

Rural Water Supply Operations Manual



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RURAL WATER SUPPLY MANUAL

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RURAL WATER SUPPLY MANUAL

I. INTRODUCTION

Every year in Fairfax County fires occur in rural and non-hydrant areas that account for significant fire losses. These fires typically occur where hydrants are in excess of 2,000 feet from the occupancy that is on fire.

Historically, in the more rural areas of the county, the dwellings and occupancies were small homes or outbuildings that did not require significant fire flows to accomplish extinguishment. However, in recent years with the advent of light-weight construction and buildings over 4,000 square feet of living space located in non-hydrant areas, water supply requirements become critical. These incidents easily overwhelm the first-arriving companies and their ability to generate adequate water supplies.

II. PURPOSE

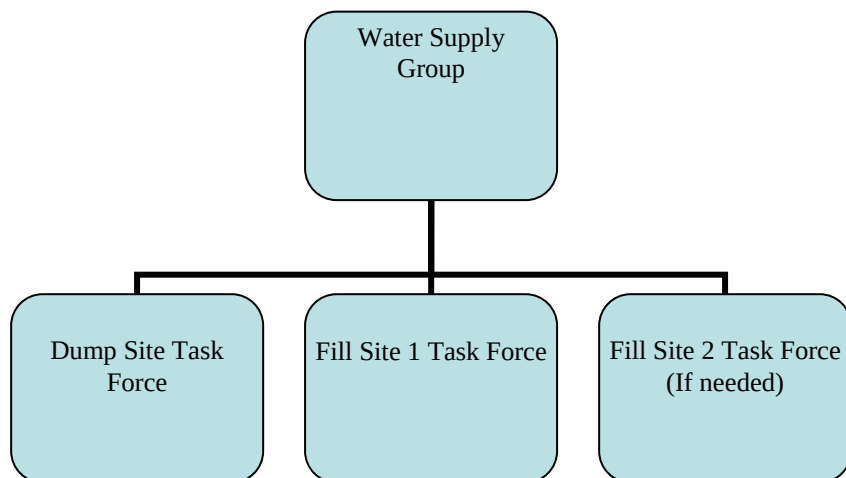
The purpose of this manual is to:

- Reduce the potential loss by developing an adequate water supply.
- Identify all rural/non-hydrant boxes in CAD.
- Develop a standardized build-up of resources and tactics to combat fires in non-hydrant areas.
- Develop the appropriate Incident Management System (IMS) to successfully manage water supply operations in non-hydrant areas.
- Identify common terminology.
- Describe the equipment to be used and standardize the equipment for all Tanker companies in Fairfax County.
- Develop standard deployment of operation units for fires in non-hydrant areas.
- Establish a Tanker Task Force response for CAD to be dispatched to all working fires in non-hydrant areas.
- Provide for a safe working environment for initial attack companies on these incidents.

III. DEFINITIONS

- **Attack Engine:** The first-arriving engine on the scene of a working fire that deploys attack line(s).
- **Dump Site:** The location for shuttle apparatus to dump their water. Typically, a portable tank and/or a supply pumper (dump-site engine) will be set up at this location.
- **Fill Site:** The location where shuttle apparatus fill their tanks for transport to the dump site. An engine at draft or at a hydrant will be at this location.

- **Fill-Site Supervisor:** Officer in charge (OIC) from the fifth engine supervises activities at the fill site. Reports to the Water Supply Group Supervisor (WSGS) and is responsible for setting up and maintaining the operations at the fill site.
- **Non-Hydrant:** Includes all known locations within Fairfax County where hydrants are in excess of 2,000 feet from a given structure. The definition of a non-hydrant area should include areas where the infrastructure has failed and/or has limited-access highways where water supply operations may significantly affect the handling of the incident.
- **Nurse Tanker:** A tanker that proceeds with the initial attack engine to the incident scene and provides water as needed for the initial attack. This is used in a long driveway scenario where the initial layout of hose would be over 1,000 feet.
- **Relay Operations:** The process utilizing two or more engines to supply the attack engine(s) directly from the water source through a supply line.
- **Shuttle Operations:** A process utilizing engines and tankers to move water from a specified source to the incident scene.
- **Shuttle Route:** The most efficient route possible for shuttle apparatus to utilize in transporting water from the fill site to the dump site.
- **Tanker:** Apparatus designed to carry water from a fill site to the incident scene, according to FIREScope, a Type I tanker has a 300 gpm pump and carries 2,000 gallons of water.
- **Tanker Task Force:** Three tankers, two engines, and a battalion chief.
- **Water Supply Group:** An ICS group that is established by the incident commander who has the primary responsibility of supplying water to the incident scene in the needed gpm to meet the needs of the incident. It is recommended that the second battalion chief be assigned as the WSGS.



- **Water Supply Group Supervisor:** The WSGS is the person assigned the role of developing an adequate water supply for the fire incident. The WSGS will be in charge of the Water Supply Group. The Water Supply Group will need to be assigned its own radio channel for water supply operations. Additionally, the dump-site engine driver will be assigned the task of WSGS until relieved by the second battalion chief. The WSGS will establish the water supply group and will be located at the dump site to facilitate the efficient movement of water at the incident.

IV. GENERAL CONSIDERATIONS

- A. Tanker and rural water supply (drafting) operations need to be practiced on a regular basis.
- B. The ability to build up and support these incident operations need to be identified early, and additional resources need to be called for at that time.
- C. Build-up and support for this operation is time consuming and calls for an extremely proactive approach by the initial Incident Commander (IC).
- D. Units and personnel at the dump and fill site need to be very conservative in their water management. Water should not be wasted at the fill or dump site, it needs to be handled efficiently so that it can be transferred to the attack engine for use on the fireground.

1. Tanker Flow Calculations

- a. Total Capacity of Tanker – 20% divided by the round trip time. This gives the fire flow that can be gained from a particular unit which will assist in developing flow calculations.

Basic Example: Tanker 412 with 2,500 gallons of water and a travel and fill time of 10 minutes (this example is designed to allow readers to envision time constraints). Will typically give us 200 gallons per minute fire flow on the fire ground:

Capacity of 2,500 – 20% (2,500 – 500) = 2,000

2,000/10 = 200 gallons per minute. This is the estimated fire flow based on this calculation.

V. TOOLS AND EQUIPMENT

A. Drafting Pits

- Drafting pits are portable water tanks that can be set up to augment the water supply in a tanker shuttle operation.
- One pit shall be designated as the drafting pit and the other as the dumping pit.



Photo 1 – Drafting Pits

B. Low-Level Suction Strainer

- Low-level suction strainers are for use in drafting pits. They allow the engine company doing the drafting to make the best use of all available water down to approximately 2 inches.



Photo 2 – Low Profile Suction Strainer

C. Low-Profile Jet Siphon Strainer

- This new strainer allows engines the ability to get water from the dump tanks without having to draft. By charging the 1 ¾" line a continuous flow is established.
- This can be used to draft from the drafting pit or for tank to tank transfers.



Photo 3 – Low Jet Siphon Strainer

D. Supply-Line Holder

- Supply-line holders allow for personnel assigned to the dump site to set up fill lines for the tanks utilizing 4" hose. This holder will replace a firefighter that is typically needed in position to hold the line while it is discharging into the pit.
- Sections of 4" hose are recommended to allow engines to connect to the dumping pits which allow tankers easy access to the dumping pit.



Photo 4 – Supply Line Holder (Photo courtesy of Fol-Da-Tank)

E. Bar Clamp for Pits

- The bar clamp is useful in multi-drafting tank operations. When closed off it prevents the tanks from equalizing which will drop the water level in both tanks. When it is opened, the water level in both tanks will reach equilibrium. Based on current practice it is recommended that the jet siphon be used in lieu of connecting the drafting and dumping pits.



Photo 5 – Bar Clamp (Photo courtesy of Fol-Da-Tank)

F. Jet Siphon

- The jet siphon is an auxiliary item that helps move water between drafting tanks and helps with water conservation in the operation. By using a Venturi effect the siphon moves 500 gpm between the tanks as needed.



Photo 6 – Jet Siphon

G. Clapper Valve

- This device prevents water from flowing back into the drafting pit once a draft is established (DO NOT USE WITH A FLOATING DOCK STRAINER).



Photo 7 – Clapper Valve

H. Floating Dock Strainer

- This device allows engines or tankers to draft from a static water source. The strainer floats on the surface of the water and does not need additional equipment to keep it off the bottom of the water source.



Photo 8 – Floating Dock Strainer (Photo courtesy of Fol-Da-Tank)

VI. RURAL WATER SUPPLY PREPLANNING

- A.** Preplanning areas where there are no hydrants is extremely important to allow operations to be initiated at the earliest possible moment.
 1. A comprehensive preplan needs to be developed.
- B.** Homes and other occupied structures in non-hydrant areas need to be identified and a water supply preplan needs to be completed to ensure that an adequate water supply can be established.
- C.** Preplans for all non-hydrant areas in the county shall be completed and sent to the first six engine companies and the tanker stations for inclusion in a rural water supply preplan book.
- D.** A rural water supply preplan book shall be maintained by the tanker stations, and new streets and preplans shall be included in the book as they become available. (See Standard Operating Procedure 01.02.03, Street Locator Books for examples of what is to be included in the preplans).

VII. FIRE OPERATIONS

A Tanker Task Force will be dispatched on all structure fire incidents in non-hydrant areas at the discretion of the incident commander. A Tanker Task Force shall consist of the following units, in addition to the first-alarm assignment.

- Two engines
- Three tankers
- One battalion chief

If tankers are dispatched without engines they need to have an additional firefighter on the unit. This will increase the safety of the crew responding to the incident.

A. Size-Up and Situation Reports

1. The first-in company in a non-hydrant area must provide a good concise situation report to the balance of the assigned units coming to the scene.
2. The first-arriving officer on the first engine company needs to do a very good risk benefit analysis to determine whether or not to commit to an offensive operation based on the visual cues available to them on arrival. Additionally, the OIC needs to base their tactics and fire flow requirements on the anticipated water supply.
3. Based on a risk benefit analysis, the first-in engine company officer must start to develop the appropriate organizational structure to manage the incident. This should be started early and needs to be correct for the incident at hand.
4. If there is a need to initiate interior offensive operations, it needs to be started as soon as feasible. (Consideration should be given to the use of CAFS or 1% foam for the attack lines for better utilization of water. By using foam, we can effectively extend firefighting operations by not using as much water.)
5. Additionally while en route to the fire, the first-due engine officer needs to begin to set up for water supply operations. With the appropriate pre-plan, the officer can designate fill sites, dump sites or relay sites that will allow in-coming units to take their pre-determined positions on arrival at the incident scene.

VIII. ROLES AND RESPONSIBILITIES

A. Short Driveway Scenario (Tanker Shuttle Operation)

(Includes a Tanker Task Force)

1. First Engine
 - Upon dispatch of a working fire in a structure in a non-hydrant area, a Tanker Task Force should be requested through the Incident Commander.
 - Lay out a supply line from the driveway to the incident. This should be done from where the supply pumper and drafting tanks are to be set up. This may require a split lay.
 - Have the fifth-due engine company dispatched to a designated fill site.

- The lay out from the first engine should include a Siamese on the supply line.
- Advise incoming units of the mode of attack and supply line position according to the pre-plan.

1. First Tanker

- Pump water to first-due engine through the Siamese.
- Drop fill tanks, hard sleeves, flat suction strainer, and other ancillary devices for dump-site operations. Drop an additional Siamese and hose for the dump-site engine
- Once draft is established by dump-site engine, the Tanker dumps its remaining water into drafting pits.
- Once the tank is empty, this unit becomes part of the shuttle operation and proceeds to the fill site.

2. Second Engine (Typically Draft Engine)

- Officer on the second-due engine assumes command of the incident if it is transferred from the first engine.
- Engine driver sets up the unit to supply the first-due engine from the dump site.
- Hook a line to the Siamese dropped off by the attack engine to begin supplying water prior to accomplishing a draft from the dump tanks.
- Leave room for additional drafting tanks to expand potential water supply.

3. Third Engine

- Officer and crew arrive on the scene and assume control of the dump site.
- Crew from engine sets up dump site and staffs the dump site.
- Third-due officer assumes position as Water Supply Group Supervisor.
- Engine driver drops water into the dump tank or sets up to flow water to the second-due engine via the Siamese. After dropping off water, the unit proceeds to the designated fill site.
- Engine becomes part of the shuttle operation.

4. Fourth Engine

- Officer and two firefighters proceed to the incident scene and becomes the RIT.
- Driver drops water off at the dump site and proceeds to the designated fill site.
- Engine becomes part of the shuttle operation.

5. Fifth Engine (Fill-Site Engine)

- Dispatched on the incident and is directed to go to the fill site location with the crew to begin fill-site operations.
- At least two lines will come off the engine to facilitate the rapid filling and turn-around of units coming to the fill site for replenishment. (Tankers have priority and should have a designated fill position.)

- The officer will become the fill-site supervisor and will be under the direction of the Water Supply Group Supervisor as part of the water supply group.
6. Sixth Engine
 - Assists shuttling water.
 7. First Truck
 - Position truck as close to the fire scene as possible for access by crew and equipment.
 - **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**
 - Consideration should be given to use of adjacent driveways.
 8. First Rescue
 - Position as close to the incident scene as possible for access by crew and equipment.
 - **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**
 - Consideration should be given to use of adjacent driveways.
 9. Second and Third Tanker
 - Arrives on scene at the designated dump site and drops water into the drop tank/drafting pit.
 - Drops additional equipment as required by the Water Supply Group Supervisor.
 - Becomes part of the shuttle operation.
 10. Second Truck
 - Position truck as close to the fire scene as possible for access by crew and equipment.
 - **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**
 - Consideration should be given to use of adjacent driveways
 11. First EMS Unit
 - Follows direction of IC.
 - If this unit is from a tanker station the crew can be used to augment the operation due to their familiarity with the system.
 - If unit is used to assist in water supply operations and or firefighting an additional EMS unit needs to be called for immediately.
 - **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**

12. First Battalion Chief

- Takes over as the Incident Commander.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**

13. First EMS Supervisor

- Assists battalion chief or IC as needed.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**

14. Second Battalion Chief

- Takes over responsibility as the Water Supply Group Supervisor.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION**

15. Second EMS Supervisor

- Assists battalion chief with Water Supply Operations.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION**

B. Long Driveway (Over 1,000 Feet) Nurse Tanker Operation

(Includes a Tanker Task Force)

1. First-Engine Company

- Proceeds up driveway laying out if necessary from a pre-determined position per preplan.
- Officer and crew initiate operations based on a comprehensive size up of the situation.
- Advises incoming units of the mode of attack and supply line position according to the pre-plan
- Due to the first tanker being committed as a nurse tanker the OIC needs to consider requesting additional tankers.

2. First Tanker

- Proceeds up driveway laying out as necessary and hooks up to engine as close as possible to the incident scene.
- During this phase of the operation it is extremely important for all incoming units to pump their water to the nurse tanker to maintain as much water as possible at the incident scene until a relay/shuttle operation can be set up. Consideration needs to be given for the tanker driver to drop equipment at the anticipated dump site.

3. Second Engine

- Officer on second-due engine assumes command of the incident if it is transferred from the first engine.
- Proceeds up driveway if necessary and supplies initial Tanker with water from tank. Drops supply line as determined by the preplan.
- Crew provides support to initial companies.

4. Third Engine

- Officer and crew arrive on the scene and assume control of the dump site.
- Crew from engine sets up dump site and staffs the dump site.
- Third-due officer assumes position as Water Supply Group Supervisor.
- Engine driver drops water into the dump tank or sets up to flow water to the second-due engine via the Siamese.

5. Fourth Engine

- Crew with officer proceeds to the incident site to become the RIT.
- Driver supplies water to dump-site engine and then proceeds to the fill site to become part of the shuttle operation.

6. Fifth Engine

- Proceeds directly to the fill site and takes over and sets up at draft or hydrant.
- Officer and crew staff the fill site and officer is then the fill-site supervisor.

7. Sixth Engine

- Assists shuttling water.

8. Second and Third Tanker

- Stops at dump-site location.
- Hooks line up to Siamese and begins to supply water to it.
- Assists third-due engine company driver with establishing dump site by dropping additional drafting pits and equipment.
- When water drop is completed this unit becomes part of the shuttle operation.

9. First Truck

- Positions truck as close to the fire scene as possible for access by crew and equipment.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**
- Consideration should be given to adjacent driveways.

10. Second Truck

- Positions truck as close to the fire scene as possible for access by crew and equipment.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**
- Consideration should be given to adjacent driveways.

11. First Rescue

- Positions as close to the incident scene as possible for access by crew and equipment.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**
- Consideration should be given to use of adjacent driveways.

12. First EMS Unit

- Follows direction of IC.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**
- If this unit is from a tanker station the crew can be used to augment the operation due to their familiarity with the system.
- If unit is used to assist in water supply operations and or firefighting an additional EMS unit needs to be called for.

13. First Battalion Chief

- Takes over as the IC.

14. First EMS Supervisor

- Assists battalion chief or IC as needed.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**

15. Second Battalion Chief

- Takes over as the Water Supply Group Supervisor.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**

16. Second EMS Supervisor

- Assists battalion chief with Water Supply Operations.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**

C. Rural Water Supply Relay Operations

- Relay operations with 4" hose are feasible up to one mile or five engines.
- The low friction loss makes this a viable option.
- These operations need to be preplanned and the preplan needs to be followed.
- The rural water supply relay operation is a time consuming operation and a Tanker Task Force needs to be dispatched to these incidents to ensure an adequate supply of engine companies to complete the hose lay.
- Additional tankers and engines that are not needed to accomplish the relay can supply their water to the fireground through a designated relay engine. The Water Supply Group Supervisor shall designate which engine is the designated relay engine.
- The third-due engine company officer shall assume the role of the Water Supply Group Supervisor until relieved by a battalion chief.

IX. ICS COMPONENTS AND POSITIONS

A. Water Supply Group Supervisor

The roles and responsibilities of the Water Supply Group Supervisor include:

- Establish and supervises the **Water Supply Group** which is responsible for providing adequate water to the incident.
- If not already done so the Water Supply Group Supervisor will be responsible for establishing and coordinating the fill site, dump site, shuttle route and/or relay operations in either hydrant or non-hydrant areas.
- Determines with the incident commander the water supply needs of the incident.
- Keeps command apprised of the amount of water available upon request.
- Coordinate traffic control with law enforcement as required.
- Ensures that tankers get priority at the fill and dump sites.
- Ensures adequate resources are available to support the water supply group.

B. Dump-Site Operations

(See Appendices for further explanation)

- The dump site should be located near the end of the driveway leading to the structure unless otherwise noted in the preplan.
- The company that is designated by the preplan should drop the Siamese at the dump-site location and proceed into the incident.
- Companies arriving on the scene need to support the water supply through the Siamese until the drafting pits can be set up for use by the supply engine.

- The first tanker, either pulls past the driveway or stops short of it to allow for the setting up of the dump tanks. Driver then attaches a line to the supply Siamese and provides water for the first (attack) engine. They then drop off both of the dump tanks and set up one to be used immediately. The hard sleeves with the low level strainer will be left by the tanker driver at the dump site to allow the supply engine to readily hook up and begin water supply operations.
- Supply engine at the dump site sets up for a draft.
- Once a draft is established the tanker will drop the remaining water into the drafting pit and then proceed to the fill site.
- If a draft cannot be established in three minutes or less, this unit shall be replaced by another engine company.
- The dump-site engine driver assumes the position of Water Supply Group Supervisor until relieved.
- The Water Supply Group Supervisor needs to make sure that at least two tanks are set up at the dump site.
- When two drafting tanks are set up, use of the jet siphon system is recommended. This allows for better use of the water on hand and prevents equalizing of the drafting pits which will bring the water below the minimum height for drafting.
- Tankers have the right-of-way in the dump site area; tankers will utilize their side dumps.
- Engine companies involved in the shuttle operation will attach to 4" supply lines that are set up to the rear of the water supply engine. This should leave ample room for tankers to move through the dump site area.
- The Water Supply Group Supervisor needs to be very cognizant of the fact that apparatus will be moving through the site and safety of the personnel is paramount.
- Water is a very important resource in this situation and needs to be placed in the tanks for supply to the fireground. (DO NOT WASTE WATER.)
- Personnel at the dump site need to wear appropriate PPE to include traffic vests.
- Water supply or shuttling units may need to be staged and directed into the incident site as needed to keep the operation moving efficiently.

C. Fill-Site Operations

(See Appendices for further explanation)

- Typically, the fifth engine is responsible for setting up and maintaining the fill site
- Engine OIC is the fill-site supervisor.
- The fill site should be chosen and established where the best flow of water can be achieved so that shuttle units can be filled as quickly as possible.
- **Tankers have priority at the fill sites;** they need to have a designated fill position that does not become encumbered by engines.
- The crew from the fill-site engine needs to deploy enough lines to rapidly fill numerous incoming units.

- Additionally, they will connect and disconnect these lines as needed to facilitate a rapid turn around for units coming and departing the fill site.
- The fill-site supervisor needs to ensure that apparatus moves efficiently through the fill site.
- The fill-site supervisor is responsible for site safety ensuring that all personnel know their assignments.
- The WSGS needs to ***STRONGLY*** consider more than one fill site.
- Personnel at the fill area need to wear the appropriate PPE to include traffic vests and PFDs.

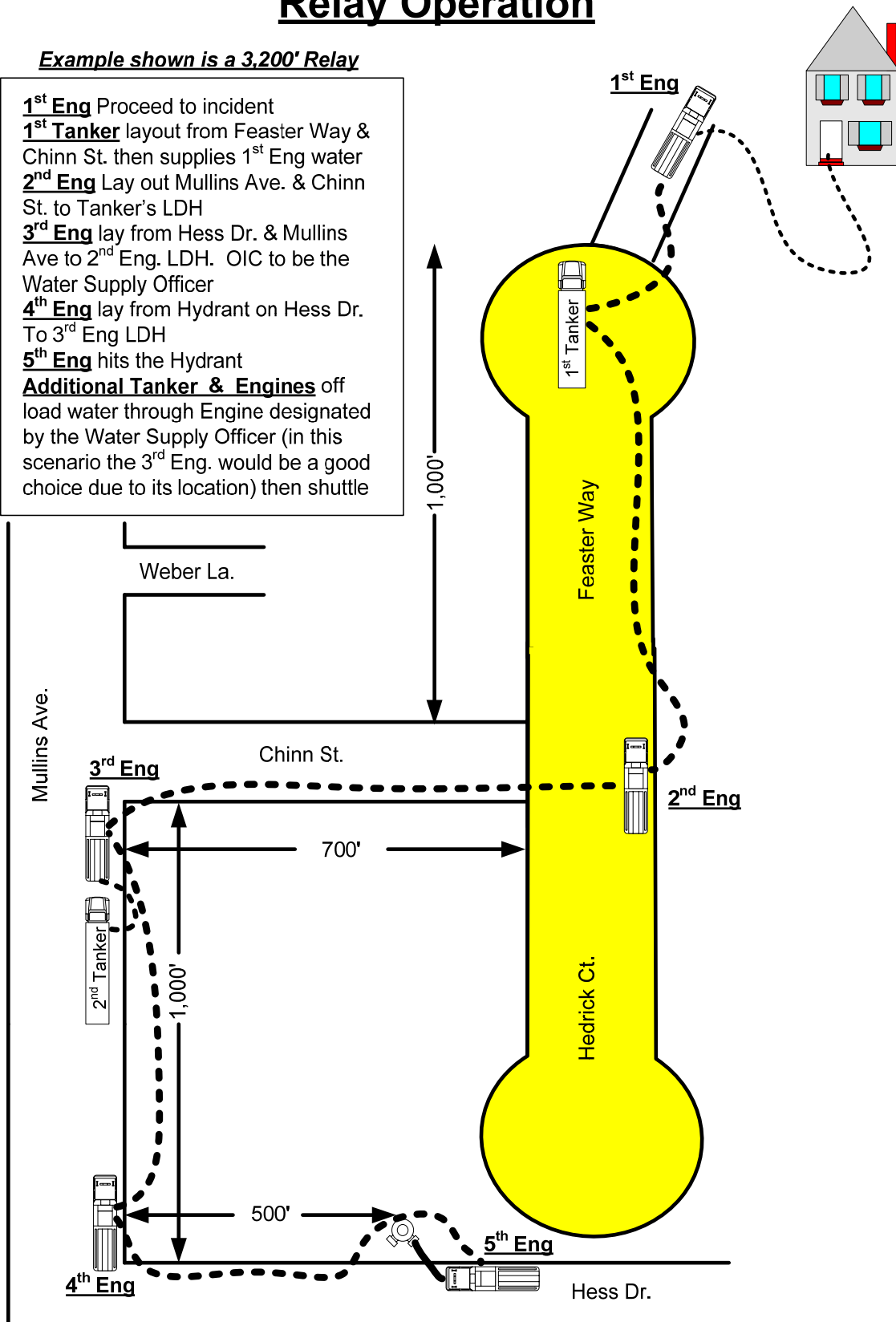
- X. APPENDICES**
 - A. Relay Operations**
 - B. Short Driveway Shuttle (Steps 1 through 3)**
 - C. Long Driveway Shuttle**

A. Relay Operations

Relay Operation

Example shown is a 3,200' Relay

1st Eng Proceed to incident
1st Tanker layout from Feaster Way & Chinn St. then supplies 1st Eng water
2nd Eng Lay out Mullins Ave. & Chinn St. to Tanker's LDH
3rd Eng lay from Hess Dr. & Mullins Ave to 2nd Eng. LDH. OIC to be the Water Supply Officer
4th Eng lay from Hydrant on Hess Dr. To 3rd Eng LDH
5th Eng hits the Hydrant
Additional Tanker & Engines off load water through Engine designated by the Water Supply Officer (in this scenario the 3rd Eng. would be a good choice due to its location) then shuttle



B. Short Driveway Shuttle (Steps 1 through 3)

Short Driveway Shuttle

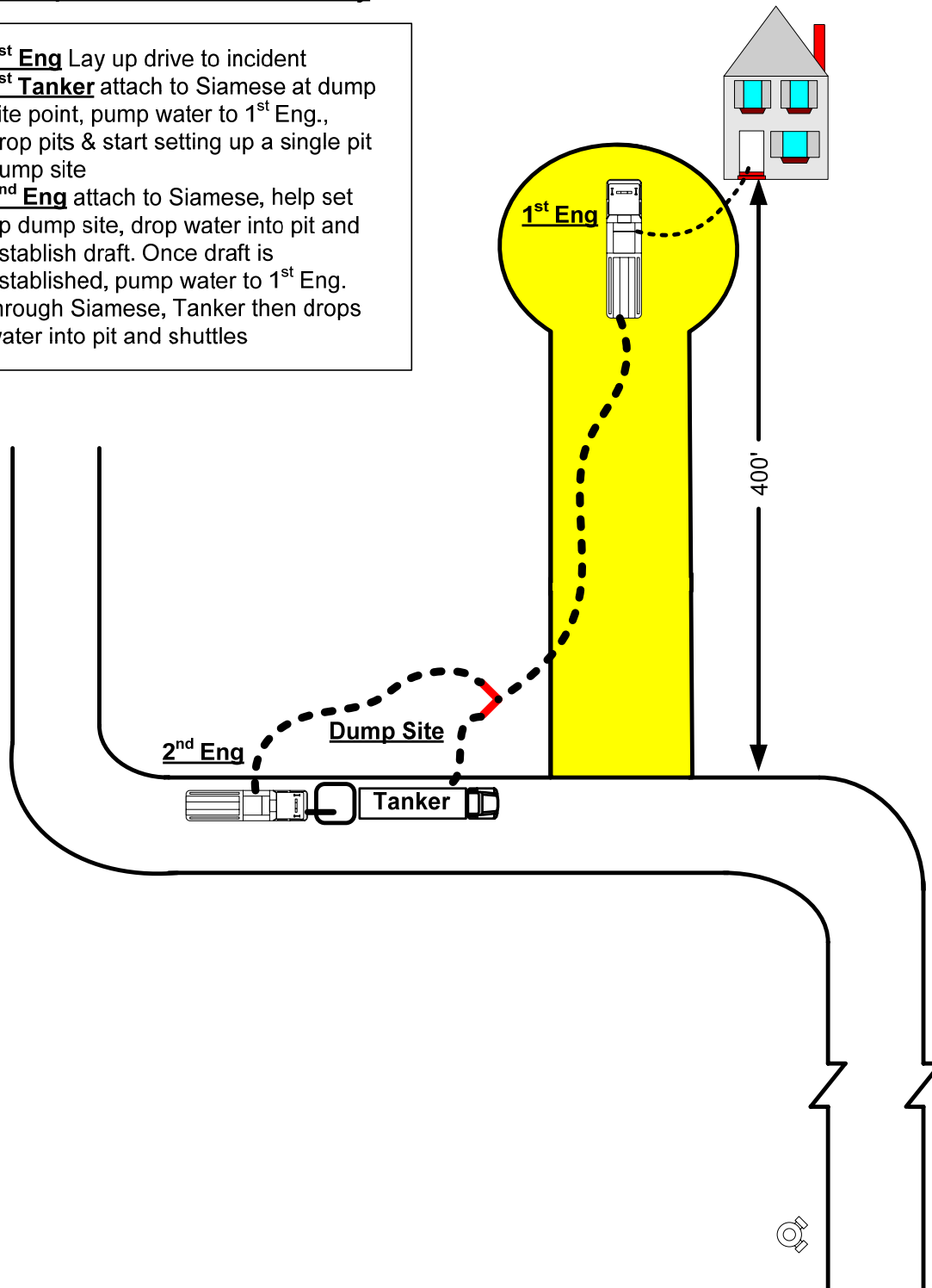
(Step 1 of 3)

Example shown is a 400' driveway

1st Eng Lay up drive to incident

1st Tanker attach to Siamese at dump site point, pump water to 1st Eng., drop pits & start setting up a single pit dump site

2nd Eng attach to Siamese, help set up dump site, drop water into pit and establish draft. Once draft is established, pump water to 1st Eng. through Siamese, Tanker then drops water into pit and shuttles



Short Driveway Shuttle

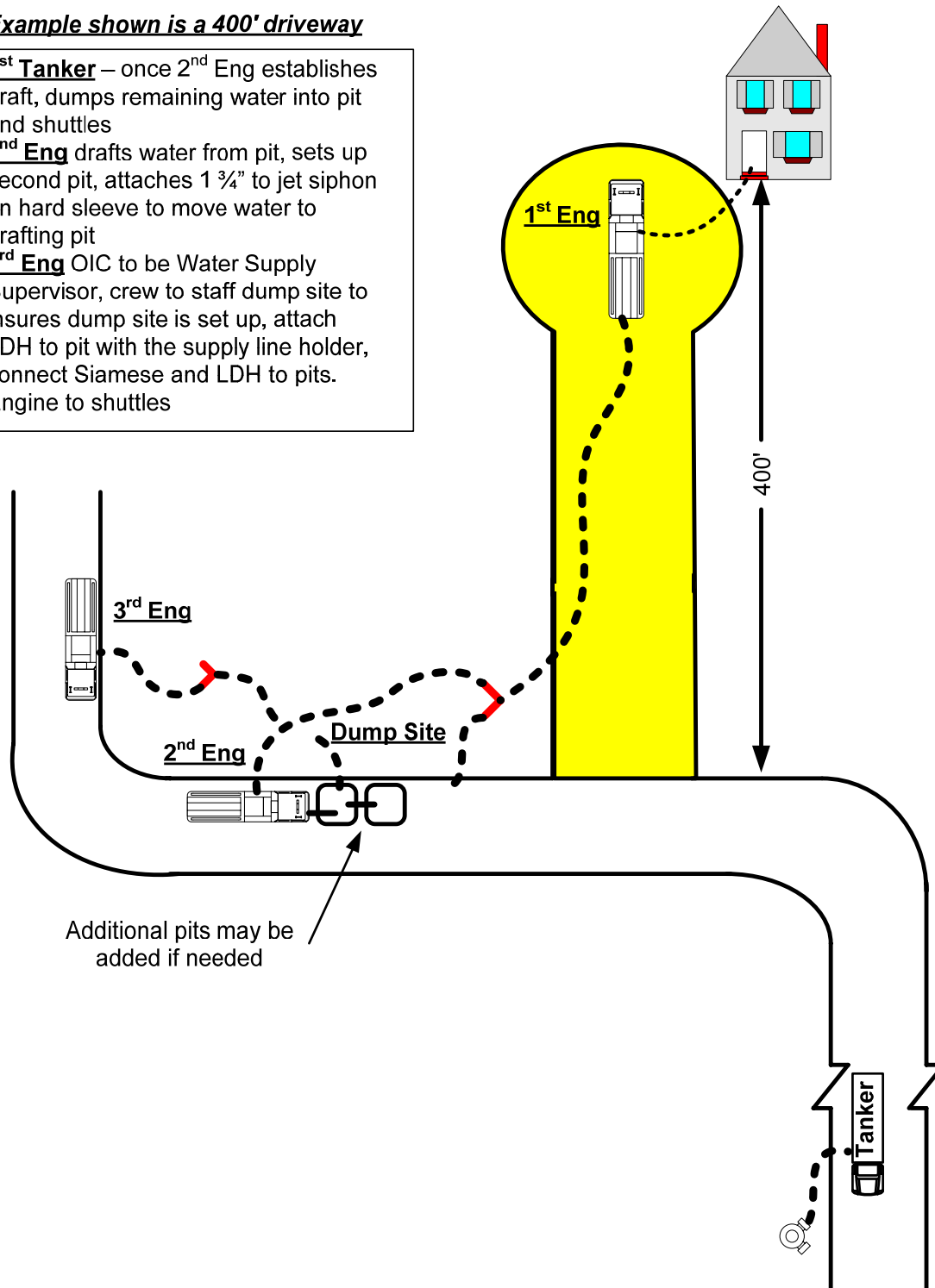
(Step 2 of 3)

Example shown is a 400' driveway

1st Tanker – once 2nd Eng establishes draft, dumps remaining water into pit and shuttles

2nd Eng drafts water from pit, sets up second pit, attaches 1 3/4" to jet siphon on hard sleeve to move water to drafting pit

3rd Eng OIC to be Water Supply Supervisor, crew to staff dump site to insure dump site is set up, attach LDH to pit with the supply line holder, connect Siamese and LDH to pits. Engine to shuttles

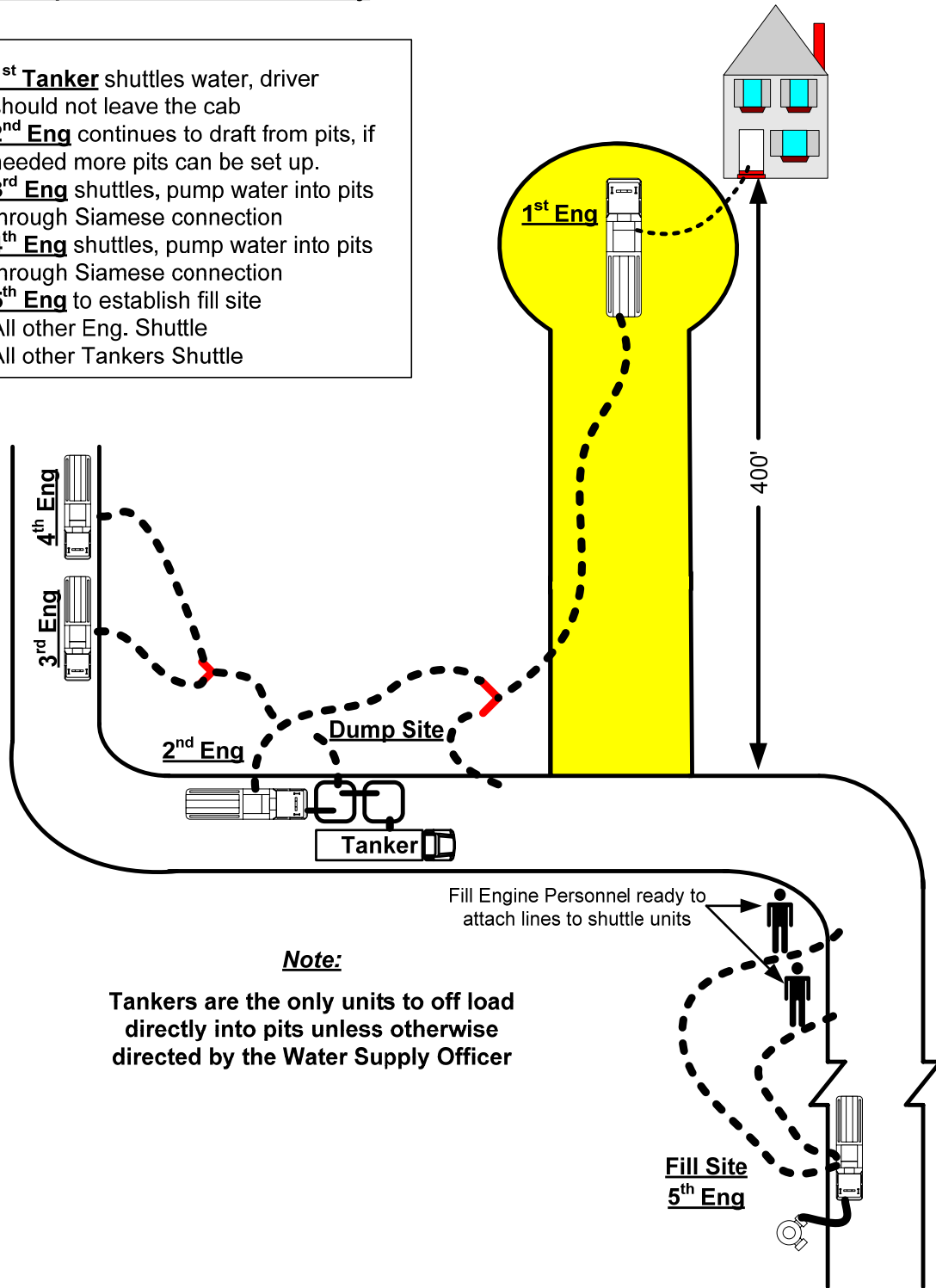


Short Driveway Shuttle

(Step 3 of 3)

Example shown is a 400' driveway

1st Tanker shuttles water, driver should not leave the cab
2nd Eng continues to draft from pits, if needed more pits can be set up.
3rd Eng shuttles, pump water into pits through Siamese connection
4th Eng shuttles, pump water into pits through Siamese connection
5th Eng to establish fill site
 All other Eng. Shuttle
 All other Tankers Shuttle



C. Long Driveway Shuttle

Long Driveway Shuttle

Example shown is a 2,000' driveway

