

EMERGENCY RESPONSE PLAN FOR UDOT'S TRAFFIC SIGNALS

Revision: May 6, 2016

Purpose

To formalize the priority, process and plan of emergency response to traffic signals. This includes when immediate response is required, guidelines where battery backup systems should be deployed, and a plan when action should be taken for generator power.

Immediate response

An immediate response is required for the following situations:

- Signal knockdowns.
- Signals operating in flashing mode.
- Fallen or Hanging traffic signal(s) and/or pedestrian signal head(s).
- Twisted heads over 30 degrees or causing confusion to conflicting movements.
- Dark signals (after contacting the power company to verify that it is most likely a problem with the traffic signal).
- Stuck signals (after failed attempts are made to place a recall through the central system).
- Exposed wiring.
- Lack of signal indication (e.g. burned out green, yellow, or red) if just one signal head for the phase.
- Signals showing conflicting movements.

In rare cases, UDOT may not be able to address the issue if the UDOT technician's safety is at risk by performing the needed work. Examples of such situations include the following:

- High winds if gusts exceed 30 mph.
- Blizzard conditions or icing roads.
- Downed or whipping power lines.
- Electrical storms.
- Flooding.
- Other similar situations.

Response time and procedures

Safety-critical issues listed above with signal crews three or larger should be attended to within 30 minutes (or sooner) plus travel time 24/7 365 days of the year (meaning that within 30 minutes you should be mobilized and on your way to either the region office to pick up a work vehicle or if you have a work vehicle at home to be in the work vehicle and in-route).

Signal crews with three or more employees shall have a formalized on-call program. If six or more employees are available to assist with the on-call program, then a backup employee can be assigned. The on-call and backup on-call employees will receive on-call compensation as defined in UDOT Policy 05-70. On-call and backup on-call employees while on-call are allowed to garage their vehicles as defined in UDOT Policy 06-02.

An on-call schedule for signal crews three or larger will be prepared at least one week in advance. When contacted by the operator, the on-call employee (if unavailable to answer the call) has 15-minutes to respond back to the operator to let the operator know that you will respond. After 15-minutes of no response, the operator will contact in order (every 15 minutes) the following employees until a response is received:

- a) Backup on-call employee (if program exists in the region).
- b) Signal supervisor
- c) Signal lead technician
- d) Region signal engineer
- e) Signal operations engineer
- f) Region operations engineer

If the on-call signal employee estimates that it will be more than one hour before they can respond to other critical safety issues, or needs additional support, they should contact the employees listed above in order for assistance.

Where to deploy uninterruptible power supply/backup system (UPS system)

Due to the high costs of deploying and maintaining UPS systems, the recommendations below are guidance to help prioritize locations for installation. UPS systems will be installed on a case-by-case basis for all locations. For rural areas, the ADT can be reduced by 25%.

- Intersections with railroad preemption or coordinated with flashing-light signal systems (Utah MUTCD 4D.27).
- Freeway interchanges.
- Complex intersections including but not limited to SPUIs, CFIs, DDIs, THrU Turns, Flex Lanes, and Light-Rail.
- Intersections closer than 1000 feet from another intersection with UPS.
- Intersections where the ADT is greater than 40,000 (30,000 rural) for a single corridor.
- Arterials crossing arterials where the ADT is greater than 30,000 (22,000 rural) for a single corridor.
- Intersections with approaches 50 mph or higher with an ADT greater than 20,000 (15,000 rural) for a single corridor.

Other factors can also be considered in prioritizing where to install and maintain UPS systems, such as:

- Intersections with a history of signal malfunctions due to power quality or reliability issues.
- Intersections near fire stations (within 1200 feet).
- Intersections over capacity during peak hours with a heavy directional traffic flow.
- Intersections with split phasing or where the right-of-way assignment is difficult for a four-way stop operation.
- Intersections where CCTV coverage during power outages is important (However, all of the network switches at the intersections along either the primary or secondary channel will also need to have power).
- Intersections with high pedestrian and/or bicycle traffic.
- Intersections where the signal repair response time is excessive.
- Intersections along critical routes to hospitals.

When to use generator power

1) Power outage expected to be 3 or more hours:

Generators should be deployed to the site to restore stop-go operations at all intersections where power is expected to not be restored within 3 hours. During large power outages, locations will need to be prioritized dependent on the available personnel and generators.

During large power outages, place generators at the key locations and proceed down the list as generators are available:

- A) Freeway interchanges.
- B) Complex intersections nearby freeway interchanges.
- C) Other complex intersections as directed by the region signal engineer, signal operations engineer, or region operations engineer.
- D) Other intersections as needed.

2) Power outage expected to be 1 or more hours:

An immediate response (30 minutes or sooner plus travel time) should be made in installing generators at traffic signals to restore stop-go operations for any of the following situations:

- When requested by law enforcement, region signal engineer, signal operations engineer, or region operations engineer.
- Freeway interchanges.
- Complex intersections including but not limited to SPUIs, CFIs, DDIs, ThrU Turns, Flex Lanes.
- During business hours at locations where the cabinet is already equipped with a generator plug and power transfer switch. Response time from available personnel in consideration of the estimated power outage time will need to be considered if an immediate response is justified.

Additional support from non-technical personal, particularly maintenance sheds

This section addresses additional support by staging generators at maintenance sheds and utilizing additional personal, if available. A generator plug and transfer switch can be installed on signal cabinets that will allow for a generator to be connected into the signal cabinet, thus providing power to the intersection during emergencies. Some benefits of a generator plug and power transfer switch are that the time to connect a generator to power the intersection is minimized and simplified, and that it can be done by non-technical people, thus leveraging other resources at UDOT, available personnel, particularly the maintenance sheds.

In shortening response time in responding to intersections with no power and in increasing available personnel, it is desired to store generators at maintenance sheds and allow for the maintenance personnel (if available) to assist in deploying generators at dark signals. The shed supervisors will be contacted directly for assistance when needed. Signal cabinets will be retrofitted by shed boundaries. Once most of the signal cabinets in a shed boundary are retrofitted with the generator plug and transfer switch, the Traffic Management Division will conduct an inventory of generators and if needed, purchase additional generators for the respective sheds. After hands on training, the non-technical personal would follow the instructions below.

SHED	REGION 1	# GEN.
	Region 1 Signals	3
1432	Bothwell	2
1436	Logan	3
1435	Wellsville	2
1423	Brigham City	2
1422	Ogden	3
1421	Clinton	3
1424	Clearfield	3
1427	Centerville	3
	Total:	24

SHED	REGION 2	# GEN.
	TOC	6
2430	Salt Lake	3
2424	Salt Lake West	3
2425	Salt Lake East	3
2432	Murray	3
2433	Cottonwood	3
2431	West Jordan	3
2427	South Valley	3
2423	Tooele	3
2437	Kamas	2
2435	Silver Summit	2
	Total:	34

SHED	REGION 3	# GEN.
	Region 3 Signals	3
3423	Lehi	3
3428	Saratoga	3
3427	Provo/Orem	3
3426	Spanish Fork	3
3424	Santaquin	2
3422	Nephi	2
3431	Heber City	2
3434	Duchesne	1
3435	Roosevelt	2
3437	Vernal	3
	Total:	27

SHED	REGION 4	# GEN.
4459	Wellington	3
4464	Richfield	2
4479	Beaver	1
4452	Monticello	1
4453	Moab	2
4461	Mt Pleasant	1
4463	Salina	1
4476	Cedar City	3
4470A	Tropic	1
4483	Delta	1
4473	Purgatory	4
4472	Kanab	2
	Total:	22

Where to deploy generator plug and power transfer switch

The generator plug and power transfer switch should be installed in existing cabinets at all UDOT intersections as resources allow. The prioritization will occur by shed boundaries.

INSTRUCTIONS FOR INSTALLING GENERATORS AT SIGNALIZED INTERSECTIONS

Note: Only use generators that are approved for traffic signal use. Approved generators have a UDOT sticker placed on the generator stating approval. Using the wrong generator can severely damage the electrical equipment in the signal cabinet and at the intersection, causing thousands of dollars of damage.

Instructions on deploying generators at intersections with plug and power transfer switch

1. Fill generator tank full of gasoline.

2. Secure generator to the ring on cabinet foundation with cable and lock provided. If a ring is not present, secure generator to nearby pole.
3. Plug the extension cord into the generator and flanged inlet (plug) on the signal cabinet.
4. Start the generator and allow it to run until the engine is running smoothly.
5. Open the police panel door of the signal cabinet using the skeleton key provided. Turn the toggle switch from Utility to Generator.
6. Power should be restored to the intersection. Verify that signal heads are on and not in flash.
7. Call the TOC at 801-887-3700 to report that intersection is fully operating on generator power.
8. Refuel generator approximately every 5-6 hours (if using 2000 watt generator with 1 gallon tank). If using a Generac generator, the "time remaining" display will give a good indication when to refuel.

Instructions if intersection does NOT come out of flash mode or traffic signal still dark after power has been restored.

1. Call the Region Traffic Signal Supervisor before you open the signal cabinet door so they can help guide you through the process (R1: Dave Townsend – 801-940-0485; R2: Dave Mount – 801-330-4446; R3: Grant Jackson – 801-830-9546; R4: Graig Ogden - 435-201-4465 or Lee Thompson – 435-590-9976).
2. Using the #2 key provided, open the main signal cabinet door.
3. Check to see if the main breaker in the cabinet (on right side) is tripped. Reset breaker.
4. On the inside door top left is a toggle switch that says, "Cont Equip On". Turn this off for 5 seconds and then back on. Wait 30 seconds for signal to come out of flash.
5. If still in flash, power cabinet back down again by turning off the "Cont Equip On" switch. After 4 seconds of powering back on the switch, push the "reset" button on the SmartMonitor or MMU (electronic equipment next to the signal controller on the right).
6. If it still does not come out of flash, please call the TOC at 801-887-3700 or the Region Traffic Signal Supervisor.

Removal of generator from intersection

When utility power is restored to the intersection, please do the following:

1. Verify that utility power is back at the intersection.
 - a. If nighttime, the street lighting luminaries will be eliminated and nearby businesses/homes will appear to have lights on.
 - b. If daytime, observe the readout on the digital power pedestal. If on, the utility power is present.
2. Open the police panel door of the signal cabinet using the skeleton key provided. Turn the toggle switch from Generator back to Utility.
3. Remove the generator.
4. Remove the fuel or use a fuel stabilizer when storing the generator.
5. Call the TOC at 801-887-3700 to report that the generator has been removed from the intersection and that utility power has been restored.

Generator Plugs on Signal Cabinets

- Signal electricians are few in number and centralized at region headquarters
- Leverage existing resources at maintenance sheds scattered throughout Utah

- Equip sheds with generators
- Shed personnel assist with blackouts
- Much faster response time
- Better use of resources
 - i.e. don't need battery backup systems everywhere

