are wired and powered for the Compressor(s) and located behind the screen, or location customer has chosen. Each compressor requires two separate, dedicated power outlets to operate.
5 lane – two 110 VAC, 60 HZ, 20 Amp circuits. Installed as a pair of identical circuits.
10 lane – four 110 VAC, 60 HZ, 20 Amp circuits. Two pairs of identical circuits.
15 lane – six 110 VAC, 60 HZ, 20 Amp circuits. Three pairs of identical circuits.
or 220 VAC, 50 HZ, 10 Amp circuits

Recommended: (but not required)

☐ Ability to dim the lights over the firing line. Helps to have ambient light for trainees vice shooting in the dark.
☐ Telephone lines.
1 for instructor/operator voice communication with EST Help Desk
1 for modem connection to IOS. Allows foe remote diagnostics conducted by Help Desk.
☐ Small table to be used for printer.

Facility Requirements



Area Requirement (1 Subsystem):

- 35’ long
- 17.5’ wide
- 8’ high

Power Requirement:

- 1 dedicated 110VAC 15A circuit for the each IOS
- 2 dedicated 110VAC 20A circuits for each air compressor

Telephone Requirement:

- 1 line required for voice communications with the Help Desk

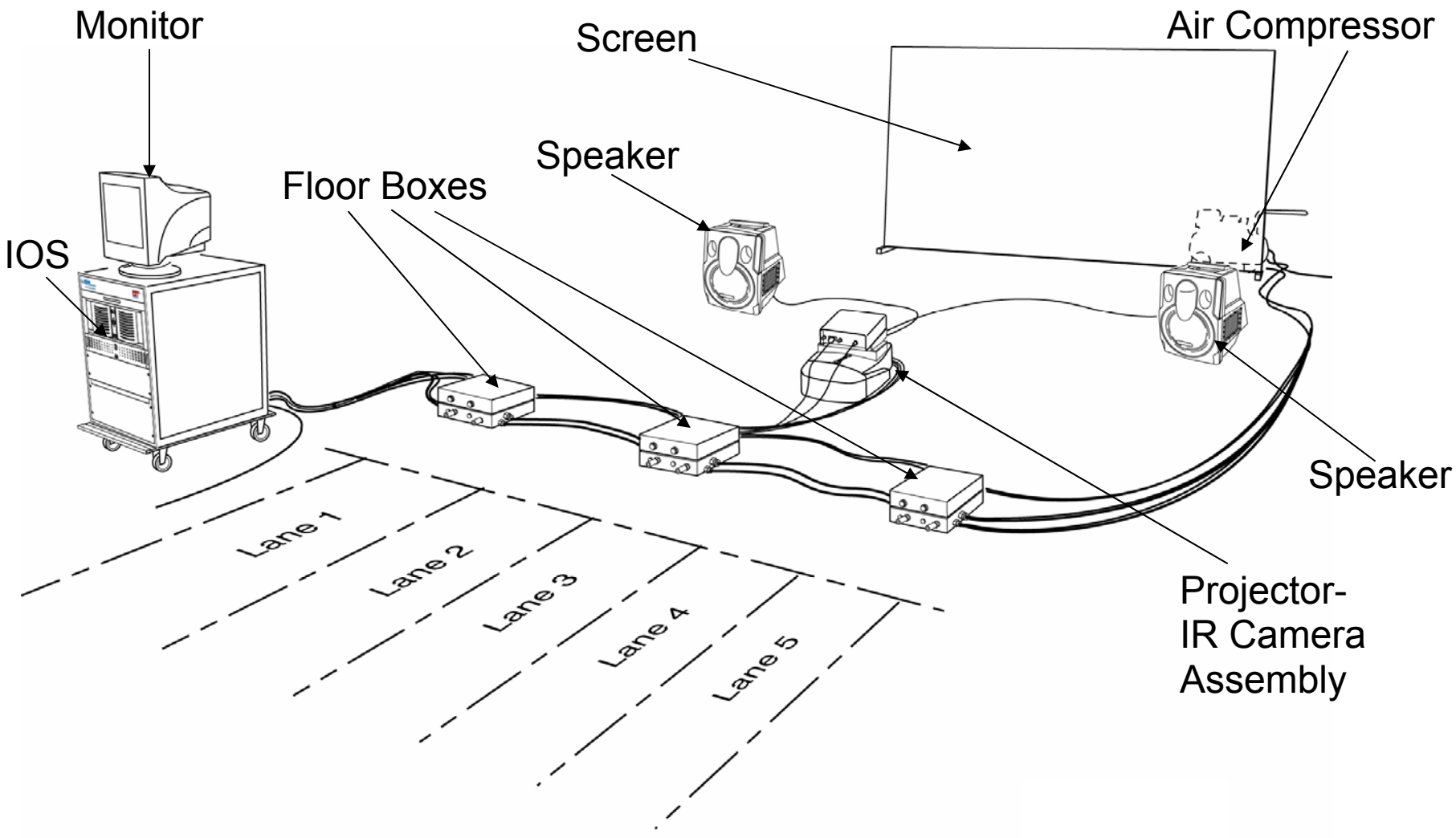
Environmental Requirements

- Acceptable operating temperature:
  59^{o} to 95^{o} F

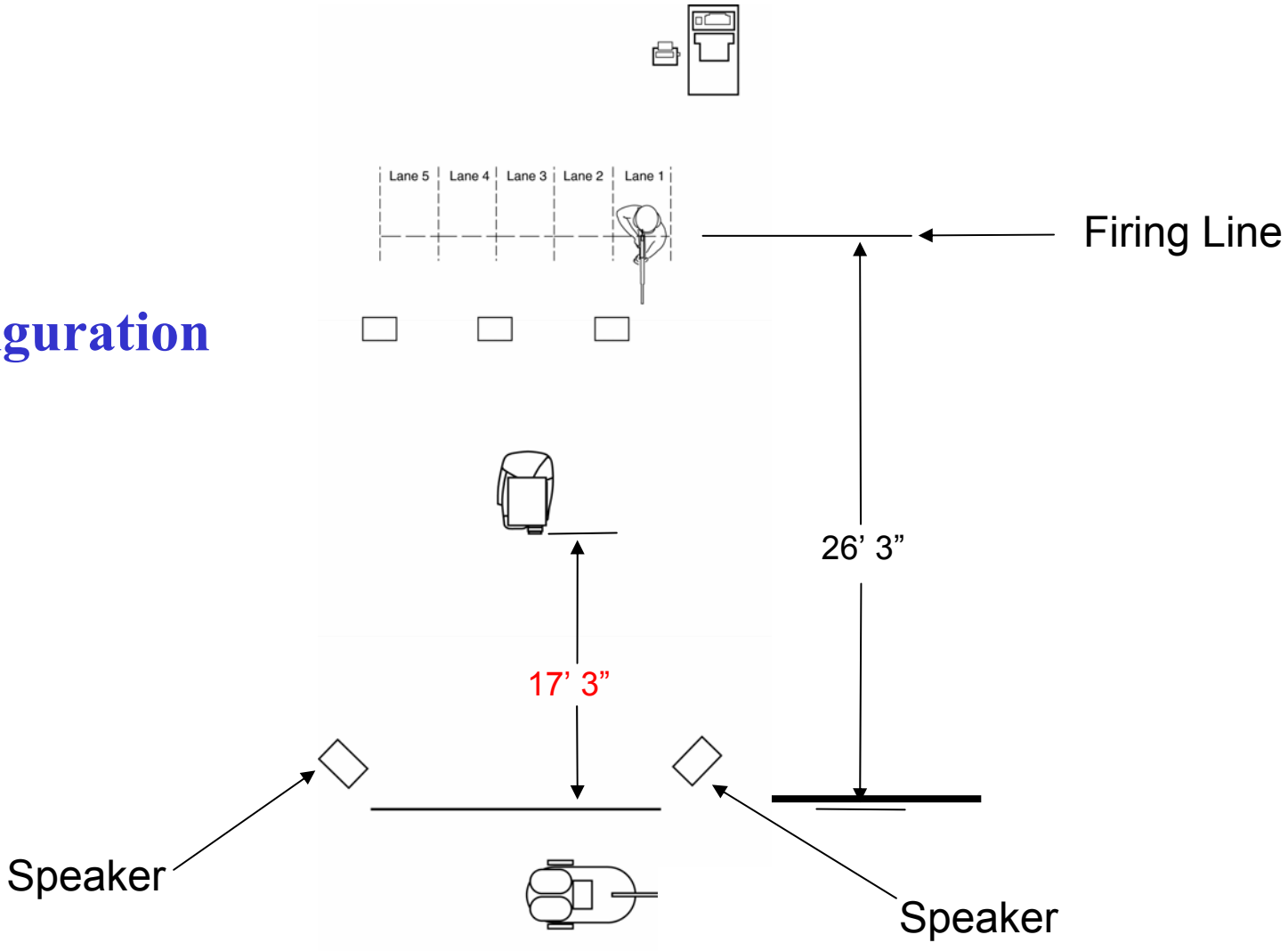
- Acceptable storage temperature:
  5^{o} to 95^{o} F

- Acceptable humidity range:
  20% to 80%

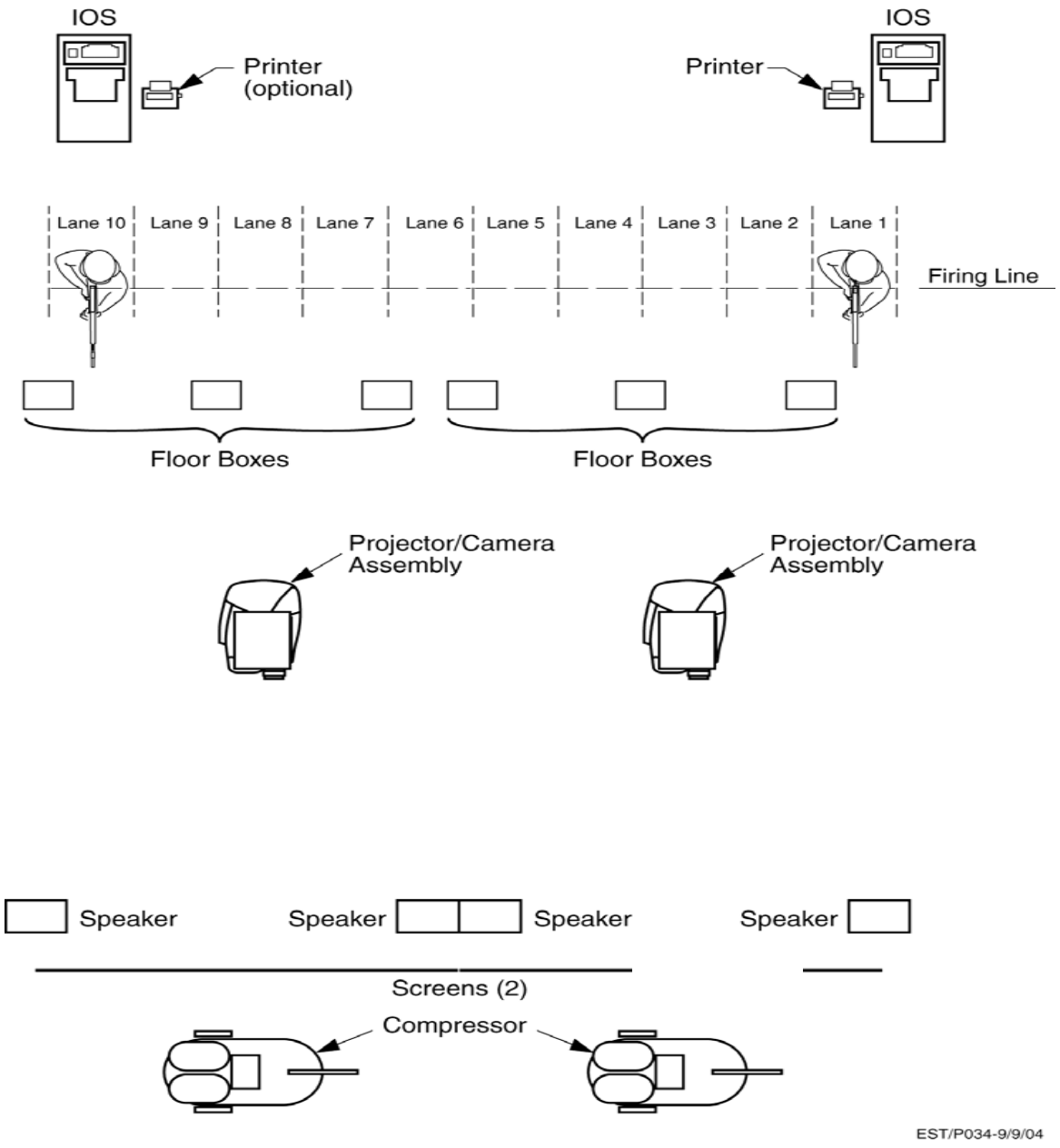
System Components



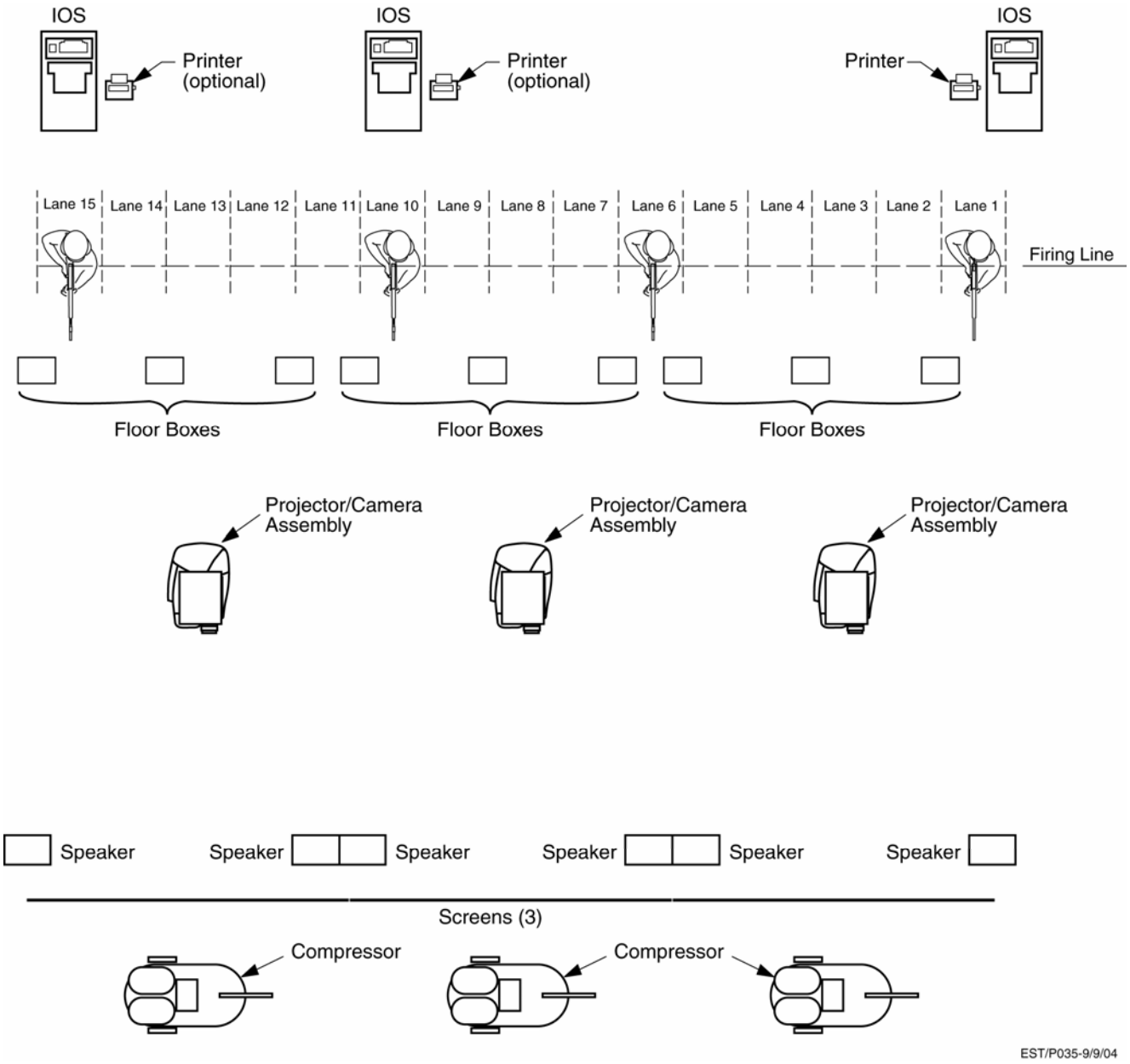
5-Lane Configuration



10-Lane Configuration

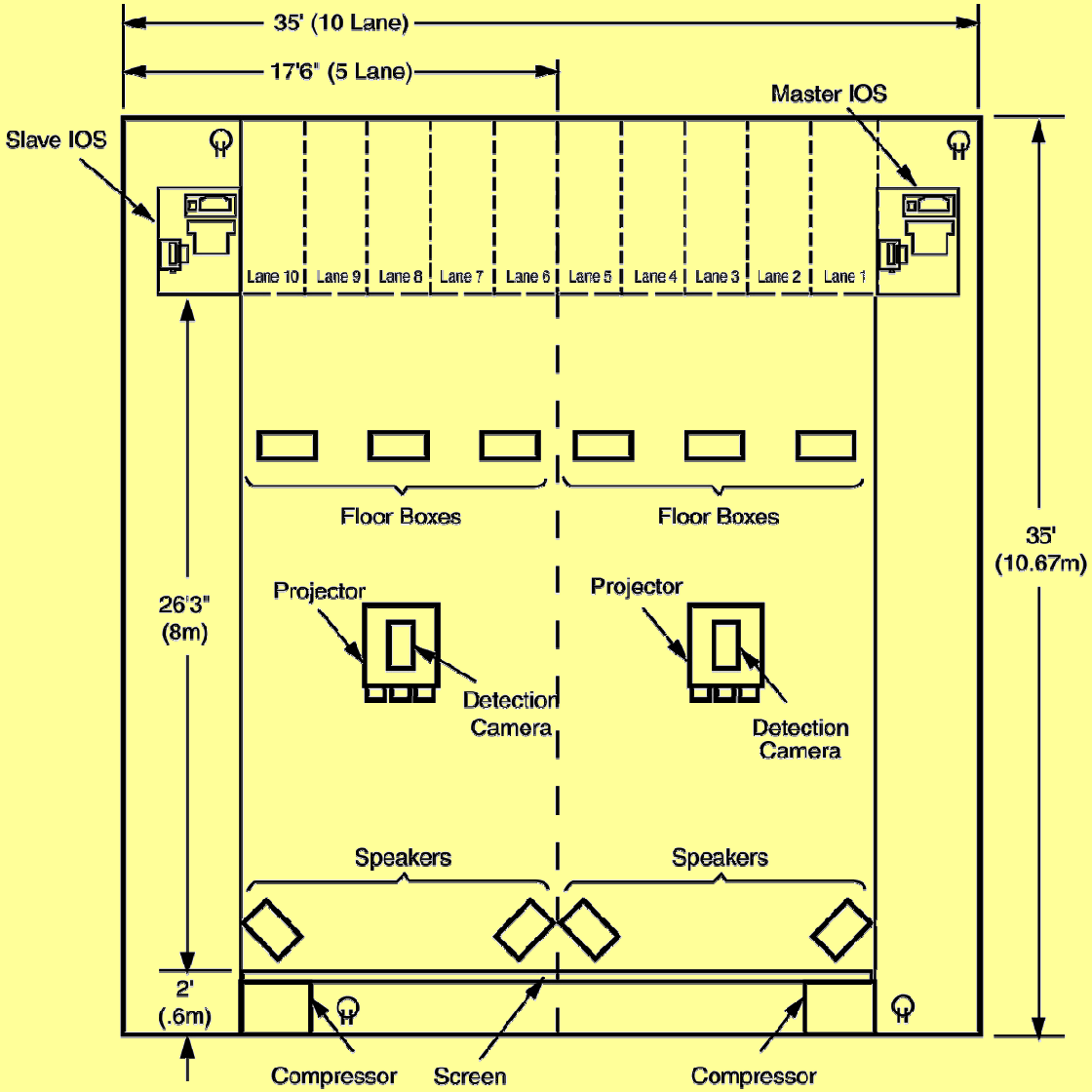


15-Lane Configuration



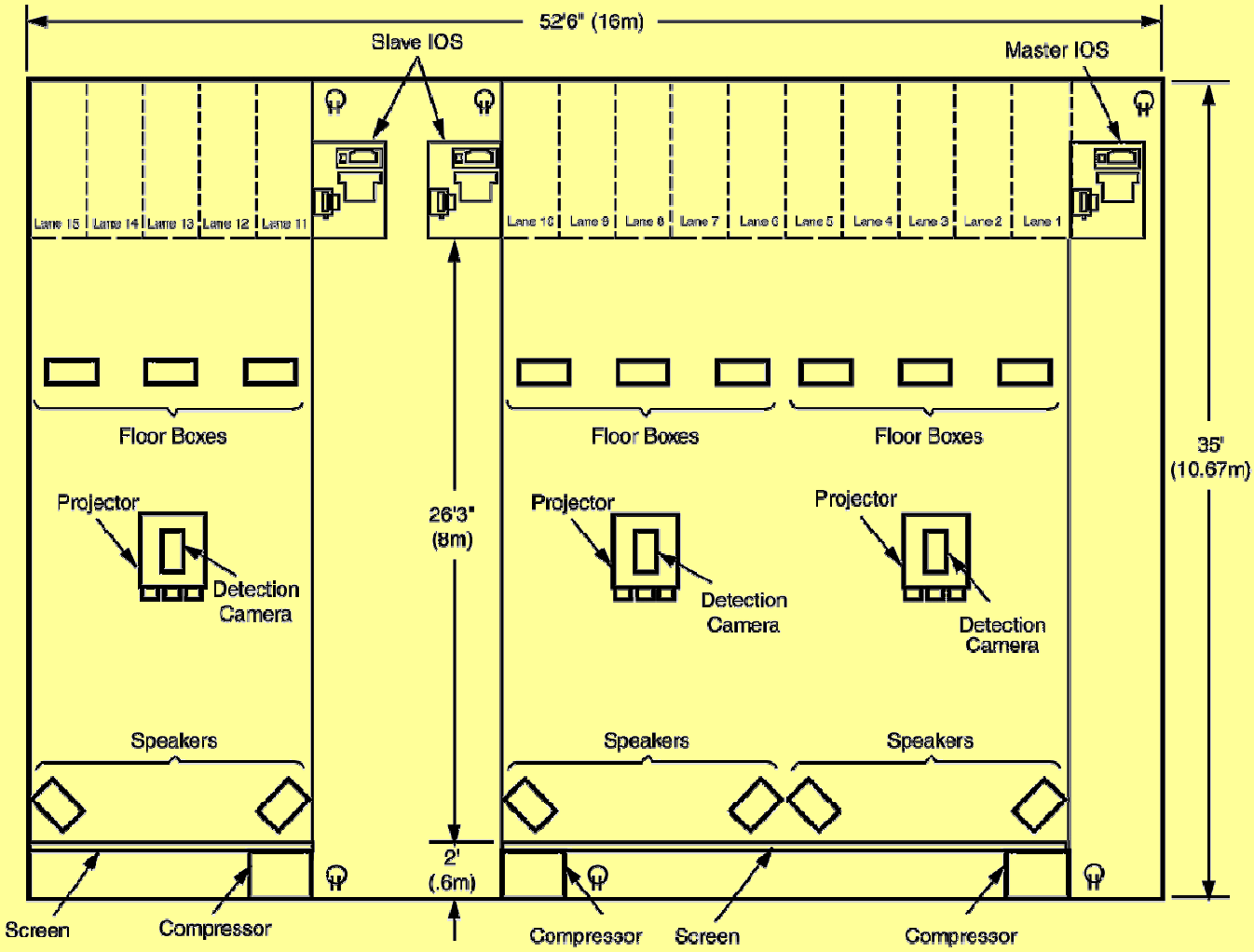
Engagement Skills Trainer (EST) 2000
Diagrams, Electrical Requirements, & Operating Environment

5/10 Lane System



- Each screen 13'2" (4m) wide
- Firing line 26'4" (8m) from screen.
- Recommended additional area for student muster and observation.
- Used for all three modes of training.

15 Lane Configuration



- **Aisle needed for compressor maintenance.**
- **Compressor position optional. ~30 feet of hose provided.**
- **Used for Marksmanship.**

Electrical Requirements per 5 Lane Subsystem

Instructor Operator Station (IOS)

- **110 VAC, 60Hz, 15 Amp circuit**
- **or 220 VAC, 50 Hz, 7.5 Amp circuit**
- **Outlet located within 20 ft. (6m) of IOS**

Compressor

- **110 VAC, 60 Hz, 2 power plugs, (2) dedicated 20 Amp circuit breakers required**
- **or 220 VAC, 50 Hz, 10 Amp circuit**
- **Outlet located within 8 ft. (2.5m) of compressor**

Operating Environment

Min - Max Operating Temperature: +15º C (+59º F) to +35ºC (+95ºF)

Recommended Operating Temperature: 70º F

Min - Max Storage Temperature: -15ºC (+5ºF) to +35ºC (+95ºF)

Relative Humidity: Capable of operation and storage in a non-condensing humidity between 20% and 80%.

Construction Drawings – Camp Murray CSMS Yard Drainage Design
As-Built Record 9/2009

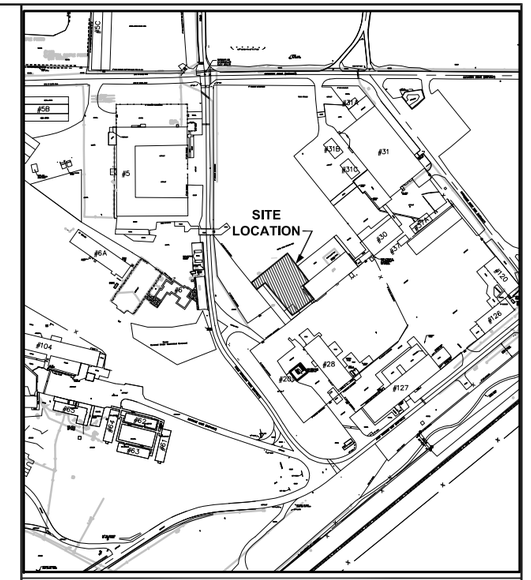
OFFICE Bothell, WA | DRAWING NUMBER BT-134744-ASB-D1

CONSTRUCTION DRAWINGS
CAMP MURRAY CSMS YARD DRAINAGE DESIGN

SEPTEMBER 2009

PREPARED FOR

WASHINGTON MILITARY DEPARTMENT
COMBINED SUPPORT MAINTENANCE SHOP (CSMS)
CAMP MURRAY, WASHINGTON



SOURCE: WASHINGTON MILITARY DEPARTMENT

LOCATION MAP

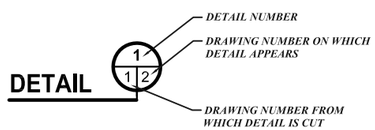
APPROX. SCALE (FT.)
0 200 400

DRAWING INDEX

DRAWING NUMBER	TITLE AND DESCRIPTION	LATEST REVISION NUMBER	LATEST REVISION DATE
1	COVER SHEET		
2	INFILTRATION SYSTEM PLAN AND DETAILS		
3.	STORMFILTER AND INFILTRATION SYSTEM STANDARD DETAILS		
4.	SECTIONS AND DETAILS		
SHEET 1 OF 1:	*AS-BUILT STORM STRUCTURES BY PACIFIC NORTHWEST LAND SURVEYORS, LLC, DATED JULY 2009.*		

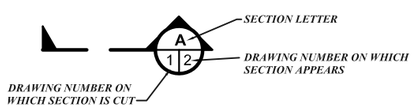
DETAIL INDICATOR:

DRAWING ON WHICH DETAIL APPEARS:

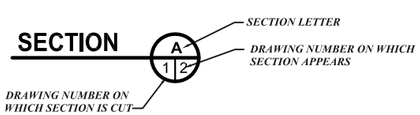


SECTION INDICATORS:

DRAWING ON WHICH SECTION IS CUT:



DRAWING ON WHICH SECTION APPEARS:



PREPARED BY

Shaw®
Shaw Environmental, Inc.

12100 NE 195th Street, Suite 150
Bothell, Washington 98011
Phone (425) 485-5000
Fax. (425) 486-9766

INFILTRATION FACILITY DESIGN PARAMETERS

- DRAINAGE AREA: 2.40 ACRES IMPERVIOUS SURFACE
- 100-YEAR FLOWRATE: 1.66 CFS
- 15-MINUTE WATER QUALITY ANALYSIS FLOWRATE: 0.37 CFS
- NUMBER OF CHAMBERS: 56
- PROVIDED STORAGE VOLUME: 4,600 CF
- AVERAGE D_{10} SIZE FROM ASTM D422 FIELD SOIL GRADATION TEST - 0.2915
- LONG TERM DESIGN INFILTRATION RATE: 6.2 INCHES/HOUR
- DOWNSTREAM LIFT STATION MAXIMUM FLOWRATE CAPACITY IS 225 GPM WITH A TRIBUTARY AREA OF 0.40 ACRES. THE 100-YEAR UNDETAINED FLOWRATE FROM 0.4 ACRES OF IMPERVIOUS SURFACE IS 124 GPM. 225 GPM-124 GPM = 101 GPM = 0.23 CFS REMAINING LIFT STATION CAPACITY DURING 100-YEAR STORM EVENT.
- 100-YEAR MAXIMUM RELEASE OVERFLOW RATE FROM THE INFILTRATION FACILITY: 0.23 CFS
- STORMWATER RUNOFF MODELING SOFTWARE: WWHM3

AS-BUILT RECORD 9/2009

PREPARED UNDER THE RESPONSIBLE CHARGE OF:

DO NOT USE THIS DRAWING FOR CONSTRUCTION UNLESS STAMPED AND SIGNED BY A WASHINGTON RESISTERED CIVIL ENGINEER.

MARK	DATE	BY	CHK'D	APPRV'D	DESCRIPTION/ISSUE
2	9/09	TW	IS	IS	*AS-BUILT RECORD*
1	6/09	TW	IS	IS	ISSUED FOR CONSTRUCTION
0	5/09	TW	IS	KWW	ISSUED FOR 90% CLIENT REVIEW

REVISIONS

DESIGNED BY: / DATE: T. Wentz–4/09
DRAWN BY: / DATE: M.Portacio–4/09
CHECKED BY: / DATE: I. Slutsky–9/09
APPROVED BY: / DATE: K. Wiken–9/09

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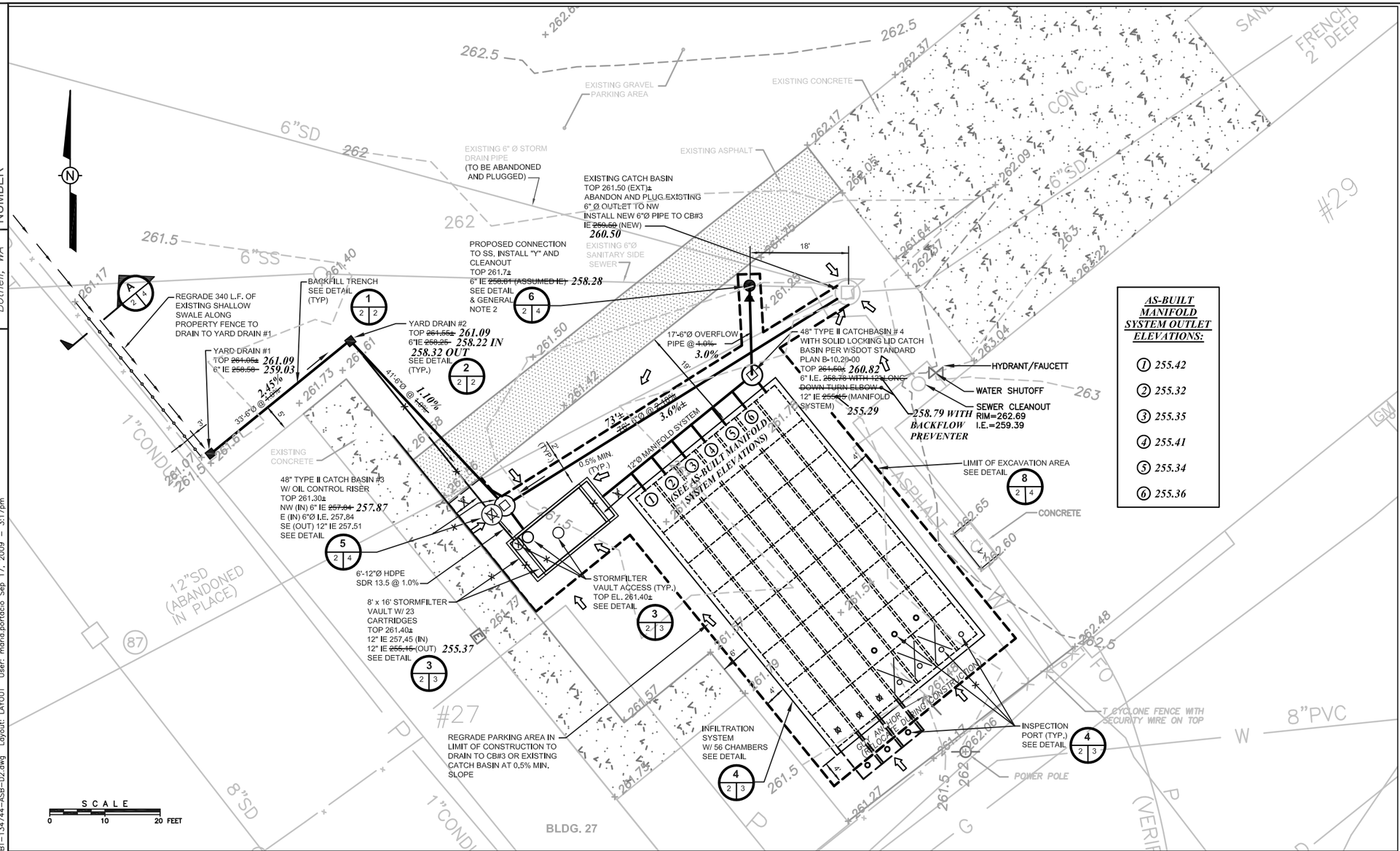
WASHINGTON MILITARY DEPARTMENT
CAMP MURRAY, WASHINGTON

CONSTRUCTION DRAWINGS
CAMP MURRAY CSMS YARD DRAINAGE DESIGN

COVER SHEET

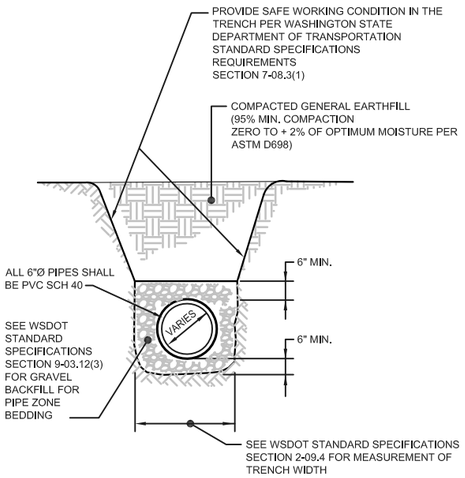
DATE:	SCALE:	PROJECT NO.	DRAWING NO.
9/09	AS SHOWN	134744	1 OF 4

OFFICE Bothell, WA | DRAWING NUMBER BT-134744-ASB-D2

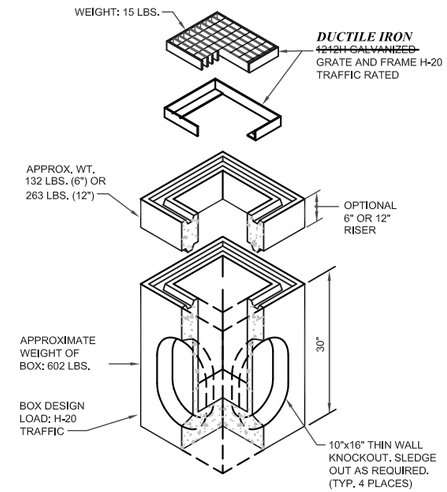


AS-BUILT MANIFOLD SYSTEM OUTLET ELEVATIONS:

1. 255.42
2. 255.32
3. 255.35
4. 255.41
5. 255.34
6. 255.36



TYPICAL TRENCH DETAIL (1 | 2 | 2) NOT TO SCALE



YARD DRAIN (TYP.) - *(REPLACED WITH TYPE 1 CATCH BASINS)* **DETAIL** (2 | 2 | 2) NOT TO SCALE

RECOMMENDED CONSTRUCTION SEQUENCE:

1. PRE-CONSTRUCTION MEETING.
2. MARK LIMITS OF THE CONSTRUCTION.
3. LOCATE ALL EXISTING UTILITIES WITHIN LIMITS OF CONSTRUCTION.
4. INSTALL CATCH BASIN PROTECTION.
5. INSTALL PERIMETER PROTECTION SILT FENCE AS REQUIRED.
6. CONSTRUCT SURFACE WATER CONTROLS (INTERCEPTOR DIKES, ETC.) SIMULTANEOUSLY WITH GRADING FOR PROJECT DEVELOPMENT.
7. MAINTAIN EROSION CONTROL MEASURES IN ACCORDANCE WITH WSDOT STANDARDS AND MANUFACTURER'S RECOMMENDATION.
8. REMOVE AND DISPOSE OF CONTAMINATED SOIL PER DOE STANDARDS IN EXCAVATED AREAS (APPROXIMATELY 4' THICK).
9. GRADE, COMPACT AND PREPARE THE SUBGRADE OF EXCAVATION IN NATURAL SANDY GRAVEL SOIL PRIOR TO ANY STRUCTURES INSTALLATION.
10. INSTALL STORM DRAINAGE SYSTEM STORMFILTER VAULT AND INFILTRATION FACILITY.
11. BACKFILL THE AREAS BETWEEN THE STRUCTURES THAT REQUIRED ENGINEERING FILL WITH OFFSITE SUITABLE BORROW SOURCE SOIL MATERIAL. THE SOIL SHOULD BE FREE OF ORGANIC MATERIAL AND HAVING A MAXIMUM PARTICLE SIZE OF 2 INCHES. COMPACT THE FILL TO A MINIMUM RELATIVE COMPACTION OF 95% DETERMINED BY ASTM D-1557.
12. RELOCATE EROSION CONTROL MEASURES OR INSTALL NEW MEASURES SO THAT AS SITE CONDITIONS CHANGE THE EROSION AND SEDIMENT CONTROL IS ALWAYS IN ACCORDANCE WITH THE WSDOT EROSION AND SEDIMENT CONTROL STANDARDS.
13. CLEAN STORM DRAINAGE SYSTEM AND INSTALL STORMFILTERS IN VAULT.
14. UPON COMPLETION OF THE PROJECT, ALL DISTURBED AREAS MUST BE STABILIZED AND BMPs REMOVED IF APPROPRIATE.
15. REMOVE RISER TEE AND PLUG OVERFLOW OUTLET AT CATCH BASIN BETWEEN LIFT STATION AND EXISTING CSMS WASHRACK OIL/WATER SEPARATOR, WEST OF INFILTRATION FACILITY.

PACIFIC NORTHWEST, LLC SURVEYOR'S NOTES:

1. DATE VISITED SITE AND MONUMENTS: APRIL, 2009 *AND JULY 2009.*
2. SURVEY INSTRUMENT USED: NIKON DTM-520, TOTAL STATION JUNIPER SYSTEMS DATA COLLECTOR.
3. FIELD METHOD USED: FIELD TRAVERSE.
4. THIS SURVEY MEETS OR EXCEEDS PRECISION REQUIREMENTS AS SET FORTH IN W.A.C. 332-130-090.
5. ALL UTILITIES AND SPOT ELEVATIONS SHOWN HEREON ARE THOSE OBTAINABLE BY PHYSICAL SURFACE EVIDENCE ONLY. NO UNDERGROUND SERVICE LOCATIONS AVAILABLE.
6. THIS MAP HAS BEEN DEVELOPED FROM ELECTRONIC DATA FILES AND P.N.L.S., LLC HOLDS THE ORIGINAL HARD COPY. ANY ONE USING THIS INFORMATION WITHOUT PRIOR CONSENT, IS CONSIDERED UNAUTHORIZED. ANY RE-USE, MODIFICATION OR ADAPTATION TO THIS DRAWING FILE IS AT THE USER'S RISK.
7. THE BOUNDARY LINE POSITIONING AS SHOWN WAS CALCULATED BY P.N.L.S., LCC FROM RECORD DATA AND FIELD LOCATIONS, NOTHING WAS SET BY P.N.L.S., LLC AT THE BOUNDARY CORNERS EXCEPT FOR FOUND CORNERS AS NOTED.
8. DATUM: CAMP MURRAY DATUM
   BASIS OF BEARING: HELD BRASS DISK AT INTERSECTION OF ARTILLERY TRAIL & QUARTERMASTER ROAD AND BRASS DISK AT INTERSECTION OF INFANTRY DR. & FIELD ARTILLERY TRAIL, N 01°46'09W.

GENERAL NOTES:

1. SURVEY INFORMATION PROVIDED BY STATE OF WASHINGTON MILITARY DEPARTMENT AND MODIFIED WITHIN LIMITS OF CONSTRUCTION BY PACIFIC NORTHWEST SURVEYORS, LLC DURING SITE VISIT IN APRIL 2009.
2. VERTICAL CONTROL POINT OF THE CONSTRUCTION IS ~~THE ASSUMED~~ INVERT ELEVATION ~~258.81~~ OF THE EXISTING 6"Ø SANITARY SIDE SEWER PER DETAIL 6 (2 | 4) *FIELD VERIFIED 258.28* ~~TO BE FIELD VERIFIED. IF THE ELEVATION IS DIFFERENT, PROFILE MUST BE ADJUSTED TO MEET THE DESIGN CRITERIA.~~
3. ALL CONTAMINATED SOIL BEING EXCAVATED SHALL BE REMOVED AND DISPOSED OF OFFSITE PER WASHINGTON DEPARTMENT OF ECOLOGY STANDARDS BASED ON ATTACHED SUMMARY TABLE OF THE LABORATORY ANALYTICAL RESULTS DATA. TWO TEST PITS WERE DUG ON MARCH 5, 2009 IN THE VICINITY OF THE INFILTRATION FACILITY AND THE CONTAMINATED OILY SOIL IS APPROXIMATLEY 4 FEET THICK.
4. TO ENSURE SAFETY OF THE CONTAMINATED SOIL EXCAVATION AND SAFE STABLE SLOPES, PROVIDE 4 FEET MINIMUM OFFSET FROM THE LIMIT OF THE INFILTRATION SYSTEM AND CONCRETE STORMFILTER VAULT.

PREPARED UNDER THE RESPONSIBLE CHARGE OF:
ISRAEL SLUTSKY, STATE OF WASHINGTON, 31804, REGISTERED PROFESSIONAL ENGINEER, EXPIRES 10/05/09

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MARK	DATE	BY	CHK'D	APPRV'D	DESCRIPTION/ISSUE
2	9/09	TW	IS	IS	*AS-BUILT RECORD*
1	6/09	TW	IS	IS	ISSUED FOR CONSTRUCTION
0	5/09	TW	IS	KWW	ISSUED FOR 90% CLIENT REVIEW

REVISIONS

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Fax. (425) 486-9766

DESIGNED BY: / DATE T. Wentz–4/09
DRAWN BY: / DATE M.Portacio–4/09
CHECKED BY: / DATE I. Slutsky–9/09
APPROVED BY: / DATE K. Wiken–9/09

WASHINGTON MILITARY DEPARTMENT
CAMP MURRAY, WASHINGTON

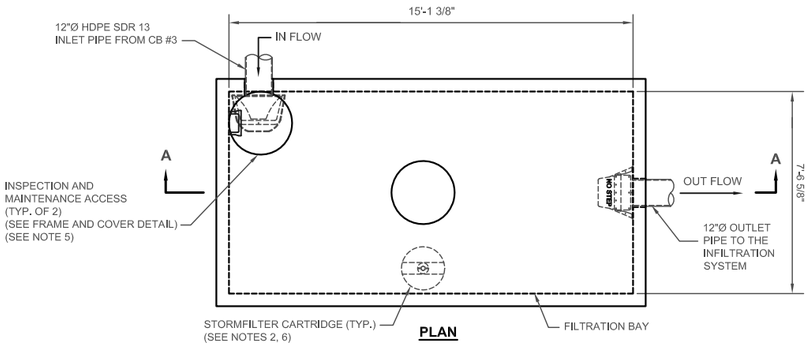
CONSTRUCTION DRAWINGS
CAMP MURRAY CSMS YARD DRAINAGE DESIGN
INFILTRATION SYSTEM PLAN AND DETAILS

DATE:	SCALE:	PROJECT NO.	DRAWING NO.
9/09	AS SHOWN	134744	2 OF 4

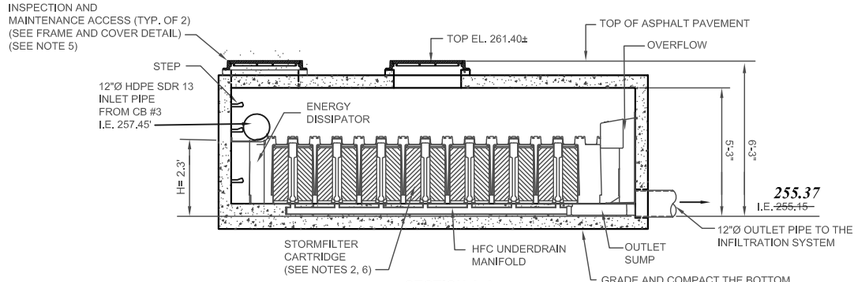
XREF Files: CONTOUR ROAD-BLDG Vegeto-1
IMAGE Files: IS-STAMP-09.jpg rectifycamp_murray1.tif
File: N:\Project\draft\Yr & Assoc\Drawings\134744-As-Built Dwgs 9-2009\BT-134744-ASB-02.dwg Layout: LAYOUT User: maria.portacio Sep 17, 2009 – 3:17pm

OFFICE Bothell, WA | DRAWING NUMBER BT-134744-ASB-D3

STORMFILTER DESIGN TABLE	
THE 8'X16' STORMFILTER TREATMENT VAULT HAS A CAPACITY OF 33 FILTER CARTRIDGES. CONVEYANCE CAPACITY IS RATED AT 1.8 CFS.	
CARTRIDGE HEIGHT	18"
SYSTEM HYDRAULIC DROP (H - REQ'D. MIN.)	2.3'
TREATMENT BY MEDIA SURFACE AREA	1 gpm
CARTRIDGE FLOW RATE (gpm)	7.5



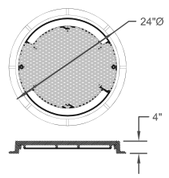
PLAN



SECTION A-A

GENERAL NOTES
1. OUTLET PIPING SHALL BE AS SPECIFIED BY CONTECH OR EQUIVALENT AND PROVIDED BY CONTRACTOR. STORMFILTER VAULT NEED TO BE MANUFACTURED WITH INLET AND OUTLET LOCATIONS AS SOWN ON THE PLAN.
2. THE FILTER CARTRIDGE(S) ARE SIPHON-ACTUATED AND SELF-CLEANING. THE ACTUAL NUMBER OF CARTRIDGES SPECIFIED BY THE ENGINEER AS SHOWN IN DATA BELOW AND SHALL BE. INSTALLED PER CONTECH RECOMMENDATIONS.
3. SEE STORMFILTER DESIGN TABLE FOR REQUIRED HYDRAULIC DROP.
4. ALL WATER QUALITY PRODUCTS REQUIRE PERIODIC MAINTENANCE AS OUTLINED IN THE O&M GUIDELINES. PROVIDE MINIMUM CLEARANCE FOR MAINTENANCE ACCESS.
5. STRUCTURE AND ACCESS COVERS TO MEET AASHTO H-20 LOAD RATING.
6. STANDARD CARTRIDGE HEIGHT IS 18". CARTRIDGE HEIGHT AND ASSOCIATED DESIGN PARAMETERS PER STORMFILTER DESIGN TABLE. PRECAST STRUCTURE TO BE CONSTRUCTED IN ACCORDANCE WITH ASTM C857 AND C858.
7. STORMFILTER BY CONTECH STORMWATER SOLUTIONS: (800) 925-5240.

SITE SPECIFIC DATA REQUIREMENTS			
STRUCTURE ID			NA
WATER QUALITY FLOW RATE (cfs)			0.37CFS
PEAK FLOW RATE (cfs)			1.66CFS
RETURN PERIOD OF PEAK FLOW (yrs)			100
# OF CARTRIDGES REQUIRED			23
CARTRIDGE FLOW RATE			7.5GPM
MEDIA TYPE (CSF, PERLITE, ZPG)			ZPG
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE	257.45	HDPE	12"
OUTLET PIPE	255.15	HDPE	12"
UPSTREAM RIM ELEVATION			261.40
CENTER RIM ELEVATION			261.40
DOWNSTREAM RIM ELEVATION			NA
ANTI-FLOTATION BALLAST			NA
			NA
NOTES/SPECIAL REQUIREMENTS:			

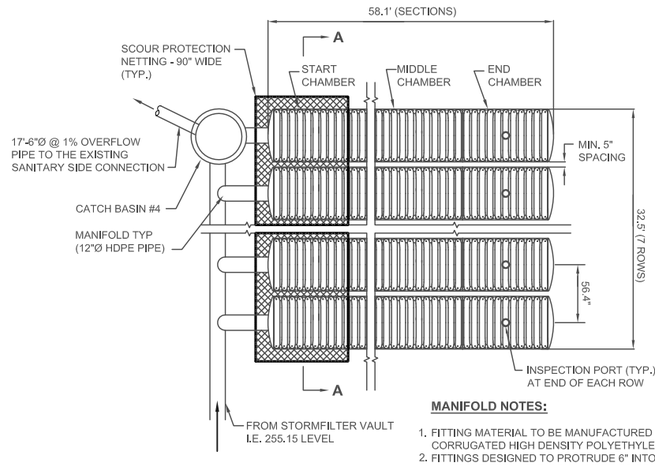


FRAME AND COVER DETAIL

8'x16' STORMFILTER VAULT

DETAIL 3 (2 | 3) NOT TO SCALE

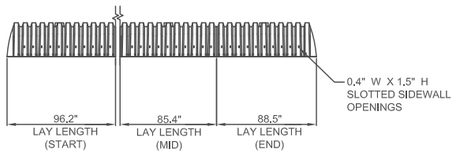
(CONTRACTOR SHALL INSTALL CONTECH STORMWATER SOLUTIONS, INC. STORMFILTER VAULT AS PICTURED ABOVE OR ENGINEER APPROVED EQUIVALENT)



MANIFOLD NOTES:

1. FITTING MATERIAL TO BE MANUFACTURED FROM CORRUGATED HIGH DENSITY POLYETHYLENE, AASHTO M294 PIPE.
2. FITTINGS DESIGNED TO PROTRUDE 6" INTO END OF THE INLET CHAMBERS.
3. MANIFOLD TEE AND ELBOW JOINTS TO BE CONNECTED UTILIZING MAR MAC POLYSEAL COUPLERS, REFERENCE WWW.MARMAC.COM

PLAN VIEW

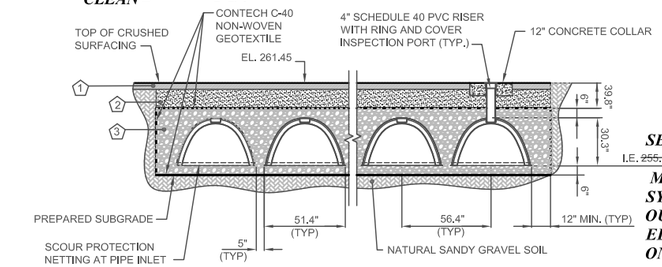


ELEVATION VIEW

KEY:

1. PAVEMENT SECTION, SEE DETAIL 7 (3 | 5)
2. WELL GRADED GRANULAR FILL. AASHTO M145 A1, A2, OR A3. COMPACT TO MIN. 90% STANDARD DENSITY PER AASHTO T99.
3. FREE DRAINING ANGULAR ~~WASHED~~ STONE ~~3/4" - 2"~~ PARTICLE SIZE. COMPACT TO MIN. 90% STANDARD DENSITY PER AASHTO T99.

CLEAN *1-1/4"*



SECTION A-A
(H20/H25 LIVE LOAD)
PER AASHTO 12

INFILTRATION SYSTEM

DETAIL 4 (2 | 3) NOT TO SCALE

(CONTRACTOR SHALL INSTALL CONTECH STORMWATER SOLUTIONS, INC. CHAMBERMAXX INFILTRATION SYSTEM AS PICTURED ABOVE)

CHAMBER DESIGN DETAILS			
FEATURE	START CHAMBER	MIDDLE CHAMBER	END CHAMBER
OVERALL CHAMBER HEIGHT - IN	30.3	30.3	30.3
OVERALL CHAMBER WIDTH - IN	51.4	51.4	51.4
ACTUAL LENGTH - IN	98.4	91.0	92.0
INSTALLED LAY LENGTHS - IN	96.2	85.4	88.5
CHAMBER STORAGE VOLUME - CF	52.5	49.3	48.2
CHAMBER STORAGE PER LINEAR FOOT - CF/LF	6.5	6.9	6.5
MIN. INSTALLED CHAMBER VOLUME - CF	78.7	76.7	76.1
MIN. INSTALLED CHAMBER VOLUME PER LINEAR FOOT - CF/LF	9.8	10.8	10.3
CHAMBER WEIGHT - LB	85	77	76
6" OF STONE ABOVE AND BELOW CHAMBER, 5" CHAMBER SPACING AND 40% POROSITY			

SITE SPECIFIC DATA REQUIREMENTS	
TOTAL REQUIRED STORAGE VOLUME (CF)	4,600
TOTAL REQUIRED NUMBER OF CHAMBERS	56
DEPTH TO INVERT BELOW ASPHALT (FT)	6.3±
LIMITING WIDTH (FT)	32.5'
LIMITING LENGTH (FT)	58.1'
POROUS STONE ABOVE CHAMBER (IN)	6
POROUS STONE BELOW CHAMBER (IN)	6
STONE POROSITY (0 TO 40%)	40%
MANIFOLD SYSTEM DIAMETER (IN)	12"

GENERAL NOTES:

1. ALL ELEVATIONS, DIMENSIONS AND LOCATIONS OF RISERS AND INLETS SHALL BE VERIFIED BY THE ENGINEER.
2. PRIOR TO INSTALLATION OF THE CHAMBERMAXX SYSTEM A PRE-CONSTRUCTION MEETING SHALL BE CONDUCTED. THOSE REQUIRED TO ATTEND ARE THE SUPPLIER OF THE SYSTEM, THE GENERAL CONTRACTOR, SUB-CONTRACTORS AND THE ENGINEER.
3. CHAMBERS ARE MANUFACTURED FROM POLYPROPYLENE PLASTIC.
4. SYSTEM TO MEET AASHTO HS20/HS25 LIVE LOADING, PER AASHTO LRFD SECTION 12.
5. ACCESS COVERS TO MEET AASHTO HS20/HS25 LIVE LOADING.
6. MINIMUM COVER IS 18-INCHES TO BOTTOM OF FLEXIBLE PAVEMENT OR TO TOP OF RIGID PAVEMENT.
7. CHAMBERMAXX BY CONTECH STORMWATER SOLUTIONS (800) 925-9240.

INSTALLATION NOTES:

1. CHAMBERMAXX MANUFACTURER INSTALLATION GUIDE TO BE REVIEWED BY CONTRACTOR PRIOR TO INSTALLATION.
2. THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, A TENSAR BX GEOGRID SHALL BE UTILIZED OR UNSUITABLE MATERIAL SHALL BE REMOVED AND BROUGHT BACK TO GRADE WITH FILL MATERIAL AS APPROVED BY THE ENGINEER. ONCE THE FOUNDATION PREPARATION IS COMPLETE, THE SYSTEM CAN BE INSTALLED.
3. THE SCOUR PROTECTION NETTING TO EXTEND 1'-0" BEYOND OUTSIDE EDGE OF INLET CHAMBERS.
4. COVER ANY OPEN VOID SPACES GREATER THAN ¾" ON CHAMBERS WITH A NON-WOVEN GEOTEXTILE TO PREVENT INFILTRATION OF BACKFILL MATERIAL.
5. BACKFILL MATERIAL TO BE PLACED IN 6-INCH TO 8-INCH LOOSE LIFTS AND COMPACTED TO 90% AASHTO T99 STANDARD PROCTOR DENSITY. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO LIFT DIFFERENTIAL BETWEEN ANY OF THE CHAMBERS AT ANY TIME DURING THE BACKFILLING PROCESS. THE BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE CHAMBER SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON THE CHAMBERS.
6. REFER TO CHAMBER MANUFACTURER INSTALLATION GUIDE FOR TEMPORARY CONSTRUCTION LOADING GUIDELINES.
7. CONTRACTOR SHALL FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

PREPARED UNDER THE RESPONSIBLE CHARGE OF:

ISRAYL SLUTSKY — STATE OF WASHINGTON — 31804 — REGISTERED PROFESSIONAL ENGINEER — EXPIRES 10/05/09

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REVISIONS

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Fax. (425) 486-9766

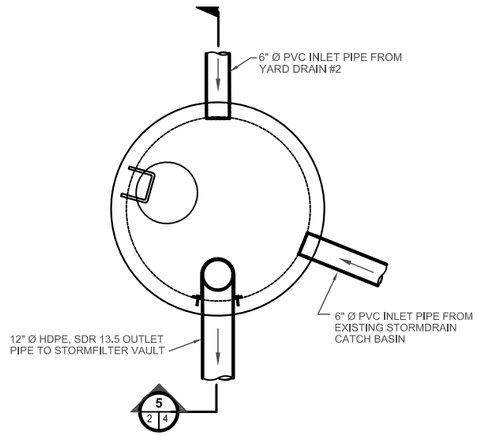
DESIGNED BY: / DATE	T. Wentz–4/09
DRAWN BY: / DATE	M. Portacio–4/09
CHECKED BY: / DATE	I. Slutsky–9/09
APPROVED BY: DATE	K. Wiken–9/09

WASHINGTON MILITARY DEPARTMENT
CAMP MURRAY, WASHINGTON

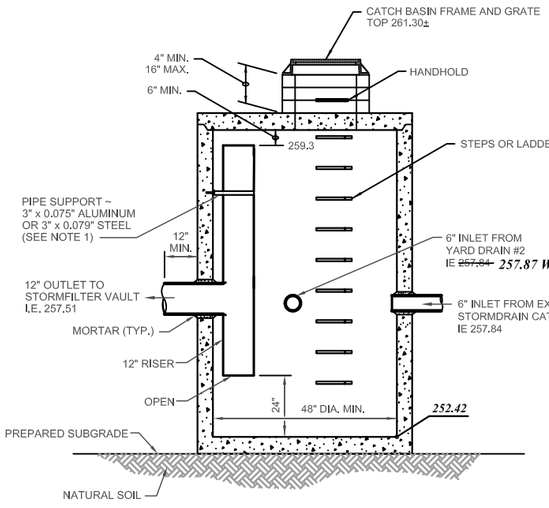
CONSTRUCTION DRAWINGS
CAMP MURRAY CSMS YARD DRAINAGE DESIGN
STORMFILTER AND INFILTRATION SYSTEM STANDARD DETAILS

DATE:	SCALE:	PROJECT NO.	DRAWING NO.
9/09	AS SHOWN	134744	3 OF 4

OFFICE Bothell, WA | DRAWING NUMBER BT-134744-ASB-D4



PLAN VIEW



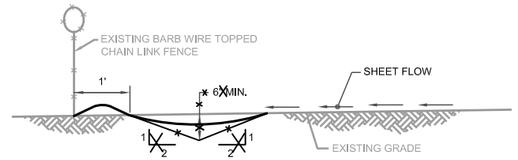
48"Ø TYPE II CB #3

DETAIL 5 (2 | 4)

NOT TO SCALE

NOTE:

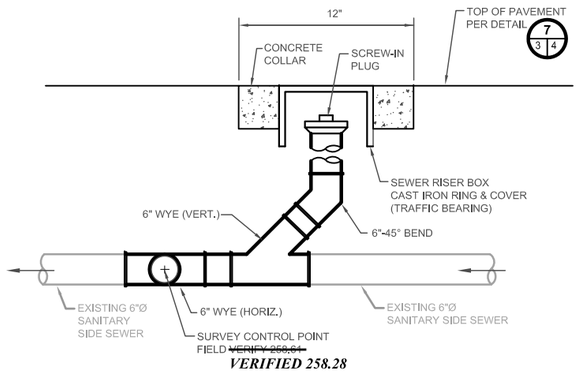
1. THE PIPE SUPPORTS AND THE FLOW RESTRICTOR SHALL BE CONSTRUCTED OF THE SAME MATERIAL AND BE ANCHORED AT A MAXIMUM SPACING OF 36". ATTACH THE PIPE SUPPORTS TO THE MANHOLE WITH 5/8" STAINLESS STEEL EXPANSION BOLTS OR EMBED THE SUPPORTS INTO THE MANHOLE WALL 2".



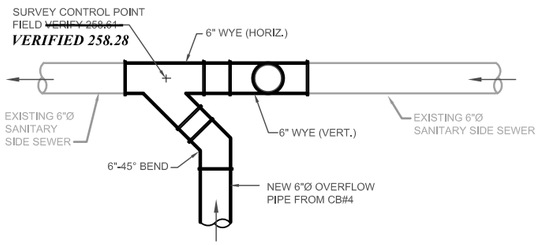
TYPICAL EXISTING SWALE REGRADING

SECTION A (2 | 4)

NOT TO SCALE



PROFILE VIEW



PLAN VIEW

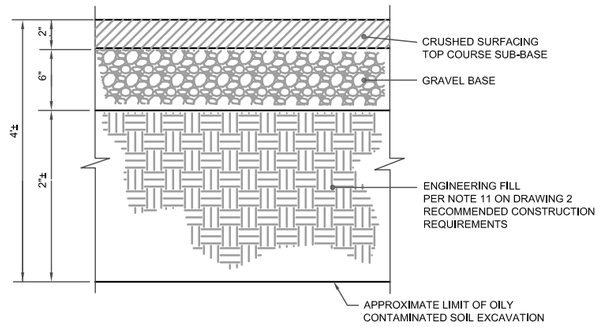
CONNECTION TO SANITARY SIDE SEWER

DETAIL 6 (2 | 4)

NOT TO SCALE

NOTES:

1. EXPOSE EXISTING SIDE SEWER LINE. CUT AND INSTALL THE OVERFLOW PIPE AND CLEANOUT AS SHOWN ON THE PLAN AND PROFILE.
2. CONTRACTOR TO ADJUST IE AT SANITARY SEWER "Y" TO MATCH EXISTING ELEVATION. TOP OF CLEANOUT SHALL BE LOCATED AT FINISHED GRADE. (SEE NOTE 2, GENERAL NOTES ON DRAWING 2).



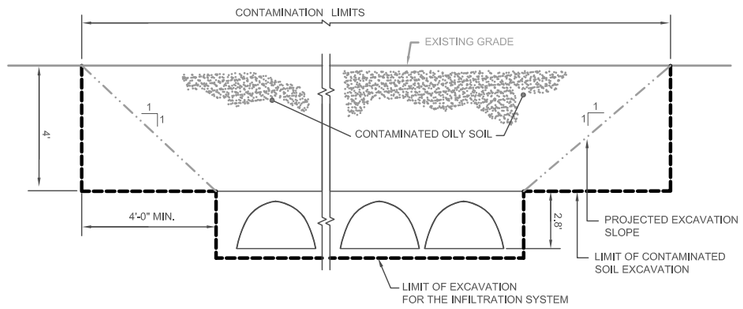
EXCAVATION, ENGINEERING FILL AND PAVEMENT SECTION

DETAIL 7 (3 | 4)

NOT TO SCALE

GENERAL NOTES:

1. INLET AND OUTLET PIPING AS SPECIFIED BY ENGINEER AND PROVIDED BY CONTRACTOR.
2. PVC PIPING SHALL BE JOINED IN ACCORDANCE WITH ASTM D3212. SUPPLIED WITH FACTORY INSTALLED NITRILE OIL RESISTANCE GASKET.



TYPICAL EXCAVATION

DETAIL 8 (2 | 4)

NOT TO SCALE

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WASHINGTON MILITARY DEPARTMENT
CAMP MURRAY, WASHINGTON

CONSTRUCTION DRAWINGS
CAMP MURRAY CSMS YARD DRAINAGE DESIGN
SECTIONS AND DETAILS

DATE:	SCALE:	PROJECT NO.	DRAWING NO.
9/09	AS SHOWN	134744	4 OF 4

CAMP MURRAY BUILDING #27

AS-BULT STORM STRUCTURES

A PORTION OF SECTION 21, TOWNSHIP 19 NORTH, RANGE 02 EAST OF THE WILLAMETTE MERIDIAN
PIERCE COUNTY, WASHINGTON

NORTH

DATUM: CAMP MURRAY DATUM

BASIS OF BEARING: HELD BRASS DISK AT INTERSECTION OF ARTILLERY TRAIL & QUARTERMASTER ROAD AND BRASS DISK AT INTERSECTION OF INFANTRY DR. & FIELD ARTILLERY TRAIL, N 01°46'09W.

20 0 20 40 60
GRAPHIC SCALE – FEET

LEGAL DESCRIPTION

AREA AROUND BUILDING #27, CAMP MURRAY.

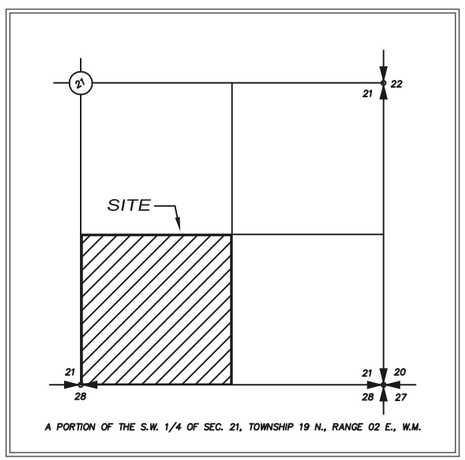
SURVEYOR'S NOTES

1. DATE VISITED SITE AND MONUMENTS: APRIL, 2009/JULY, 2009
2. SURVEY INSTRUMENT USED: NIKON DTM–520, TOTAL STATION JUNIPER SYSTEMS DATA COLLECTOR.
3. FIELD METHOD USED: FIELD TRAVERSE.
4. THIS SURVEY MEETS OR EXCEEDS PRECISION REQUIREMENTS AS SET FORTH IN W.A.C. 332–130–090.
5. ALL UTILITIES AND SPOT ELEVATIONS SHOWN HEREON ARE THOSE OBTAINABLE BY PHYSICAL SURFACE EVIDENCE ONLY. NO UNDERGROUND SERVICE LOCATIONS AVAILABLE.
6. THIS MAP HAS BEEN DEVELOPED FROM ELECTRONIC DATA FILES AND P.N.L.S., LLC HOLDS THE ORIGINAL HARD COPY. ANY ONE USING THIS INFORMATION WITHOUT PRIOR CONSENT, IS CONSIDERED UNAUTHORIZED. ANY RE–USE, MODIFICATION OR ADAPTATION TO THIS DRAWING FILE IS AT THE USERS RISK.
7. THE BOUNDARY LINE POSITIONING AS SHOWN WAS CALCULATED BY P.N.L.S., LLC FROM RECORD DATA AND FIELD LOCATIONS. NOTHING WAS SET BY P.N.L.S., LLC AT THE BOUNDARY CORNERS, EXCEPT FOR FOUND CORNERS, AS NOTED.

REFERENCE MATERIALS

1. PROJECT CONTROL PER LETTER FROM CENTRE POINTE SURVYING, INC. DATED AUGUST 5, 2005.

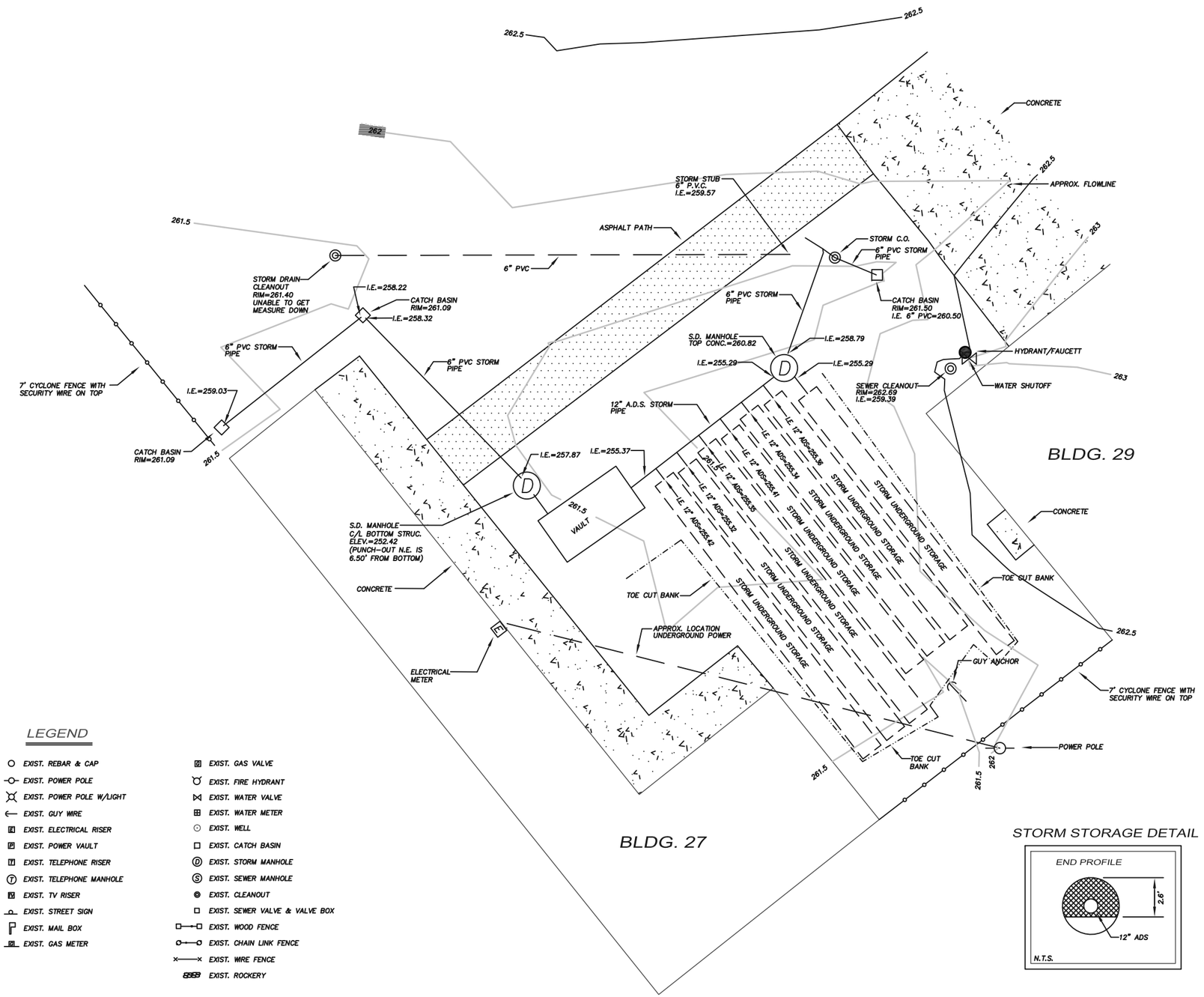
VICINITY MAP



A PORTION OF THE S.W. 1/4 OF SEC. 21, TOWNSHIP 19 N., RANGE 02 E., W.M.

VERTICAL DATUM: CAMP MURRAY BENCHMARK (NGVD 29)

BENCH MARK – SURFACE BRASS DISK WITH PUNCH AT INTERSECTION OF ARTILLERY TRAIL & QUARTERMASTER ROAD. ELEVATION=257.42



LEGEND

- EXIST. REBAR & CAP
- EXIST. POWER POLE
- EXIST. POWER POLE W/LIGHT
- EXIST. GUY WIRE
- EXIST. ELECTRICAL RISER
- EXIST. POWER VAULT
- EXIST. TELEPHONE RISER
- EXIST. TELEPHONE MANHOLE
- EXIST. TV RISER
- EXIST. STREET SIGN
- EXIST. MAIL BOX
- EXIST. GAS METER
- EXIST. GAS VALVE
- EXIST. FIRE HYDRANT
- EXIST. WATER VALVE
- EXIST. WATER METER
- EXIST. WELL
- EXIST. CATCH BASIN
- EXIST. STORM MANHOLE
- EXIST. SEWER MANHOLE
- EXIST. CLEANOUT
- EXIST. SEWER VALVE & VALVE BOX
- EXIST. WOOD FENCE
- EXIST. CHAIN LINK FENCE
- EXIST. WIRE FENCE
- EXIST. ROCKERY

STORM STORAGE DETAIL

Prepared for:
YI & ASSOCIATES
1217 FOURTH AVENUE EAST, SUITE 100
OLYMPIA, WASHINGTON 98506

Drawn By: J. NAYLOR
Checked By: D. SALMON
Scale: 1" = 20'

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REVISIONS
NO. DATE CHANGE

D. SALMON
STATE OF WASHINGTON
9748
REGISTERED PROFESSIONAL LAND SURVEYOR

CAMP MURRAY BUILDING #27
AS-BUILT STORM STRUCTURES
A PORTION OF SECTION 21, TOWNSHIP 19 N., RANGE 02 E., W.M.
PIERCE COUNTY, WASHINGTON

DATE
JULY, 2009

PNLS JOB NUMBER
09–630–336

PNLS DRAWING NAME
09630 ASBUILT.DWG

SHEET 1 OF 1

XREF Files: IMAGE Files:
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