PLANNING FIRE STATIONS

The purpose of this document[1], is to provide a checklist for fire chiefs and municipal officials, in the planning of a fire station.

It is not intended to decide what the facility will look like, inside or out, nor specifically where it should be located, but rather to give consideration to the minimum size, configuration of spaces, mechanical and safety features, property and communication needs, uses of the facility, site selection and other pertinent factors.

Cost is obviously important, but should not be a part of the initial planning process. After determining the specifications of the proposed station has been completed, then the cost factor should be applied to decide which of those specifications can be afforded and which may not.

As an example to the municipality, fire stations must have "state-of-the-art" automatic fire detection, alarm, and safety systems.

What follows will present questions to answer, suggestions to follow and an outline of functions to consider. The categories listed are not in any special order, nor do they imply priority.
If the list is not complete, it is because each municipality has its own goals, objectives, fire suppression problems, special equipment and policies for providing fire services.

The categories are:

- fire station property
- communications
- cooling
- special considerations
- exterior configuration
- heating
- size of property
- proximity of spaces
- configuration (sizes and types of rooms/spaces)
- functions (uses)
- lighting and power
- safety features
- space requirements
- materials

[1] *Fire Station Planning Design and Construction*

FUNCTIONS OR USES

The objectives should include but not be limited to the following:

Quick and safe response by personnel and apparatus to alarms.

Desired characteristics - minimum internal travel distances; doors swinging in the direction of travel to the apparatus floor without encroaching on walkways; minimum conflict in cross circulation; good proximity of all spaces to apparatus floor and other rooms.

Administration of department or station.

Desired characteristics - space for line, administrative and fire prevention officers; close proximity od space to public access.

Fire prevention/education.

Desired characteristics - sufficient space for inspectors, public information officers, audio-visual storage and bulletin boards; close public access.

Training.

Desired characteristics - sufficient classroom space for station personnel; space for training (inside and outside); storage space for files and audio-visual equipment and training aids.

Maintenance and station grounds.

Desired characteristics - the use of such low maintenance building materials as brick, block, metal and interior tile; natural grounds, rather than a lawn with formal landscaping.

Public use of facility.

Desired characteristics - public use of specific ares without conflict with normal fire department operations, sufficient parking.

Flexibility.

Desired characteristics - design to allow for future growth in size, methodology and equipment; internal design of office space to allow for future changes in systems and methods.

Cost effective building materials and systems.

Desired characteristics - zone heating; easy clean wall materials; fewer windows, and double glazed window assemblies; insulated walls and large insulated doors; materials conducive to insurance savings.

Exterior configuration of building.
Desired characteristics - minimum impact on single-family neighbourhood; fit in with surrounding buildings; minimal noise factor; objectionable lighting controlled.

Multiple uses of building.
Desired characteristics - combined uses of sections of building with other government agencies, eg. police, emergency medical services, municipal government.

ROOMS AND TYPES OF ROOMS
(configuration and size)

The configuration of the building will relate to the proximity of the various rooms and spaces (relationship of rooms and spaces to each other) to be addressed later.

The number and types of apparatus to be used in the building, the number of personnel (full-time, volunteer or both) needed for their operation, and types of office function to be conducted from each station are important factors to be considered.

The space requirements set out below are considered to be absolute minimums. Serious consideration should be given to maximizing the future potential of any proposed fire station. Storage space, social areas, sufficient meeting and training rooms, and maintenance/repair and apparatus space are often overlooked or reduced in size to meet budget constraints.

The following spaces and rooms will be considered. These spaces and rooms could be combined, depending on a department's administrative priorities and philosophies.

Office - Chief of Department.
Space for desk, chair, worktable or conference table, filing cabinet and at least two side chairs; optional work station and conference space.

Office - Deputy Fire Chief; Platoon Officer(s).
Space for desk, chair, worktable, filing cabinet and two side chairs.

Office - Fire Prevention/Training Personnel.
Space for desks, chairs, side chairs, work stations, filing cabinets, lockers, plans review table, interview room.

Office - General/Secretarial.
Space for clerks, filing cabinets and public waiting area; workstations; duplicating machines; storage requirements; consider noise factor.

Storage Room(s)
Fire prevention, training and administration space for audio-visual equipment and supplies; training aids and printed materials; public education materials; evidence lockers.

Multipurpose Room
Space large enough for at least 50 students for training purposes; give consideration to storage space for chairs, tables; projection/storage room.

Kitchen
Space for cooking and food preparation; enough space should be provided so several people can work in the area at the same time; appliances sized to accommodate social events if conducted; sufficient electrical service capacity; ventilation and exhaust systems.

Eating area.
Space large enough to seat anticipated maximum number of staff; could be combined with kitchen, lounge and multipurpose room.

Conference Room.
Although this room can be combined with another room, it is recommended that it be separate which allows its use without interfering with the routine of others.

Lounge.
Space for fire fighters away from the public.

Dispatch/Communications Room.
Space for radio equipment, emergency telephones, computers, maps, bulletin boards, etc.

Male Washroom.
Toilet facilities to be used by department personnel and/or public; in close proximity to multipurpose room; public rest rooms should be accessible to the handicapped, and have insulated walls for privacy.

Female Washroom.
Same criteria as above.

Washrooms, Showers and Lockers for Fire Fighters.
Close to dormitories. Should not be combined with public bathrooms. Separate facilities for males and females. Provision for decontamination showers with retention tanks.

Apparatus Area
Indoor parking for all apparatus and vehicles including reserve apparatus; space for limited hands-on training with vehicles as well as routine maintenance work. Additional space, if required, for mechanical functions including tool and parts storage. (See Figure 1).

Storage Room
Space for fire fighters for protective clothing, equipment such as breathing apparatus parts etc., hose, other tools and equipment.

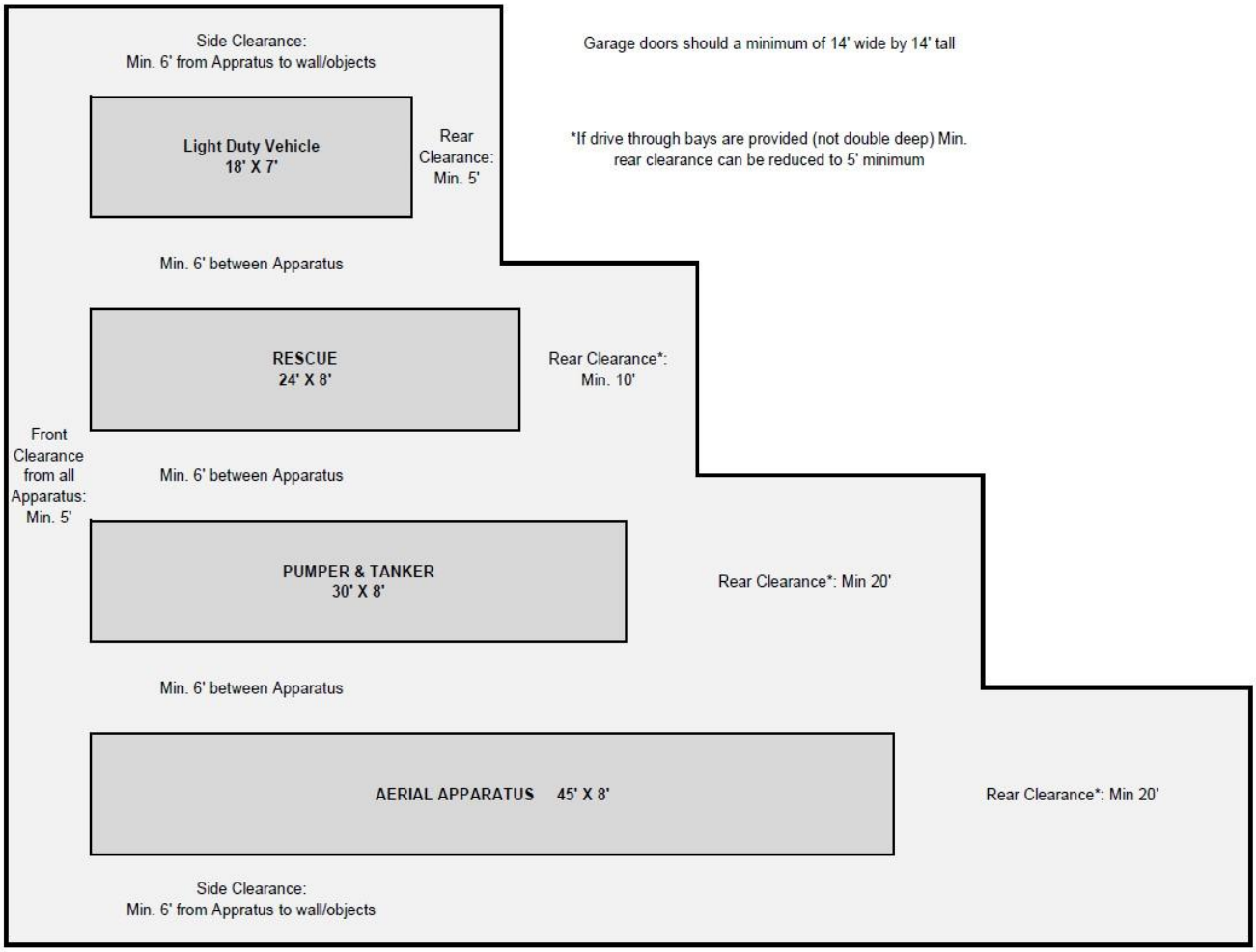
Storage Room
General supplies such as cleaning/ maintenance supplies and materials.

Dormitory.
Can be either a one room general sleeping area, or a series of rooms. May be combined with other rooms (classroom).

Exercise Room.
A separate room is recommended because of the emphasis on a requirement for physical fitness for both full-time and volunteer personnel.

Social Room.
Usually for volunteer departments, which can be combined with other rooms above.

FIGURE 1 - APPARATUS SPACE REQUIREMENT



Not to Scale

FIGURE 2A - PROXIMITY RELATIONSHIPS

Some thought must be given to the relationship of one room or space to another. This will allow the user and architect to decide where each room or space should be in the fire station. This is an important factor before determining what a building will look like. Using figure 2 and the values listed below, decisions can be made about where rooms should be in relationship to each other.

Room numbers and values on following page.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	X	C	C	A	B	D							D							
2	C	X											D							
3	C		X										B							
4	A			X									D							
5	B				X								D							
6	D					X							B							
7							X						A							
8								X					A							
9									X				B							
10										X			A							
11											X		C							
12												X	C							
13	D	D	B	D	D	B	A	A	B	A	C	C	X							
14														X						
15															X					
16																X				
17																	X			
18																		X		
19																			X	
20																				X

Room Number Room or Space

1 Chiefs Offices
2 Fire Prevention-Training Offices
3 Line Officer Office
4 General Office
5 Waiting Room
6 Multipurpose Room
7 Kitchen
8 Eating
9 Lounge
10 Dispatch/Communications
11 Male Washroom
12 Female Washroom
13 Apparatus Area
14 Maintenance Area
15 Repair shop
16 Hose Tower
17 Dormitory
18 Locker Room
19 Toilets/Showers
20 Station Officer

Proximity Values

A - necessary

B - important

C - average

D - unimportant

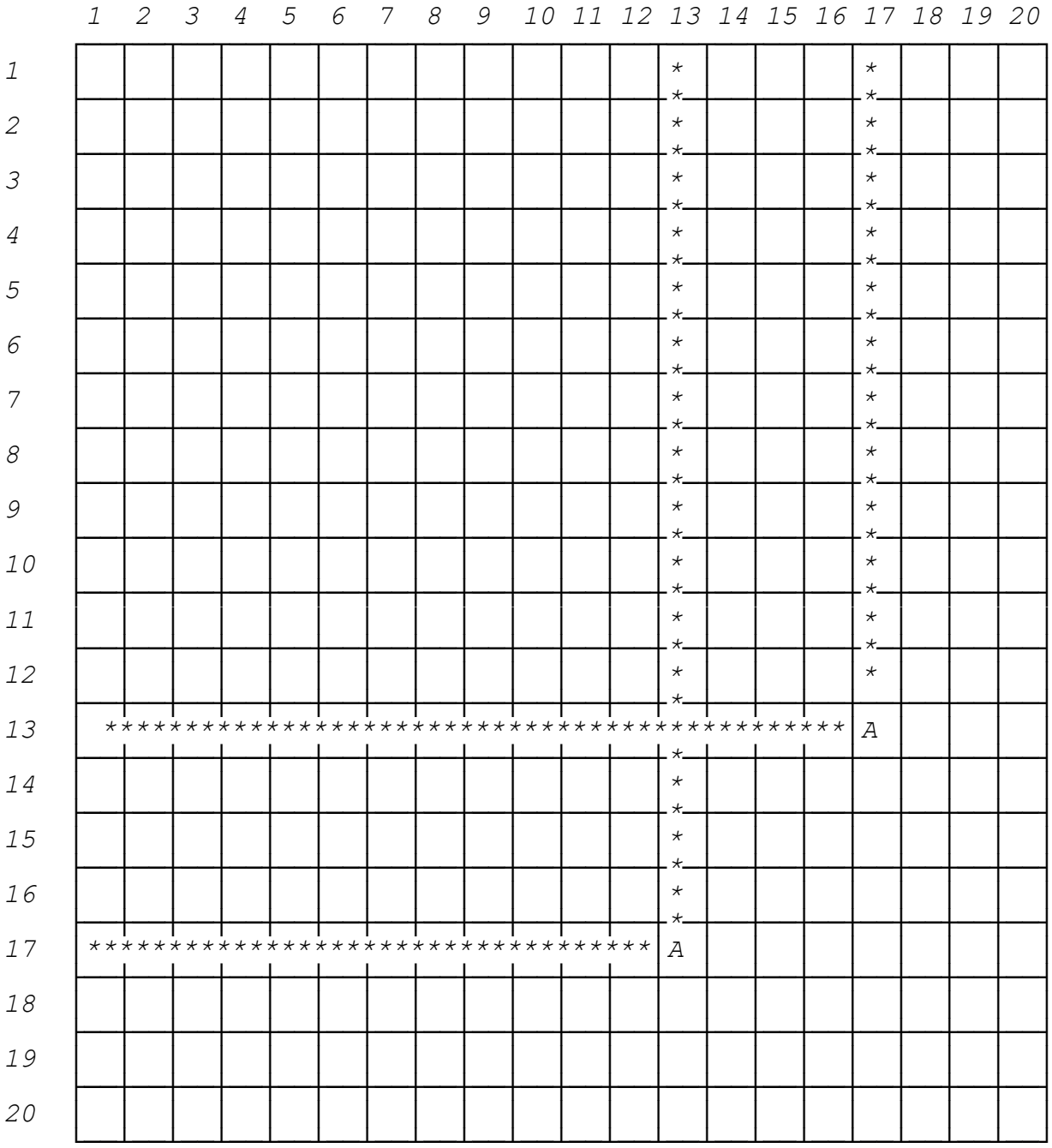
E - undesirable

To Plot A Proximity Value

To establish that the proximity value between Apparatus Area (13) and the Dormitory (17) is "necessary" (Code letter - A), first find the two areas on the grid. For example, the number (13) on the side of the grid represents from Room 13 to the number (17) at the top of the grid and vice versa. Extend lines from the two areas along the respective rows until the lines intersect. At these points write the code letter for the established value. See Figure 2B.

Conduct this evaluation several times to be sure of proximity decisions.

FIGURE 2B- TO PLOT A PROXIMITY VALUE



SPACE REQUIREMENTS

The space requirements shown in Figure 3 are only guidelines. Consideration should be given to such "waste space" as hallways, walking spaces between workspaces, stairs, wall and partition widths, and the space taken by doorway swing. None of these are included in Figure 3. (Code & local requirements may exceed, or vary from, the following guidelines).

FIGURE 3. MINIMUM SPACE REQUIREMENTS.

Rooms	Minimum Square Feet
Office - Chief.....	192 sq. ft. per person
Office - Deputy Chief.....	120 sq. ft. per person
Office - Company Officers.....	90 sq. ft. per person
Office - Fire prevention, training.....	72 sq. ft. per person
Office - General.....	54 sq. ft. per person
Multipurpose space.....	750 sq. ft.
Conference room.....	120 - 150 sq. ft.
Office with waiting room - one employee.....	180 sq. ft.
Kitchen.....	40 sq. ft. per person
Eating.....	same as kitchen
Dispatch (not alarm headquarters).....	120 sq. ft.
Male washroom.....	36 sq. ft. per person
Female washroom.....	36 sq. ft. per person
Apparatus area.....	See Figure 1
Lounge.....	30 sq. ft. per person
Storage room - office.....	18 sq. ft.
Storage room (bureau or training).....	80 sq. ft.
Storage room)personnel).....	300 sq. ft.
Maintenance area.....	200 sq. ft.
Hose tower.....	120 sq. ft. per floor
Dormitory.....	75 sq. ft. per space
Locker room.....	10 sq. ft. per person
Toilet/showers.....	220 sq. ft. each
Study.....	150 sq. ft.
Station Officer(sleep & work station).....	200 sq. ft.

FIGURE 4. CRITERIA FOR PLANNING SPACE

PROJECT _____ *FIRE STATION #* _____

SPACE OR ROOM _____
(one of these forms for each room planned)

Number of identical spaces _____

1. Users	
2. Activity	
3. Size and shape	
4. Equipment and furnishings	
5. Internal physical organization	
6. Interrelation and proximity needs	
7. Special requirements	
8. Services and utilities	
9. Remarks and miscellaneous	

Discussed with architect ? YES ___ *NO* ____

FIGURE 5. TABULATION SHEET

Position	Number		Space
	Now	Future	Square Feet
Chief			
Chief Officers			
Training & F.P. Officers			
Training & F.P. Staff			
Administrative Staff			
On Duty/Volunteer Staff			
Vehicles in Building			
Pumper			
Tanker			
Rescue			
Aerial			
Car			
Other			
Station Officers			
Storage- Office			
Storage- Other			
Radio and Report Room			
Kitchen			
Dormitory			
	Total Sq. Ft.		
Plus 10% - 12% for circulation, utilities, etc.			
NOTE; This list would be expanded to include personnel positions and activities for each facility planned. Include such items as dispatch, computer areas, washroom/showers, exercise rooms and recreation ares.			

SAFETY FEATURES

In addition to the requirements and considerations of the building code, fire code, occupational health and safety act, the following
factors should also be considered:

- apparatus floors should not be too smooth or slippery;
- doors should not swing into paths of travel;
- pathways between furniture in offices should be open and straight;
- driveways for responding apparatus should be separate from driveways for business traffic;
- there should be effective pathway lighting inside and outside the building;
- proper ventilation for all areas;
- stairway steps should have non-skid treads;
- shower areas to have non-skid floors;
- safety fountain for eye washes should be installed;
- a security-key system should be provided; and,
- automatic alarm/detection/extinguishing systems.

MATERIALS

Fire station designers should consider building materials that will give long life, reduce maintenance, conserve energy and foster safety for the occupants.

Those materials should include, but not be limited to:

- stable low-maintenance exterior materials (e.g., pre-finished metal or brick);
- insulated exterior walls and roof;
- double (triple) glazed windows and fewer windows;
- insulated doors with fewer windows;
- metal insulated exterior doors;
- a pitched roof for more effective run-off;
- automatic alarm and detection systems; and
- hard surface or wainscot surface in apparatus area.

LIGHTING AND POWER

An emergency generator is a must. It should have capacity to supply power for interior pathway lighting, apparatus area doors, radios, telephones, fuel pumps, heating systems, fire alarm systems, some defined room lighting and some wall outlets to operate equipment required in an emergency. The generator should have an automatic starting capability and should be located inside the building in a separate room. the type of fuel for the generator should be considered. Emergencies can disrupt the normal electrical power supply for a long period of time. Natural gas lines could break. Bottled gas, or a separate fuel tank could be possible solutions.

A Multipurpose room should have an area or stage lighting for audio-visual presentations and speakers; area lighting with intensity control is usually more effective.

Extra high intensity lighting should be provided for maintenance and repair areas.

Outside the station, pathway lighting should be installed, preferably on a timing or light sensitive switch.

If there is an outside training area, there should be sufficient lighting for those functions and for the parking lot.

Inside the station, three-way switches should be provided for rooms with more than one door.

Some interior lighting should come on automatically when an alarm is activated.

HEATING

Zone heating is preferred, so those areas not being used can have temperatures reduced.

Timed temperature controls are advisable particularly in volunteer stations that are unoccupied other than for alarms, training sessions, etc.
Slow ceiling fans are effective in some areas, particularly the apparatus area.

More than one hot water tank may be necessary to reduce the lengthy piping necessary to move hot water where it is required. The size of the tank(s) is also important.

COOLING

Air conditioning is no longer considered a luxury. Comfortable employees work more effectively, so air conditioning, at least in parts of the building, should receive some priority.

COMMUNICATIONS

Communications is the most misunderstood function in a fire station. Each department has to determine its needs, but there are some common specifications to consider:

- a public address or paging system is a must, particularly in a large building. Keep it separate from other systems;
- an additional relay should be installed to turn off kitchen stoves, ovens and appliances when an alarm is received. This relay can be connected to a radio toning system or any other system used in responding to an alarm;
- radio-controlled apparatus door closures are recommended; Timing devices are not recommended because of accidents occurring with automatic timed closures;
- Outside speakers (with on-off switches) may be required for outside training areas; and,
- Paging and alarm speakers should be installed in all areas of the station.

SIZE OF PROPERTY

The width of the property must:

- allow for drive-around or drive-through operations and parking;
- allow enough space for buffer of landscaping that is pleasing to neighbours and the department;
- allow adequate side yard parking; and,
- permit the infusion of effective anti-noise and anti-bright light buffers.

The depth of the property must:

- afford enough space to hold the longest apparatus to be used at the station without projecting onto a sidewalk or street;
- allow for visitor and employee parking;
- allow for rear training area, if needed and planned;
- have enough space for landscaping, including a rear buffer area; and,
- allow rear access to a drive-through bay or bays.

When making decisions about the above design factors, consideration should be given to:

- public use of parking spaces;
- the entrance to a public meeting room;
- public walkways;
- staff and spare vehicle parking;
- training class parking; and,
- the amount of exterior training space.

OUTSIDE CONFIGURATION

When planning the outside configuration of a station and the property, there are several factors to consider, including:

- building location on property;
- vehicle circulation and parking - space for double crews, public vehicles and some fire department vehicles;
- gasoline and diesel fuel storage;
- garbage - if a dumpster is used, a space convenient for the garbage trucks must be assigned;
- recreation;
- training area- paved area by hose or dill tower; consider conflicts with parking and/or recreation;
- fire hydrants - a training hydrant with a return pit may be desirable if public hydrants are too far or not accessible;
- lighting;
- signs;
- landscaping;
- fire alarm - if the department needs an alarm box on the outside of the building for alerting fire fighters, this should be planned;
- building configuration;
- storm water;
- electrical - conduit for future outside use should be considered; and,
- driveways (ramps/aprons)- a driveway should not allow vehicles to enter the flow of traffic within 150 feet of a traffic signal, when the signal will back up traffic in front of the driveway.

SPECIAL CONSIDERATIONS CHECKLIST

1. Offices
   - furniture;
   - radio, remote (so administrative staff may monitor emergency operations);
   - drinking fountain;
   - telephone outlets;
   - cable television connections;
   - bulletin boards;
   - trophy case;
   - storage cabinets and closets; and,
   - computer work stations.

2. Dispatch/Communications
   - wall space for maps and bulletin boards;
   - traffic light control;
   - fire alarm controls;
   - telephones;
   - radios;
   - writing space (drawers for forms);
   - computer-aided dispatch operations;
   - chalkboards;
   - antenna conduit to roof area;
   - three-way switches;
   - fuel pump switches;
   - low maintenance flooring; and,
   - acoustical considerations.

3. Kitchen
   - stove of adequate size;
   - tables and chairs;
   - refrigerator;
   - double sink;
   - adequate cabinets;
   - effective ventilation;
   - low maintenance flooring;
   - food lockers; and,
   - broom closet.

4. Multipurpose Room
   - screen for films, slides, etc.;
   - special lighting;
   - good acoustics;
   - separated by doors from rest of facility;
   - blackout capability for films, etc.;
   - ventilation fan;
   - cable television connection;
   - chalkboard;
   - tack board or strips for displays;
   - furniture storage; and,
   - coat rack.

5. Station Officer's Room
   - lockers;
   - telephone;
   - furniture; and,
   - computer work station.

6. Apparatus Area
   - floor sloped for water drainage, drain under each vehicle; drains should empty into a separator(outside of building)
   - floor smooth enough to clean but rough enough to prevent slipping;
   - apparatus doors at least 14 x 14; 12 x 12 can be used but remember that an 8 foot vehicle with 14" mirrors on each side will leave only a 6" clearance;
   - separate heating system;
   - radio-controlled door controls next to doors;
   - a mop sink;
   - an emergency shower and eye wash;
   - electrical connections for battery chargers;
   - electrical connection for hose dryer;
   - a dryer room for protective clothing, salvage covers, etc.;
   - space for sliding pole, if required;
   - high scoff board for ladder training;
   - drinking fountain;
   - motor operated doors with manual override;
   - duct system for vehicle exhaust;
   - large slow moving ceiling fans; and,
   - air line for apparatus brakes, if required.

7. Workroom
   - workbench at least 8' long;
   - storage cabinets;
   - washer/dryer;
   - tools;
   - large capacity duplex outlets;
   - floor drain; and,
   - exhaust fan.

8. Hose/Training Tower
   - drying racks;
   - power or manual hose-raising machine;
   - floor drains;
   - waterproof lights, outlets and switches;
   - standpipe;
   - sprinklers on one floor (for training);
   - wood surfaces where ladders are used;
   - ventilation (gravity and power);
   - regular stairways if training area, or ship's ladder to roof with oversized door (use safety cage around flat wall ladder if tower used only for hose);
   - safety rails in hose hanging area;
   - roof designed for walking;
   - safety rope holder on roof ("O" ring);
   - drains on each floor;
   - minimum window openings of 3.5' x 5.5' (if used for training); and
   - two doors at ground level (if attached to fire station); one leading to the inside of the building and the other to the outside.

9. Dormitory
   - separations (4 feet) between beds;
   - ventilation fan with timing switch;
   - area for cleaning supplies;
   - located away from public area;
   - linen storage area; and
   - large lockers.

10. Showers/Toilets
    - floor drains;
    - separate male/female facilities;
    - low maintenance walls and floors;
    - ventilation fans on timers;
    - benches in locker area;
    - drinking fountain;
    - water restrictors on shower heads; and
    - wall-hung water closets for easy maintenance.

11. Lounge
    - cable television connection;
    - television and V.C.R.;
    - furniture; and,
    - bulletin boards.

12. Repair Garage/Area
    - large storage area for tires, etc.;
    - vehicle lift;
    - workbench;
    - tool storage;
    - space for special equipment; and,
    - compressor.

13. Outside
    - curbs;
    - cement pad by fuel pumps;
    - electrical outlets;
    - cement p[ads in training areas where ladders will be used; and,
    - drains and catch basins.

14. Miscellaneous
    - key system or coded locks;
    - doorbells;
    - electrical outlets high on walls for clocks;
    - water faucets inside apparatus area and outside building; and,
    - separate exercise room near shower/locker area.

FIRE STATION PROPERTY

Some questions to consider:

- is the property on solid ground or does it need fill ?
- would the building need pilings ?
- if the property was previously filled, is the material clean or does it have material that might later rot and settle ?
- is the property subject to flooding or water run-off ?
- has a core drill sample been considered ?
- has the location been considered as it relates to present and future traffic conditions ?

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