

City and Borough of Juneau

Urban Avalanche Response Plan

February 2004



Response Sequence of Events

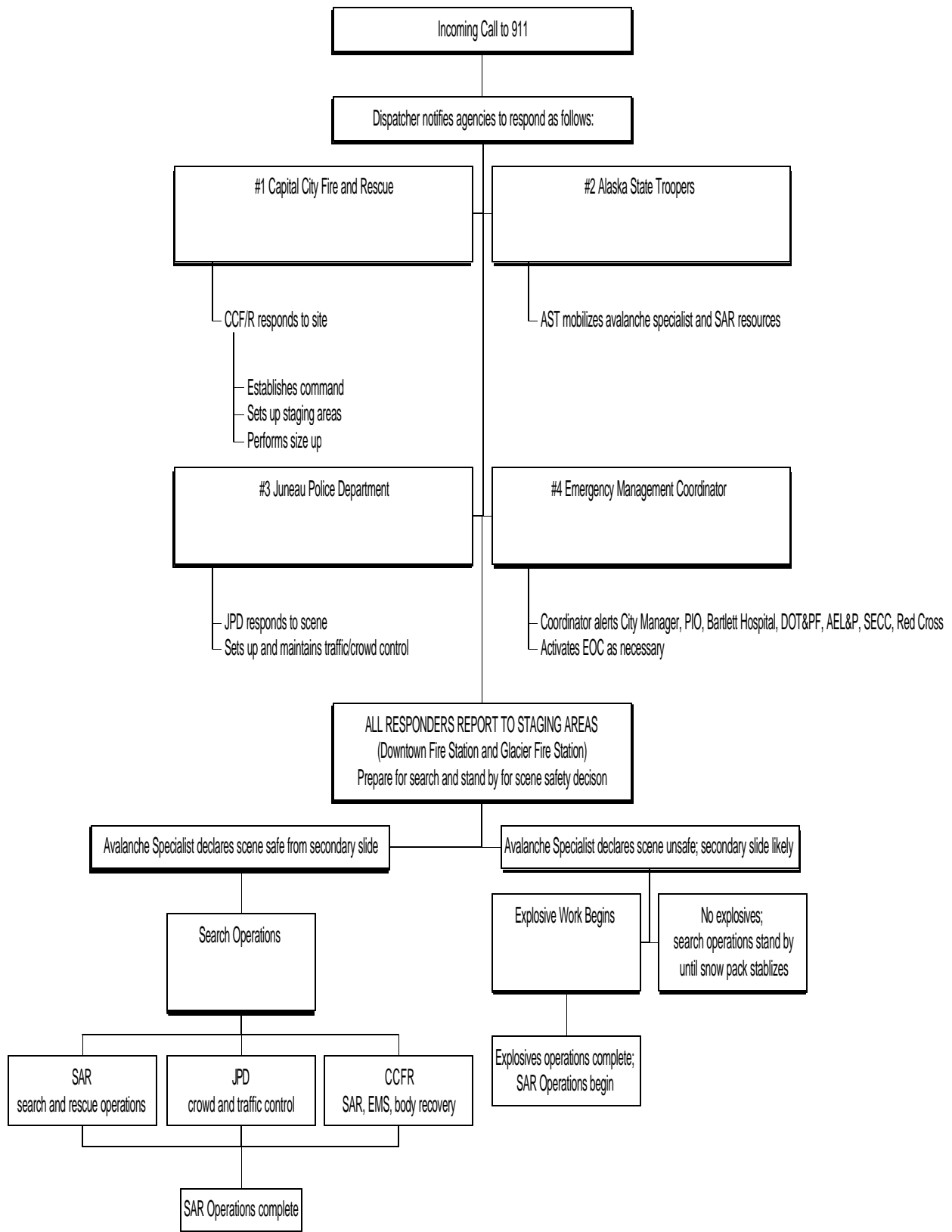


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I. PURPOSE

The CBJ Urban Avalanche Response Plan outlines the City's procedures for managing an avalanche event that impacts residential areas and infrastructure of the City of Juneau. The plan identifies departments, agencies and individuals that are directly responsible for emergency response and critical support services. It provides a management structure for coordinating and deploying essential resources following that of the nationally recognized Incident Command System.

II. SITUATION

A. Background

Avalanches are of special concern to Juneau because parts of the city are located directly beneath avalanche paths. National experts consider Juneau one of the largest municipal avalanche hazard areas in the country because of the combined threat from the Behrends and White paths as well as the many paths that empty onto Thane Road. Avalanches have hit, damaged or destroyed at least 72 buildings within a 10-mile radius of downtown Juneau in the past century.

There are 62 houses, 1 hotel, 2 sections of the Egan Expressway, a number of streets and roads, parts of the Flume, and much of Aurora Basin boat harbor in mapped avalanche zones. There are 40 houses in the severe hazard zone and 22 plus the hotel in the moderate hazard zone.

Avalanches from these paths have very high destructive potential. No historical avalanche has reached the destructive potential of its path. It is likely that 100 to 300 year events have not yet occurred in the relatively short time since the town of Juneau was established.

A 100 to 300 year avalanche event could easily destroy most buildings in the avalanche zone, sweep cars off the highways, and damage or destroy boats in Aurora Basin. Such large slides could also block the Glacier Highway and the Egan Expressway at the White and Behrends Avenue paths, hindering emergency response and possibly blocking road access to the hospital. Large slides can also occur on Thane Road and in heavily used areas near Basin Road.

B. Path Details

1. Path Descriptions

Path	Details
White Subdivision Paths	3.6 year return interval. Endangers 20 houses (9 in severe hazard zone) as well as several streets, including Glacier Highway and Egan Drive.
Greenhouse	Not mapped as affecting houses or roads, but several accounts report it reaching Glacier Highway in the 1930s.
Behrends Avenue	14.4 year return interval. Less frequent than White Paths, but larger. Endangers 42 houses (31 in severe hazard zone) 1 hotel, and Aurora harbor as well as Glacier Highway and Egan Drive.
Gold Creek – Mt Juneau (multiple paths)	Bathe Creek, Flume, Gnarly, Chop Gully, Green Weenie, and Sunshine Paths. Affect the Flume, Basin Road, and lower Perseverance Trail.
Gold Creek – Snowslide Gulch	Most frequent running large path in the area; affects Gold Creek and the A-J Mine drainage tunnel, dusts Perseverance Trail and the Mining Museum footbridge. Can run big late in the season; dammed Gold Creek 5/28/01.
Unmapped (multiple paths)	Unmapped paths above Gastineau Avenue and South Franklin Street. Currently mapped only as mudslide areas, but may produce snow avalanches when there is substantial snowfall at low elevations.
Thane Road (multiple paths)	19+ paths; Snowslide Creek has 1.2 year return interval; powerlines are now underground there; Middle & Cross Bay Creek Paths also notable. Has DOT&PF explosive avalanche reduction program with 105mm howitzer fired from near Sandy Beach, but has no forecasting. Dusted school busses twice in February 2002.

2. Avalanche Path Maps

See next three pages for maps.

In an avalanche response, all avalanche zones (both Severe and Moderate/and Special Engineering) must be avoided until an avalanche specialist clears scene safety.

Adapted from 1992 CBJ Mears-Fesler Report





C. Resources

1. Primary Avalanche Responders

Numbers vary constantly, but the key avalanche response groups have a total of about 45 highly trained avalanche responders. At any given time, that means there are probably about 30 of these highly trained searchers who are in town and able to respond.

a. Capital City Fire and Rescue

- i. 12 Rope Rescue Team responders
 - 5 at Level I
 - 7 at Awareness and Rescue level
 - All are trained as either Emergency Trauma Technician (ETT) Emergency Medical Technician (EMT) I or II or Paramedic (MIC-P)
 - 10 certified for high/low angle rescue
- ii. 38 Volunteers (current fire fighters)
 - 20 with Awareness level training
 - 10 ETT
 - 21 EMT I
 - 5 EMT II
 - 2 EMT III
 - 2 MIC-P
- iii. 35 career staff (fire fighters) plus Fire Marshal and Chiefs
 - 3 EMT I
 - 4 EMT II
 - 19 EMT III
 - 9 MIC-P

b. Ski Patrol

- i. Eaglecrest Professional Ski Patrol
 - 7 patrollers
 - All avalanche trained Level I or higher
 - All EMT or Outdoor Emergency Care (OEC) trained
 - 2 Wilderness First Responder (WFR) trained
- ii. Juneau Volunteer Ski Patrol
 - 20 patrollers with OEC training
 - 15 avalanche Level I or higher trained
 - 15 with avalanche gear

c. Juneau Mountain Rescue

- 21 members
- 15 certified by the Mountain Rescue Association
- 15 avalanche Level I trained
- 3 EMT or higher trained
- 1 ETT
- 5 associate members

d. SEADOGS

- 6 members
- all ETT trained
- 1 WFR trained
- all Level I avalanche trained
- two avalanche search dogs

e. Southeast Alaska Avalanche Center

- 1 professional avalanche specialist on staff, Level III, WFR and ETT trained
- 1 student intern, WFR and Avalanche Level II trained.

2. Avalanche Equipment

a. Capital City Fire and Rescue (evenly distributed throughout CBJ)

- 2 ladder trucks: 1-100' & 1-75' each with its own generator, each with remote lighting on the end of the ladder.
- 6 portable generators and lighting/cords
- 12 shovels
- 6 snow shovels
- 20 axes
- 1 utility rope
- Numerous rescue ropes
- 6-8 transceivers
- 6 collapsible snow probes
- 24 12' steel snow probes
- 8 pieces of 4' x 1" rebar to use as snow anchors
- 300' webbing
- Numerous tools to cut and remove wreckage
- 1 Haagland track vehicle
- 2 mass casualty incident trailers, each equipped to treat 100 people
- 4 transport vehicles with Advanced Life Support (ALS) capability
- 1 Chevy Tahoe command vehicle
- 1 R1 equipment vehicle with indoor lighting and work area
- Heated staging unit with rope and water rescue and air packs

- Handheld radios for every 4-5 CCFR personnel
- b. Ski Patrol**
 - 12 beacons
 - conduit (14 ft) probes - 10 probes at base area, 30 at top of mountain
 - 6 toboggans
- c. Juneau Mountain Rescue**
 - all responders self-equipped with avalanche gear
 - rope rescue gear and wheeled litter
- d. SEADOGS**
 - all responders self-equipped with avalanche gear
 - 2 avalanche search dogs
 - handheld radios for SEADOGS responders
- e. Southeast Alaska Avalanche Center**
 - 12 beacons
 - 10 probes
 - field and avalanche gear for SAAC responders

III. ASSUMPTIONS

- A.** Responders understand and work under ICS.
- B.** A CBJ designated qualified avalanche specialist will make a scene safety decision before search efforts within the avalanche zone can begin. The avalanche specialist may halt rescue efforts in the avalanche zone if the scene is not safe, and will go directly to the scene, with or in advance of the first search team.
- C.** Large avalanche cycles are caused by weather that is also likely to hamper search efforts. Roads may be blocked, hypothermia may become a threat to searchers, the scene may become icy or wet or otherwise slippery, and transportation from other communities may be interrupted, making additional resources unavailable. Multi-day search and/or cleanup efforts may be hampered by additional periods of high avalanche danger.
- D.** Rescuer safety is the top priority. There will be strong social, political and economic pressure to violate that rule and rush in without delay. Crowd control may be difficult, yet safety must not be compromised.
- E.** The response may need many properly equipped volunteers. Volunteer screening and management will be an important aspect of response.

IV. CONCEPT OF OPERATIONS

A. Scene Safety

The number one rule of any kind of Search and Rescue is that the safety of the rescuers comes first. Stop and evaluate before you act. Do not risk live and healthy people for victims who may very well be dead already.

1. Secondary Avalanches

The key difference between avalanche rescue response and most search and rescue (SAR) activities is that scene safety is much harder to evaluate. Additional avalanches are the norm, and risk to searchers is likely to be high.

Pressure to rush in and begin search efforts before rescuers' safety can be assured must be resisted. It is likely that the starting zone will be only partially released and still dangerous, and that the weather will be bad, which means the starting zone will not be visible for evaluation, there will be rapid loading, and secondary slides will probably occur.

2. Avalanche Specialist

CBJ designated qualified avalanche specialist must make a scene safety decision.

If avalanches have already cleaned out any unstable snow that might remain above to threaten searchers, the avalanche specialist can allow search efforts to begin immediately. But if the avalanche specialist believes a substantial threat remains, explosive avalanche reduction work must be done to release remaining potentially unstable snow above the search area before large-scale search can begin. If explosive avalanche reduction work cannot be done, searchers must wait until snow stabilizes before beginning the search.

All CBJ designated avalanche specialists will be notified in the event of an urban avalanche. If none of the primary avalanche specialists are available, the Eaglecrest Professional Ski Patrol will send the most qualified individual to the scene to perform duties of avalanche specialist.

3. Additional scene safety considerations

- a.** Searchers must stay outside the severe and moderate hazard/special engineering avalanche zones as indicated on the accompanying maps until the CBJ designated avalanche specialist has cleared scene safety.

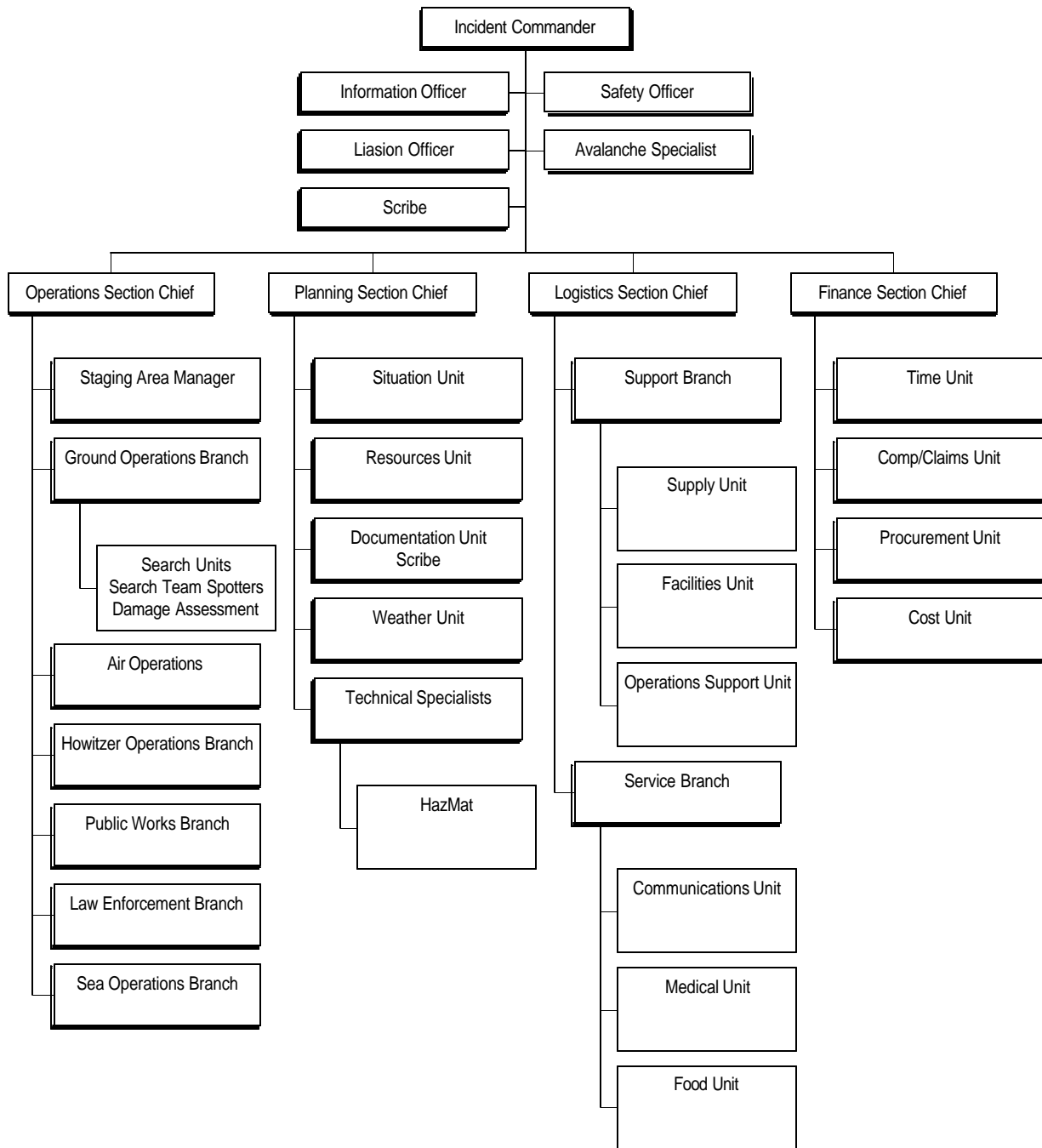
- b.** In addition to secondary avalanches, hazards to searchers may include:
 - Unstable buildings
 - Broken glass
 - Torn metal
 - Splintered lumber
 - Falling into cavities
 - Live electrical wires
 - Agitated pets
 - Propane, fuel oil, other hazardous material
 - Ignition sources
 - Fire or explosion
 - Hypothermia
 - Darkness or poor visibility
 - Working around heavy equipment
 - Unstable, icy footing
- c.** Expect all the hazards of urban disaster SAR, compounded by snow and bad weather.
- d.** Searchers will need reminders of the special hazards, and appropriate protective clothing and equipment.
- e.** Most search efforts will require lighting.
- f.** Some areas may only be accessible to teams with specialized training and equipment for the hazards presented.

4. Explosive Avalanche Reduction Work

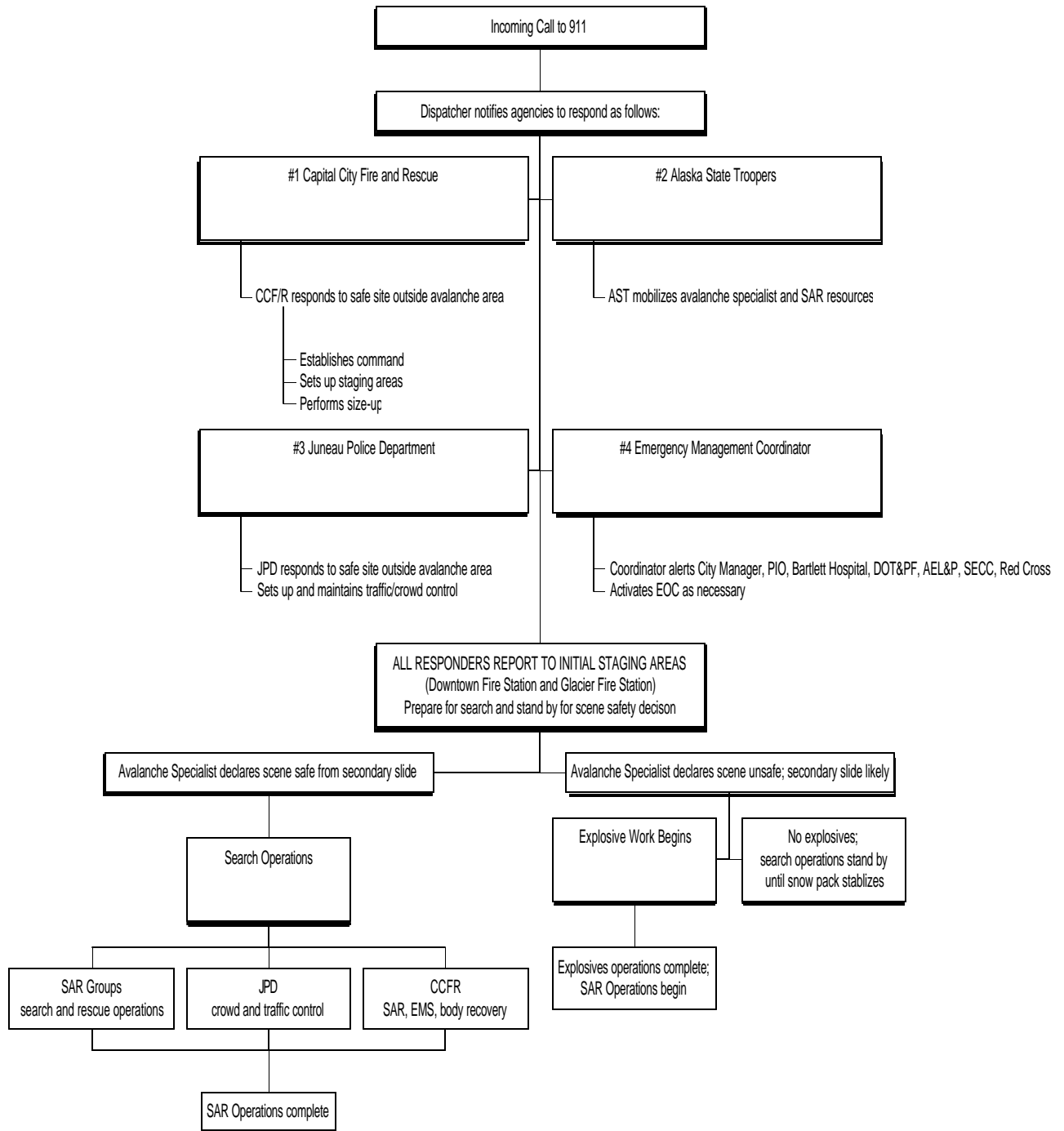
- a.** Explosive avalanche reduction work above structures cannot be done as a preventive measure. It is only done when necessary to protect the safety of rescuers responding to an avalanche that has already hit occupied areas, as an alternative to waiting for the snow to stabilize on its own, which may delay search efforts for days.
- b.** All houses in the runout, as defined by the mapped avalanche zones, must be evacuated before any explosive avalanche reduction work can be conducted.
- c.** Helicopter placement of explosives is a flexible and workable method, but is only suitable when flying conditions allow it. It usually takes three hours or more to mobilize and complete explosive procurement, assembly, and delivery.
- d.** The State Department of Transportation and Public Facilities (DOT&PF) 105mm howitzer is likely to be the only tool usable for explosive avalanche reduction work much of the time, if it is available.

B. Response Organization

1. Response Organization Chart



2. Urban Avalanche Sequence of Events Chart



Note: If JPD Dispatch Center is down, use Glacier Fire Station alarm room to activate pagers and radio communications. A copy of the Avalanche Response Notification Sheet will be posted at Glacier Station.

C. Incident Command

The Incident Commander(IC) is the person in charge of the incident and must be fully qualified to manage it. Initially, the Incident Commander will be the senior first responder to arrive at the scene, but as more responders arrive command will transfer to CCFR . As the situation grows, the IC may have one or more deputies from the same agency or different agencies. His/her command staff includes an Avalanche Specialist.

The Incident Commander will determine the need for a separate Operations Section at an incident or event. Until operations is established as a separate section, the IC will have direct control of tactical operations. Once activated, the IC will assign an individual as the Operations Section Chief for each operational period. The Operations Chief will be the most qualified person to control tactical operations.

D. Communications

1. Use 155.790/161.30 MHz (AST 1/Trooper F1) for the Command and Control frequency.
2. Use agency frequencies and alternate communications methods as much as possible for communications within groups, to keep Trooper F1 clear.
3. Use a portable multi-channel repeater if available
4. Amateur Radio Emergency Services may be activated through CBJ Emergency Operations Center or by Emergency Management Coordinator if EOC is not in operation.

V. ROLES AND RESPONSIBILITIES

- A.** Checklists for Incident Command, other roles, and gear

1. Incident Command Summary Sheet

Incident Command is responsible for a safe and efficient response. The size and complexity of the Incident Command System (ICS) structure will depend on the nature of the event. Responsibilities may be delegated to many or handled by a few, as required. Duties include:

- Establish Incident Command Post.
- Establish field staging areas. The initial staging areas are located at the Downtown Fire Station and the Glacier Fire Station.
- Initiate, develop, and oversee ICS organizational structure so tasks can be delegated; incorporate all responders into ICS system.
- Coordinate closely with Avalanche Specialist regarding scene safety.
- Maintain a log of events.
- Oversee strict accounting for all searchers and equipment, including check-out and check-in at staging area. Use T-cards, firefighter's personnel accountability system and driver's license.
- Screen volunteers for fitness, gear, and training, and deploy as appropriate.
- Ensure Communications Plan provides communications among all responders.
- Arrange for support including personnel and logistics.
- Establish shelter and logistical support centers for responders if prolonged operations are anticipated. Centennial Hall, the Armory, Harborview School, and the churches are the best sites on the town side. On the Valley side, Dzantiki Heeni Middle School, Floyd Dryden Middle School, and the churches are the most likely locations.
- Establish mortuary site.
- Conduct briefings as needed.
- Arrange for transport and medical care of victims.

- Demobilize and debrief personnel, and arrange for critical incident stress debriefing. All body recoveries or rescues involving serious injuries should have a Critical Incident Stress Debriefing within 36 hours.
- Complete and file full report.

2. Field Operations Chief Summary Sheet

Operations Chief is in charge of onsite operations. The Operations Chief is selected by the Incident Commander.

Key responsibilities include:

- Maintain communications with spotters.
- Establish alarm sound or code to alert searchers to dangerous conditions.
- Ensure that the avalanche specialist clears scene safety before teams enter the avalanche zone.
- Carry out evacuation if necessary for explosive avalanche reduction work. Only put enough rescuers in hazard zone to accomplish their mission.
- Ensure that a qualified engineer, architect, or inspector evaluates safety of damaged buildings before teams enter. (CBJ Damage Assessment teams available through Engineering Department).
- Verify is power off.
- Organize and deploy teams for efficient search once go-ahead is given.
- Conduct interviews with survivors, witnesses, family, friends, and neighbors. Delegate to supplementary interviewers as necessary.
- Maximize use of witness, survivor, neighbor, and friend information, and ensure that those people are cared for and equipped as needed. Use interview information to target search efforts.
- Communicate with Incident Commander and Emergency Operations Center.
- Coordinate support needs with Incident Commander and EOC.
- Establish snow and debris dispersal locations.
- Set up gear caches, helicopter landing zones (LZs), travel routes, escape routes, alarm methods, and carry out other onsite layout duties.

- Map, sketch, and photograph scene. Mark all clues, victim locations, and relevant features.
- Direct search operations.
- Brief arriving teams.
- Ensure that searchers have appropriate safety, search, and protective gear before entering the avalanche zone.
- Arrange safe extrication, care, evacuation, and transport of victims.
- Keep strict accounting and log of all searchers and equipment onsite.
- Ensure all searchers are accounted for.
- Ensure victims accounted for as well as possible.

3. First Responder Summary Sheet

- If you are the first person on the scene of a fresh urban avalanche, stay out of the slide path and call 911 to initiate response.
- Wait for the avalanche specialist to arrive on scene to determine scene safety.
- Serve as Site Command until relieved by the first arriving Team Leader or Site Command replacement.
- Help keep people out of the avalanche zone until scene safety can be assured, and help alert residents to the need to evacuate.
- Interview any survivors, witnesses, neighbors, and friends for key information to help organize and target search efforts.
- Assist any victims who can be helped without entering the slide zone.
- Be prepared to assist evacuation of the avalanche zone if explosive avalanche reduction work is necessary.
- Prepare to assist search efforts if possible.
- Brief the first Team Leader or Site Command when they arrive and relieve you, and join search efforts as directed.
- Have driver's licenses availability for accountability purposes.

4. First Responding Team Summary Sheet

- Wait for the avalanche specialist to arrive on scene to determine scene safety, if the specialist is not with your team or already on site.
- Help keep people out of the avalanche zone until scene safety is assured, and help alert residents to the need to evacuate
- Coordinate with JPD.
- Serve as Site Command until relieved.
- Establish safest travel and escape routes.
- Interview any first reporters, survivors, witnesses, neighbors, and friends for key information to help organize and target search efforts.
- Assist any victims who can be helped without entering the slide zone.
- Initiate evacuation of the avalanche zone if explosive avalanche reduction work is necessary.
- Ready and organize ICS structure and teams while waiting for scene safety clearance.
- Plan how to best target search efforts.
- Once the avalanche specialist gives the go-ahead, initiate the search plan, targeting the most-likely areas.
- Maintain good communication with all team members.
- Conduct targeted initial search.
- Communicate operations status to Field Operations Chief.
- Brief arriving teams.
- Ensure safe return of team members and gear.

5. Team Leader Summary Sheet

Team leaders may be assigned varying missions. Teams may be made up of members of one organization, or combined from various organizations. All teams operate under the ICS-designated leadership. General duties include:

- Screen searchers and record their names.
- Account for safety of all searchers.
- Ensure that all team members are fit, have necessary skills, and are attired and equipped for the conditions and the task.
- Communicate with Site Command.
- Communicate plan and instructions clearly to all Team Members.
- Instruct and brief all Team Members as necessary.
- Choose the most effective search methods.

6. Team Member Summary Sheet

Coordinate with and report to the Team Leader. Teams may be made up of members of one organization, or combined from various organizations. All teams operate under the ICS-designated leadership.

- Assemble at initial staging areas.
- Review check-in/check-out system to maintain strict accountability for each searcher's whereabouts.
- Have driver's license ready for accountability purposes.
- Maintain nutrition and hydration to serve effectively and safely.
- Communicate clearly and cooperate with other Team Members and Team Leader.
- Assist Team Leader as needed.

7. Scribe Summary Sheet

- Record radio and communications including time, and source of communication, and all events during the rescue.
- Assist the Incident Commander as required.
- Be sure to record this key information:
 - Time of report
 - Location of accident
 - Time of accident
 - Reported by
 - Witnessed by
 - Number of victims involved
 - Number of vehicles involved
 - Brief description of the incident

8. Gear Checklist

a. Each pack should contain:

- 1 beacon
- 1 probe
- 1 shovel
- 1 headlamp
- 1 field book & pencils
- 1 winter first aid kit (including heat packs)
- 1 bivouac bag
- 1 roll flagging
- 4 glow sticks
- 2 road flares
- 1 roll duct tape
- 1 rolls electrical tape
- 10 wand markers (flagged 1m/3', bamboo or wire)
- 1 whistle
- 1 pair 30" mountain snowshoes
- 1 set of laminated operational plan summary sheets

b. Additional Gear:

- 1 air horn
- 2 oxygen kits with bag/valve/mask manual resuscitator
- At least 2 handheld radios per team
- Clothing as needed
- Food, water, & hot liquids as needed
- Maps as needed
- Extra batteries

B. Roles of Responding Agencies & Groups

Members of responding agencies may be called upon to participate in almost any aspect of the incident; however general guidelines can be established regarding the roles of responding agencies.

1. Capital City Fire and Rescue

- Establish command
- Conduct scene size-up
- Establish staging areas
- Establish accountability system

- Provide emergency medical services (EMS)
- Assist with ground search procedures
- Conduct victim extrication
- Provide scene lighting

2. Alaska State Troopers

- Notify and mobilize SAR resources
- Reimburse costs of search and rescue after an audit is conducted and the response is found to be necessary and reasonable
- Send liaison to EOC if requested and able.

3. Juneau Police Department

- Establish and secure scene perimeter
- Set up and maintain traffic control
- Set up and maintain crowd control
- Coordinate and direct other personnel that may be called in to assist with above JPD tasks such as National Guard, Public Works, CERT teams

4. CBJ Emergency Management Coordinator

- Activate EOC as necessary
- Notify:
 - City Manager
 - Public Information Officer
 - Bartlett Regional Hospital
 - DOT&PF
 - AEL&P
 - State Emergency Coordination Center

- Red Cross
- Damage Assessment Leader

5. Juneau Mountain Rescue

- Provide qualified and fully equipped avalanche searchers
- Conduct ground searches as directed
- May provide Field Operations Chief and Ground Operations Director.

6. SEADOGS

- Provide qualified and fully equipped avalanche searchers
- Provide and utilize certified avalanche search dogs
- Conduct ground searches as directed
- May provide Operations Chief and Ground Operations Branch Director.

7. Ski Patrol

- Provide qualified and fully equipped avalanche searchers
- Conduct ground searches as directed
- May provide Field Operations Chief and Ground Operations Branch Director.
- Provide primary and/or back-up Avalanche Specialist.

VI. SEARCH PROCEDURES

A. Goals

Organized avalanche rescue has 2 goals, in this order:

1. Keep the searchers safe.
2. Recover the victims.

Everything else just supports Goals 1 and 2, no matter how complex the structure may appear.

B. Scene Rules:

1. No one may enter the avalanche zone until the Avalanche Specialist has determined that the scene is safe. The Avalanche Specialist is the only individual permitted to make the scene safety decision, and his/her decision is final.

Once the scene is declared safe by the Avalanche Specialist, organized rescue efforts may begin.

2. All personnel entering avalanche zones must have a beacon.
3. All searchers entering avalanche zones must have beacons, probes, and shovels

C. Initial Search Procedures

1. Urban Avalanche SAR

- Cover the entire area quickly, searching for obvious clues, visual or auditory finds, and survivors.
- Avalanche dogs are the best tools, if they are available.
- Most urban victims or survivors will not be wearing beacons, but it is possible that some may be. Listen for signals during initial search.
- Do not use heavy equipment on or in snow that may contain a victim.
- Shovel snow by hand onto tarps; use heavy equipment to haul it away.
- Snow disposal location must be located, and should take into consideration contaminants and pollutants as well as health hazards.
- Use frequent quiet periods, where all equipment is turned off, radios are turned down, and searchers are silent, to listen for cries.
- Recognize that urban residents may not all be inside buildings when a slide hits.
- If you don't find people outside buildings with visuals, clues, beacon signals, or dogs, begin probe lines in the most-likely areas. Use fingertip-to-fingertip spacing; probe left, center, and right. Probes are much more effective in debris without building parts.

2. Highway Avalanche SAR

- Determine who is missing, if anyone. Search usually begins only if there is a witness, a visible vehicle part, or if someone is reported overdue.
- Car probe pattern is fingertip-to-fingertip, probe center only. Advance 2 or 3 steps, depending on the size of the missing vehicle.
- Search dogs are particularly valuable.

D. Interviews

- 1.** Interviews with survivors, witnesses, family and neighbors are the principle source of information on who is missing.

2. Interview Form

URBAN AVALANCHE SURVIVOR/WITNESS INTERVIEW FORM

Interviewee Information:

Name _____

Address _____

Phone(s) _____

Current contact information, if different:

Where were you and what were you doing when the slide occurred?

Who do you know is missing?

Where and when were they last seen?

Where were the missing people likely to have been at the time of the slide?

What items were associated with them?

Were they outside a building when caught?

Were they moving or still?

If they were moving, where and how? Walking or running? Driving? Bicycling?

Where did the flow of the slide appear to go from where they were caught?

Did any of the missing have beacons?

SCENE DIAGRAM:

City and Borough of Juneau
Avalanche Notification Tree

