

Section IX
Traffic Control

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IX. Traffic Control

A. Introduction

This Section describes traffic control operations for the Photogrammetry & Surveys Section (P&S) in rural and urban situations. These traffic control procedures were patterned after the Traffic Control for Roadway Work Operations manual and further consultation with personnel from WYDOT's Traffic Program. The 2011 edition of the traffic control manual is published on the Wyoming Department of Transportation's website. Click on the following link to open the document:

[Traffic Control for Roadway Work Operations - November 2011](#)

It is the objective of P&S that the traffic control procedures described in this section be used as a guide. Every situation is unique with respect to sight distances, project lengths, traffic volumes, work zone locations, etc. Therefore, a certain amount of judgment must be used to evaluate each location to maximize the safety of our employees.

B. Rural Areas

1. Setting Survey Monuments

When setting concrete survey monuments, there are typically two to three vehicles parked near the work zone. However, depending on the width of the r/w or the terrain, survey vehicles may need to be parked just off of the shoulder. One vehicle will be pulling a tool trailer while another will be pulling a flat-bed trailer. Each vehicle utilizes overhead amber lights and a light bar. The work takes between 15 to 30 minutes at each location and should be classified as short duration.



Figure IX-1. Overhead amber lights and light bar

On two-lane highways, two "Survey Crew Ahead" signs will be placed a minimum of 500' beyond each end of the work zone. The signs will be moved throughout the day to keep the work zone between the signs. For lower traffic volumes (2 to 6 cars/minute in each direction) the signs may be placed up to 2 miles apart. For higher traffic volumes (more than 6 cars/minute in each direction) the signs shall be placed up to 1 mile apart.

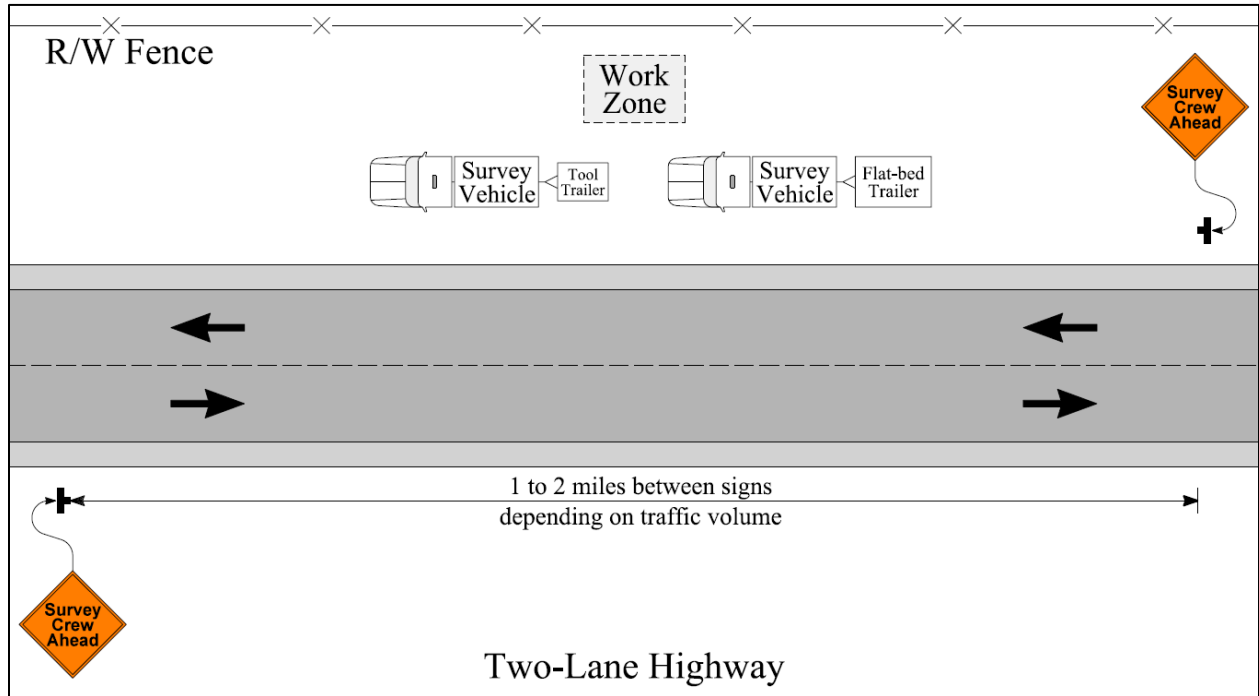


Figure IX-2. Setting survey monuments on a two-lane highway

Traffic Control

On interstates, two signs will be placed a minimum of 750' before the work zone. The signs shall be moved throughout the day to keep the work zone within 2 miles of the signs.

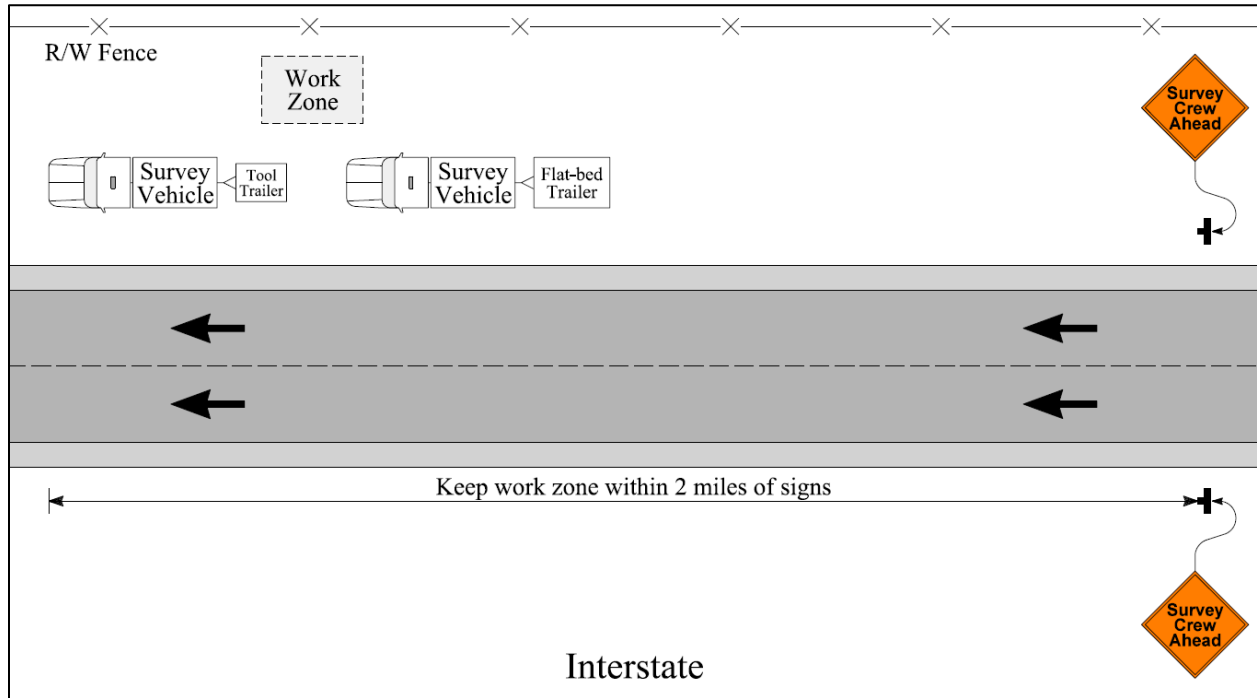


Figure IX-3. Setting survey monuments on an interstate

Note: Because of the height of the tool trailer, vehicles behind the trailer may not be able to see the overhead amber lights or light bar on the survey vehicle. Another survey vehicle should travel behind or park behind the tool trailer.

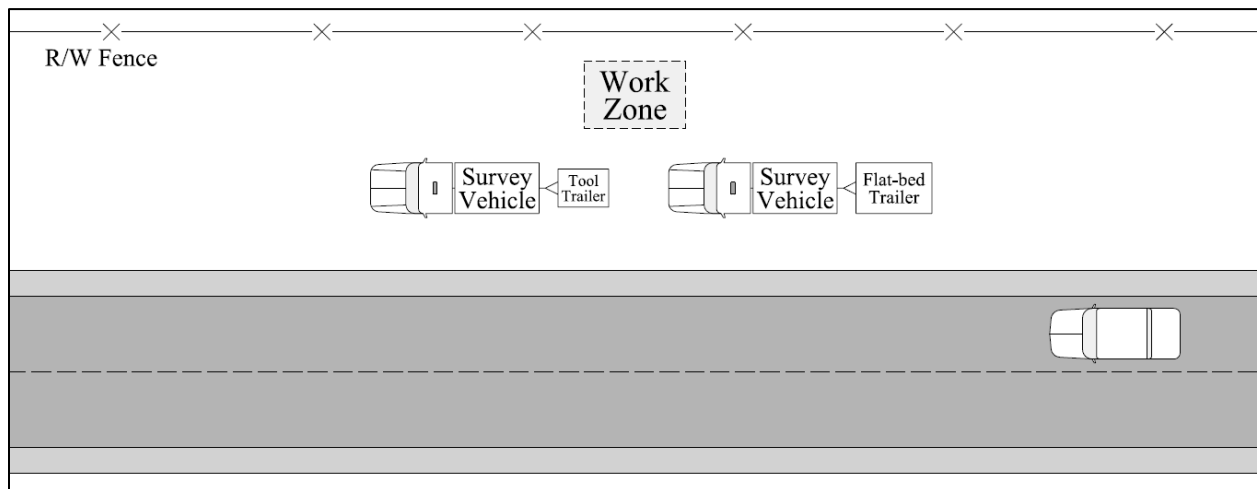


Figure IX-4. Traffic approaching work zone

2. Painting Photo Targets

Flight line targets are typically painted on the shoulder with two legs of the target parallel to the direction of travel. These targets are spaced approximately 1200' apart. One survey vehicle will be parked in front of the work zone while a shadow vehicle is parked behind the work zone to shield the worker(s) from traffic. The shadow vehicle will be parked approximately 50' to 100' behind the work zone. Each vehicle utilizes overhead amber lights and a light bar. In addition, a "Survey Crew Ahead" sign will be mounted on the back of the shadow vehicle. The work takes approximately 5 to 10 minutes to paint each target and should be classified as mobile.

On two-lane highways, two "Survey Crew Ahead" signs will be placed a minimum of 500' beyond each end of the work zone. For lower traffic volumes (2 to 6 cars/minute in each direction) the signs may be placed at each end of the project. For higher traffic volumes (more than 6 cars/minute in each direction) the signs shall be moved throughout the day to keep the work zone within 2 miles of the signs.

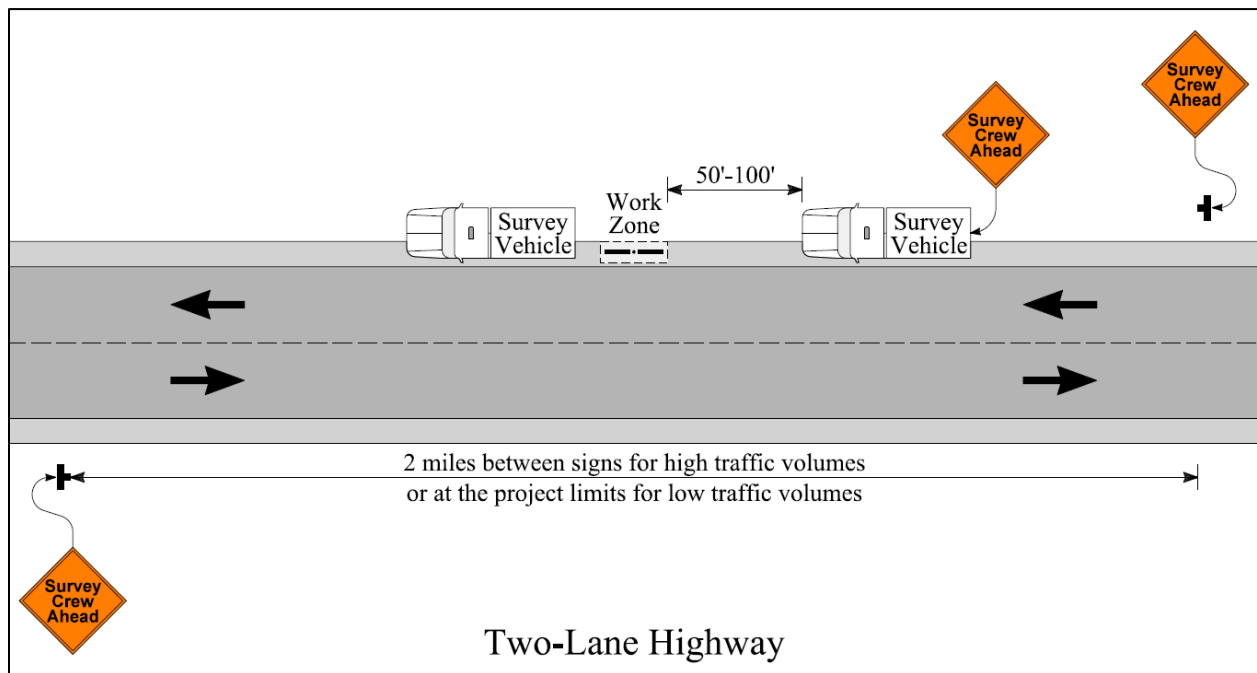


Figure IX-5. Painting flight line targets on a two-lane highway

Traffic Control

On interstates, two "Survey Crew Ahead" signs will be placed a minimum of 750' before the work zone. The signs shall be moved throughout the day to keep the work zone within 2 miles of the signs. In addition, a "Survey Crew Ahead" sign will be mounted on the back of the shadow vehicle.

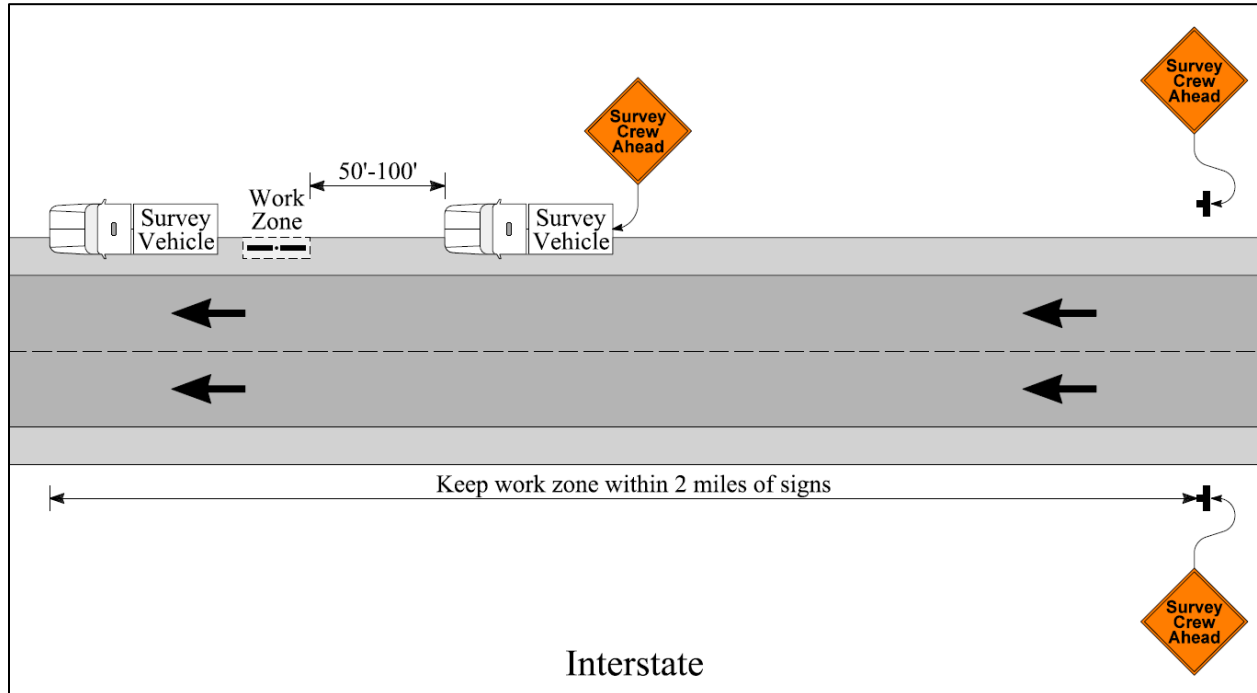


Figure IX-6. Painting flight line targets on an interstate

3. Collecting Project Control Data

When collecting GPS data at project control monuments, a single vehicle will be parked near the work zone. However, depending on the width of the r/w or the terrain, the vehicles may need to be parked just off of the shoulder. Each vehicle utilizes overhead amber lights and depending on the distance from the roadway, a light bar may also be used. The work takes between 15 minutes to 4 hours at each location and should be classified as short duration or short-term stationary.

When working around two-lane highways and the survey vehicle or work zone is within 15' of the traveled way then two "Survey Crew Ahead" signs will be placed a minimum of 500' beyond each end of the work zone. If the survey vehicle or work zone is not within 15' of the traveled way then the signs are not necessary.

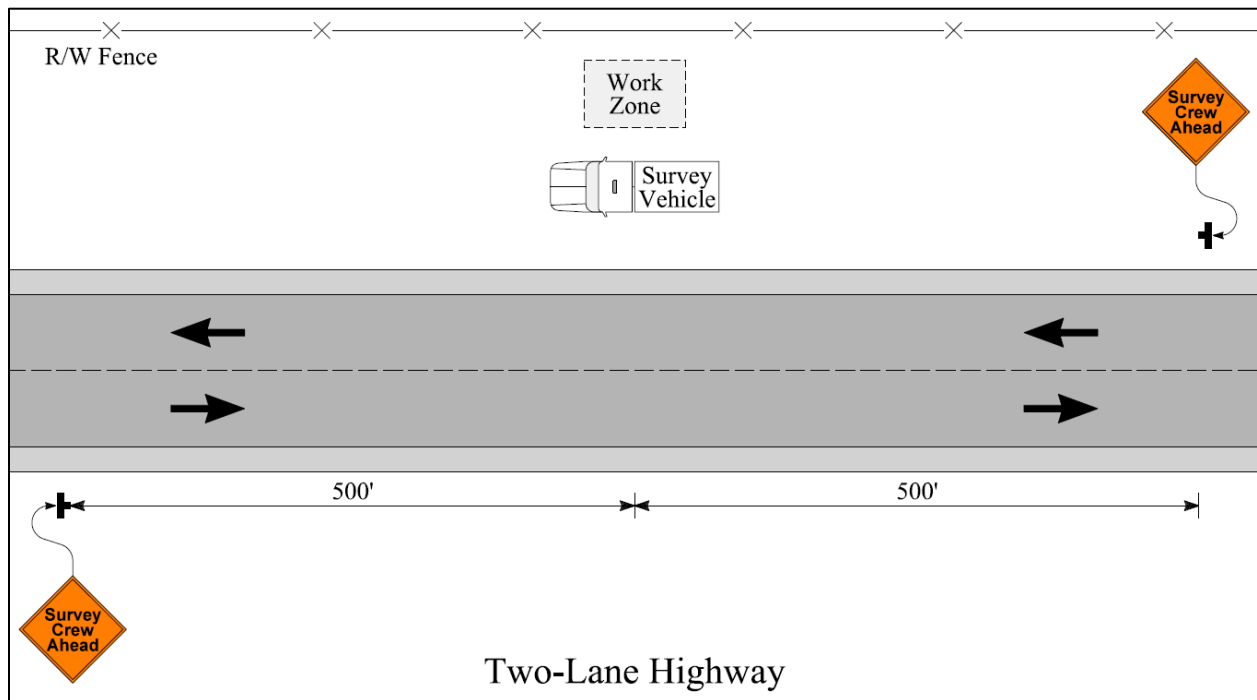


Figure IX-7. Collecting static GPS data on a two-lane highway

Traffic Control

When working around interstates and the survey vehicle or work zone is within 15' of the traveled way then two "Survey Crew Ahead" signs will be placed a minimum of 750' before the work zone. If the survey vehicle or work zone is not within 15' of the traveled way then the signs are not necessary.

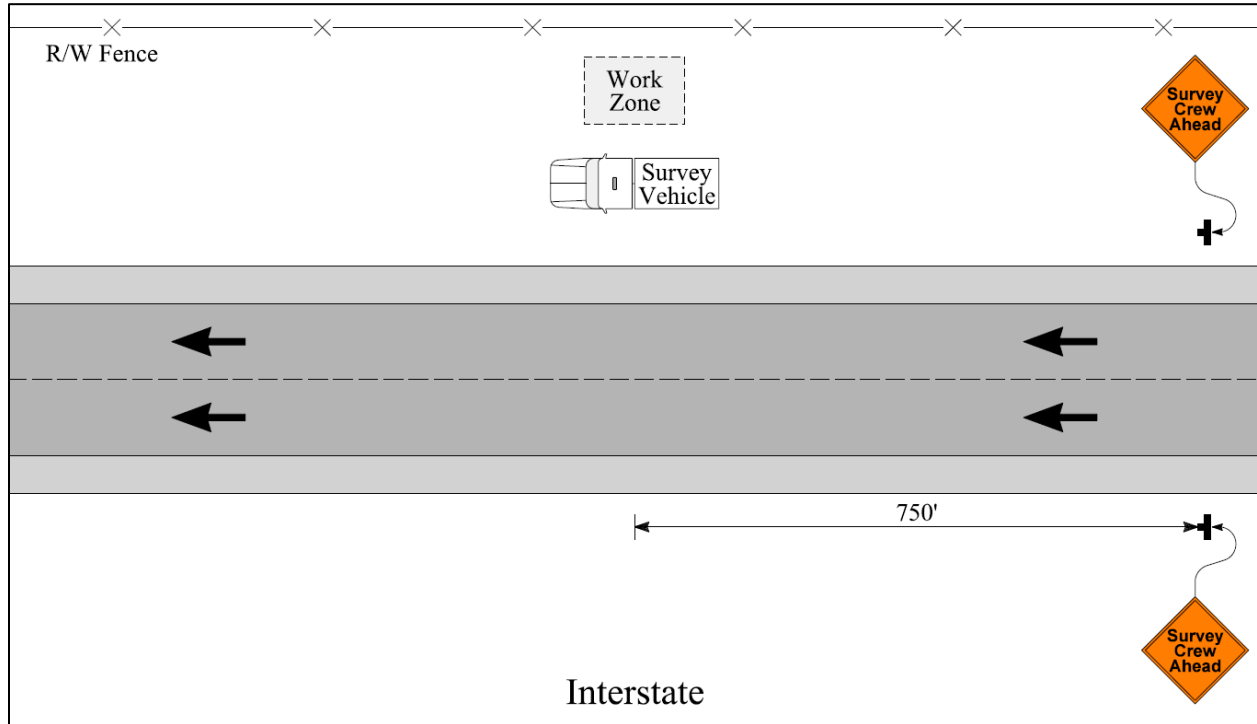


Figure IX-8. Collecting static GPS data on an interstate

For two-lane highways, rapid-static GPS collections will require two "Survey Crew Ahead" signs to be placed a minimum of 500' beyond each end of the work zones. These signs may be placed at each end of the project.

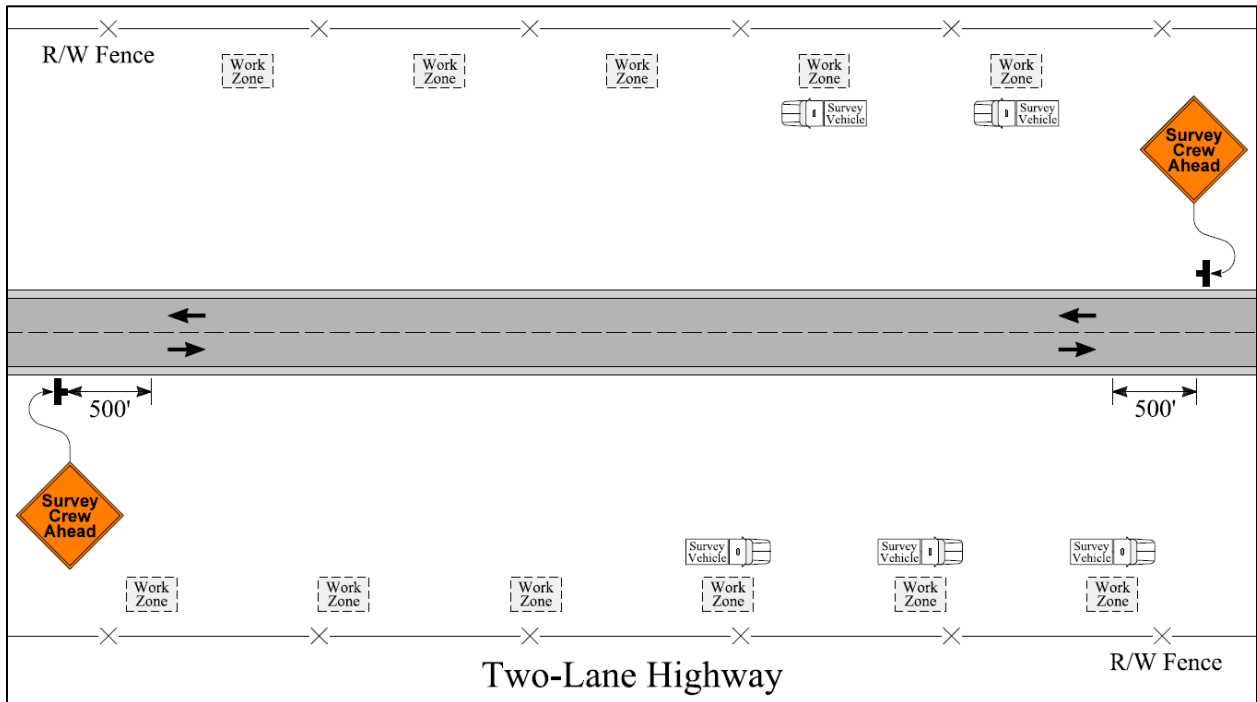


Figure IX-9. Collecting rapid-static GPS data on a two-lane highway

Traffic Control

For interstates, rapid-static GPS collections will require four "Survey Crew Ahead" signs to be placed a minimum of 750' beyond each end of the work zones. These signs may be placed at each end of the project.

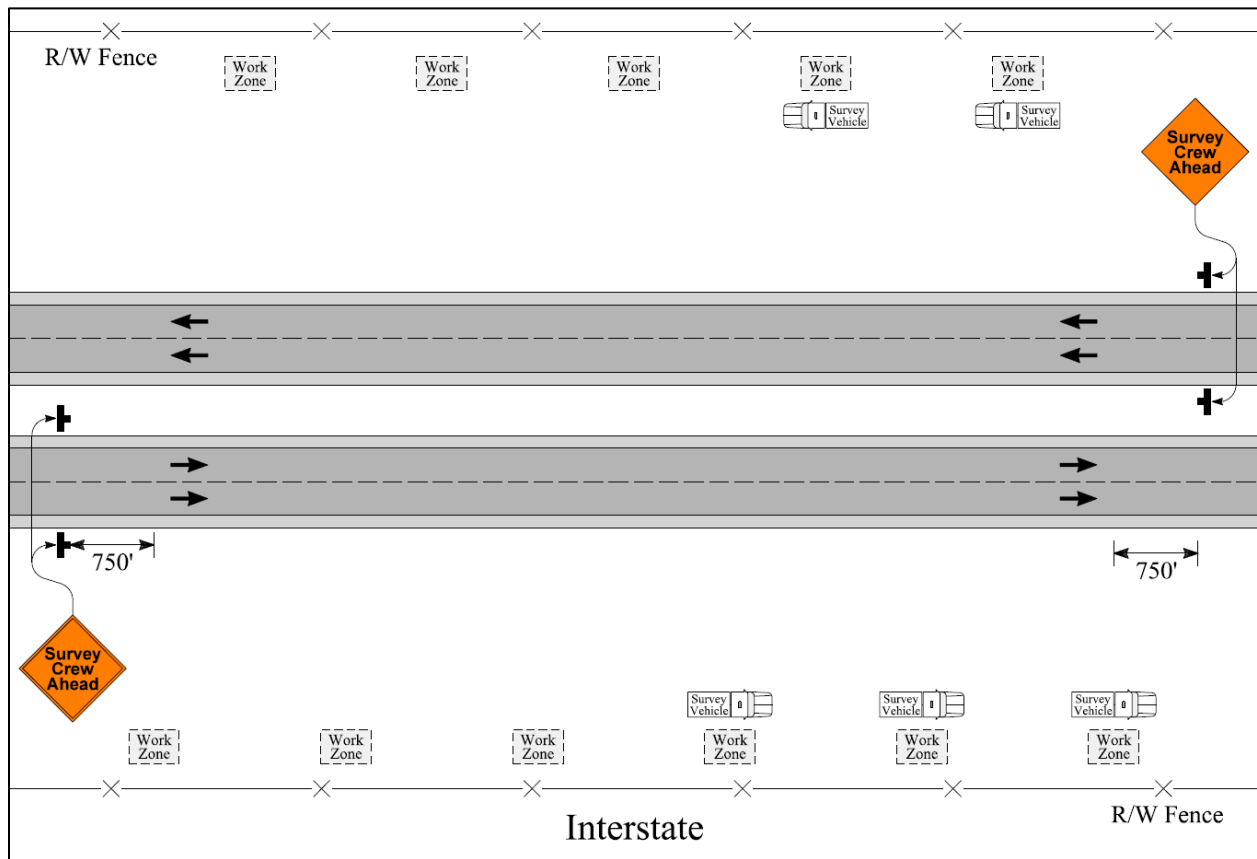


Figure IX-10. Collecting rapid-static GPS data on an interstate

4. Collecting Photo Control Data

When collecting photo control data at targets painted on the shoulder, one survey vehicle will be parked in front of the work zone while a shadow vehicle is parked behind the work zone to shield the worker(s) from traffic. The shadow vehicle will be parked approximately 50' to 100' behind the work zone. Each vehicle utilizes overhead amber lights and a light bar. In addition, a "Survey Crew Ahead" sign will be mounted on the back of the shadow vehicle. The work takes approximately 1 to 2 minutes at each target and should be classified as mobile.

On two-lane highways, two "Survey Crew Ahead" signs will be placed a minimum of 500' beyond each end of the work zone. For lower traffic volumes (2 to 6 cars/minute in each direction) the signs may be placed at each end of the project. For higher traffic volumes (more than 6 cars/minute in each direction) the signs shall be moved throughout the day to keep the work zone within 2 miles of the signs.

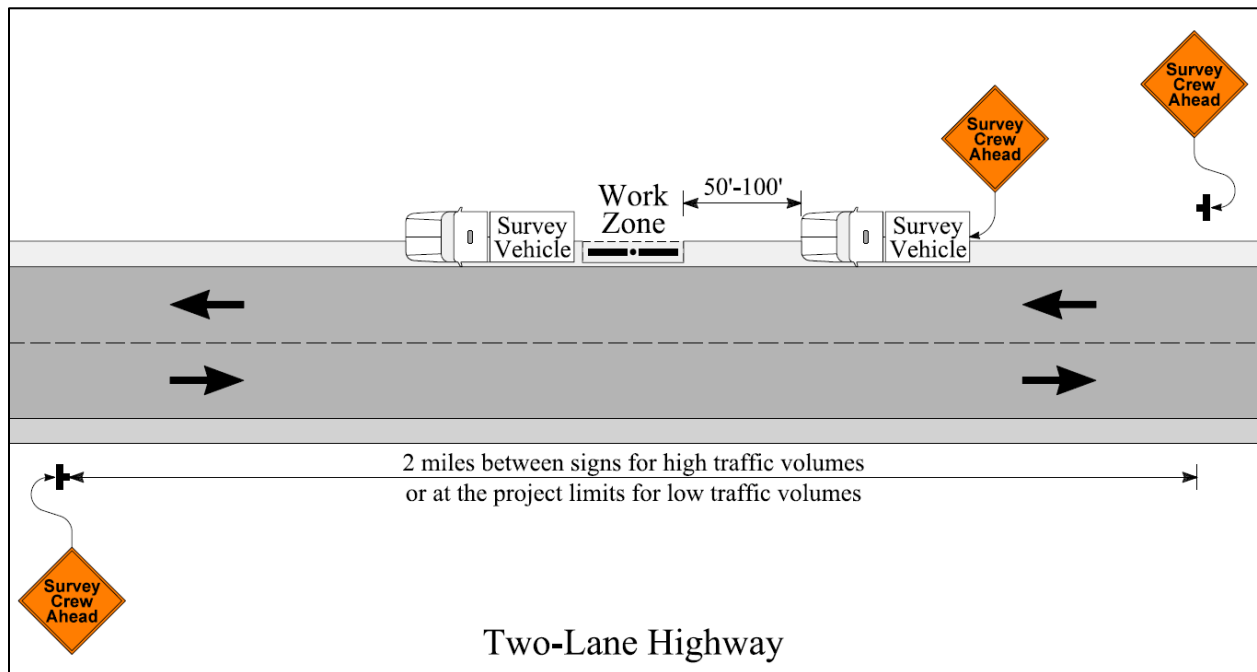


Figure IX-11. Collecting RTK data on a two-lane highway

Traffic Control

On interstates, two signs will be placed a minimum of 750' before the work zone. The signs shall be moved throughout the day to keep the work zone within 2 miles of the signs.

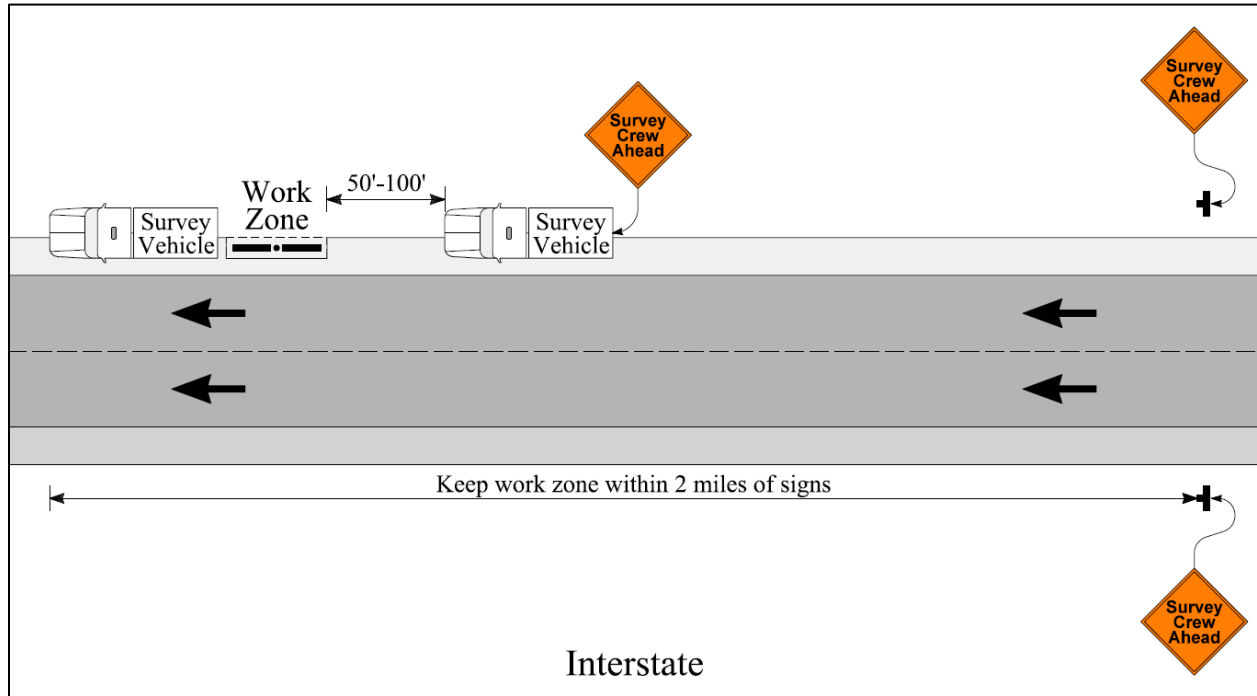


Figure IX-12. Collecting RTK data on an interstate

5. Collecting Digital Level Data

When establishing elevations at the flight line targets, workers will walk along the roadway shoulder. One person is operating a digital level while the other is holding a level rod. The work takes approximately 1 to 2 minutes at each set-up and should be classified as mobile.

For two-lane highways, two "Survey Crew Ahead" signs will be placed a minimum of 500' beyond each end of the work zone. Although the workers are not protected by a survey vehicle, they are watching traffic for one another. For lower traffic volumes (2 to 6 cars/minute in each direction) the signs may be placed up to 2 miles apart. For higher traffic volumes (more than 6 cars/minute in each direction) the signs shall be placed up to 1 mile apart.

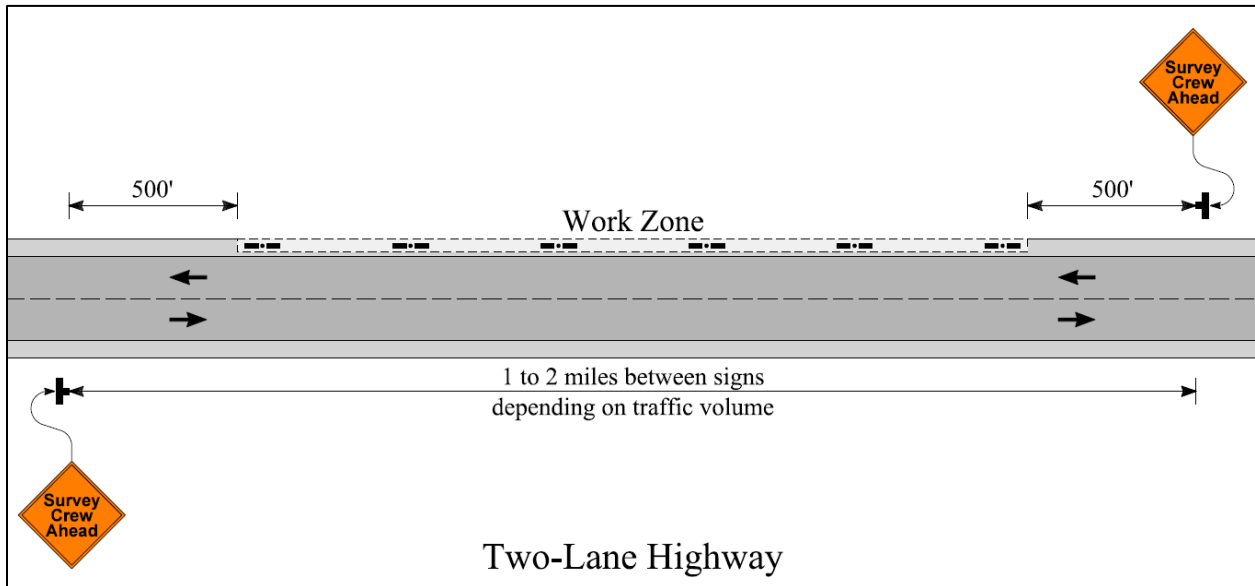


Figure IX-13. Leveling on a two-lane highway

Traffic Control

For interstates, two signs will be placed a minimum of 750' before the beginning of the work zone. The signs shall be moved throughout the day to keep the work zone within 2 miles of the signs.

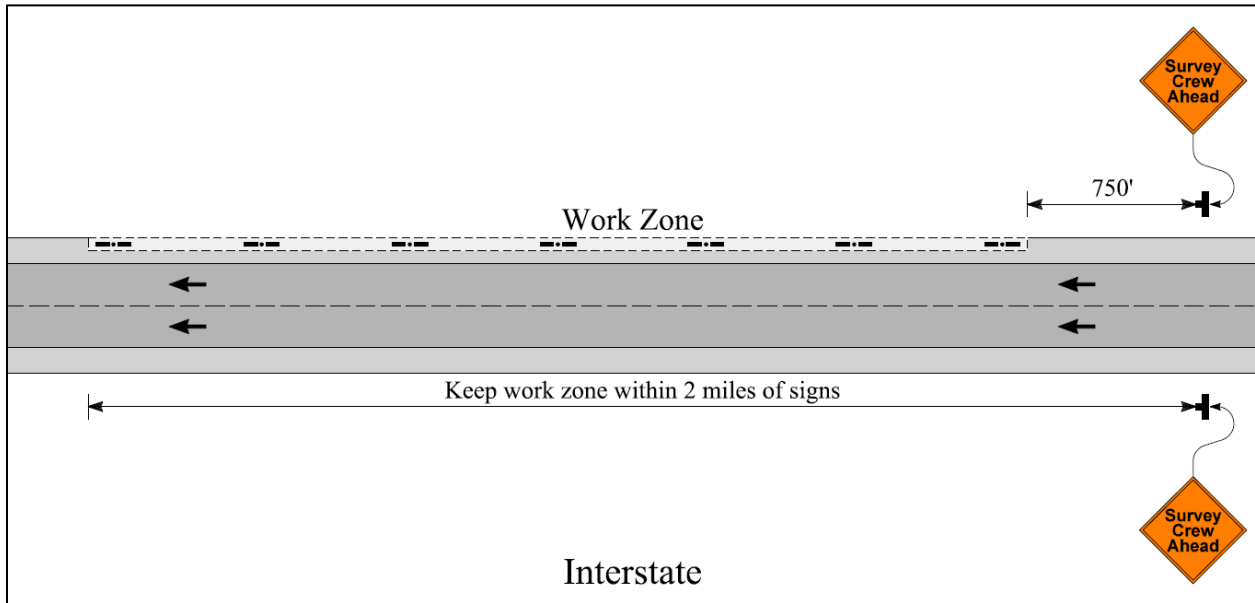


Figure IX-14. Leveling on an interstate

6. Collecting Topographic Data

Edge of paved shoulder survey shots are collected every 25' while centerline pavement shots are collected every 50' on curves and 100' on tangents. On interstate routes, the survey collection will also take place in the median. With this type of survey, a person will be placing the prism pole at each survey shot location as indicated in Figures XI-15 and XI-16. Each shot will take approximately 30 seconds to 1 minute. The work may take up to 2 hours for a 1000' section of pavement and should be classified as short-term stationary.

On two-lane highways, a "Survey Crew Ahead" sign will be placed a minimum of 500' beyond each end of the work zone. For lower traffic volumes (2 to 6 cars/minute in each direction) the signs may be placed up to 2 miles apart. For higher traffic volumes (more than 6 cars/minute in each direction) the signs shall be placed up to 1 mile apart.

When survey shots are needed on the pavement, a "spotter" will be required to accompany the rod-man to provide a warning of potential traffic hazards. The spotter may use an orange flag for additional visibility. On roads with higher traffic volumes, it may be necessary to place "Flagger Ahead" signs to provide the traveling public additional warning. These signs are to be placed 500' from each end of the work zone and the "Survey Crew Ahead" signs will be placed 500' outside of them.

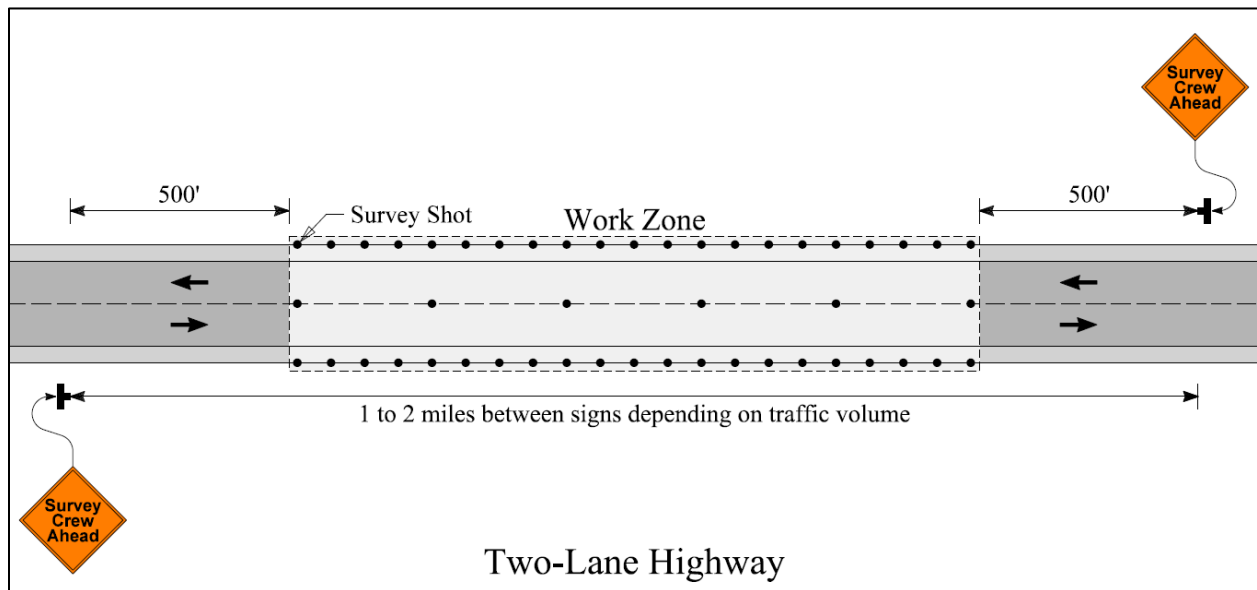


Figure IX-15. Collecting survey supplements on a two-lane highway

Traffic Control

On interstates, two "Survey Crew Ahead" signs will be placed a minimum of 750' beyond each end of the work zone. The signs shall be moved throughout the day to keep the work zone within 2 miles of the signs. When survey shots are needed on the pavement, a "spotter" will be required to accompany the rod-man to provide a warning of potential traffic hazards. The spotter may use an orange flag for additional visibility.

When working along the inside shoulder in narrow medians, it may be necessary to park survey vehicle(s) within the median to get traffic to move away from the surveyor.

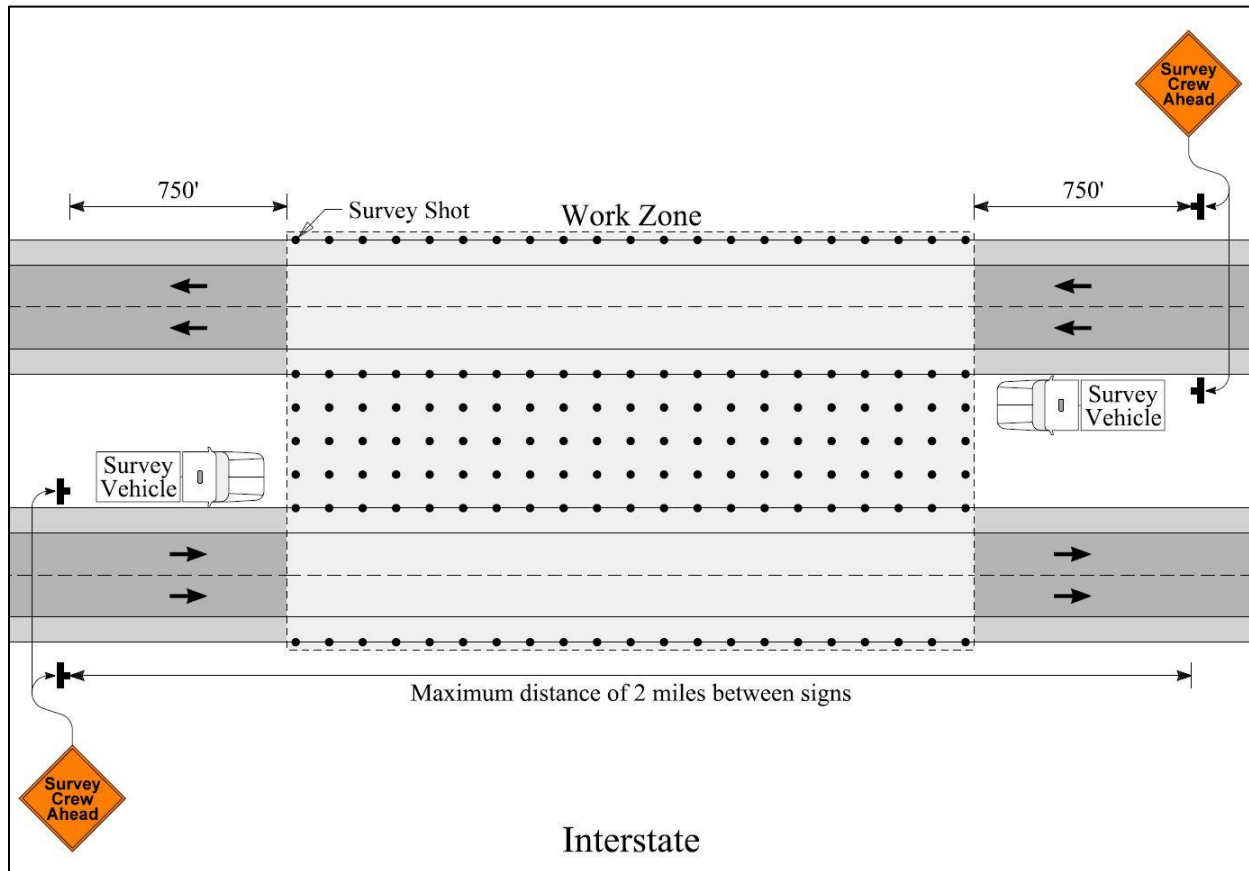


Figure IX-16. Collecting survey supplements on an interstate

7. Lane Closures

Occasionally, when working on roadways with little or no shoulders or near guardrail, the survey vehicle may not be able to get completely out of the travel lane. If an encroachment into the travel lane prohibits two vehicles from safely passing each other at the work zone, then a lane closure will be necessary. This will affect our operations especially when painting and collecting photo targets. Additional consideration will be necessary to determine if the target should be placed off of the roadway. Each vehicle utilizes overhead amber lights and a light bar. In addition, a "Survey Crew Ahead" sign will be mounted on the back of the shadow vehicle.

On two-lane highways, a flagger will be directing traffic within 500' of each end of the work zone. The flaggers will be able to communicate with each other with hand-held radios. A "Flagger Ahead" sign shall be placed within 1000' from each end of the work zone. And finally, a "Survey Crew Ahead" sign will be placed a minimum of 500' from each "Flagger Ahead" sign. The two "Survey Crew Ahead" signs on each end may be placed up to 1 mile from each other.

Note: A flagging or traffic control related training course should be completed prior to performing flagger duties.

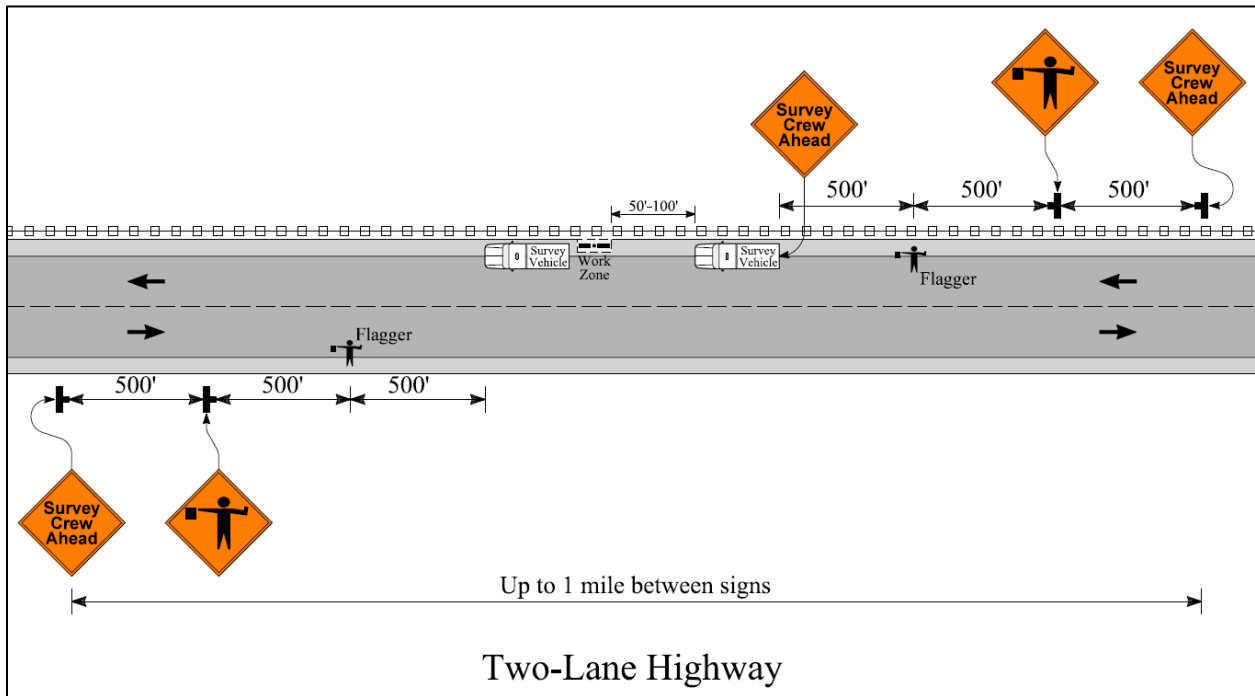


Figure IX-17. Lane closures on a two-lane highway

Traffic Control

On interstates, a flagger will be directing traffic within 750' of the beginning of the work zone. A "Flagger Ahead" sign shall be placed within 1500' from the beginning of the work zone. And finally, a "Survey Crew Ahead" sign will be placed a minimum of 750' from the "Flagger Ahead" sign. The "Survey Crew Ahead" sign may be placed up to 1 mile from the work zone.

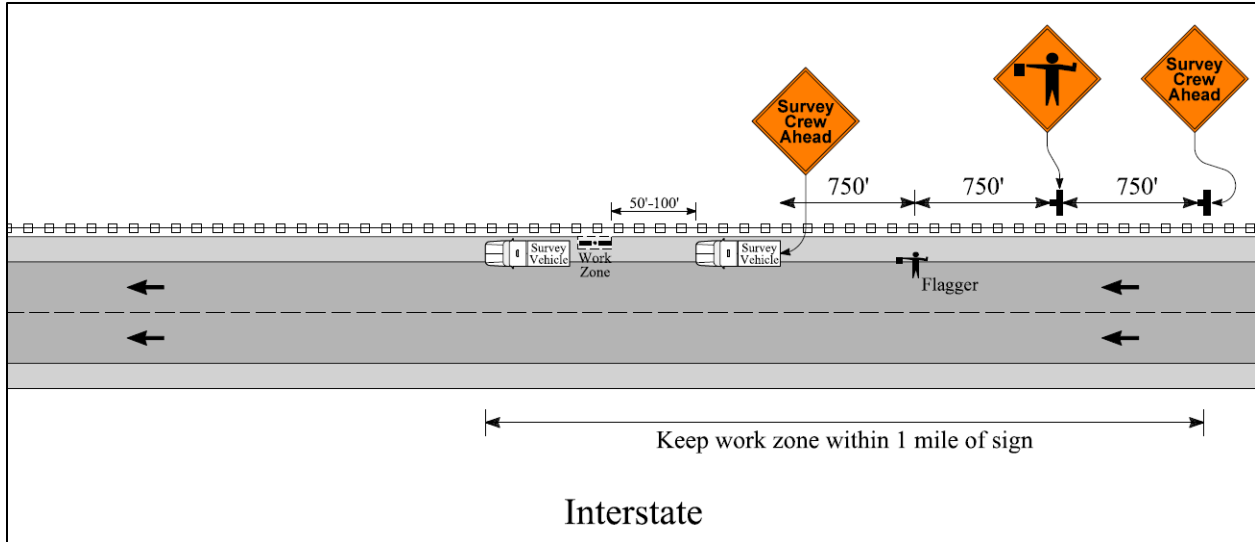


Figure IX-18. Lane closures on an interstate

C. Urban Areas

1. Setting Survey Monuments

When working in an urban setting, project control monuments are typically set in or around sidewalks, parking lots, or other areas away from the roadway. The survey vehicles are typically parked on side streets or in on-street parking areas near the work zone. Even while parked, each vehicle utilizes overhead amber lights and a light bar. The work takes between 15 to 30 minutes at each location and should be classified as short duration.

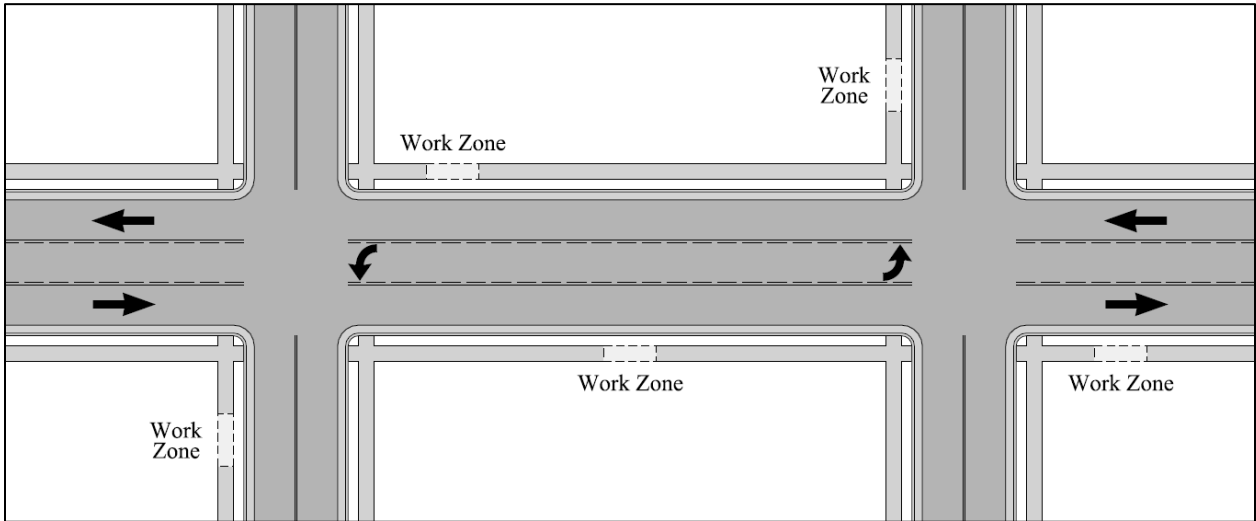


Figure IX-19. Setting survey monuments

2. Painting Photo Targets

Flight line targets are typically painted in a center turn lane (if available) or on side streets. These targets are spaced approximately 700' apart. One survey vehicle is parked in front of the work zone while a shadow vehicle is parked behind the work zone to shield the worker(s) from traffic. Each vehicle utilizes overhead amber lights and a light bar. In addition, a "Survey Crew Ahead" sign will be mounted on the back of the shadow vehicle. The work takes approximately 5 to 10 minutes to paint each target and should be classified as mobile.

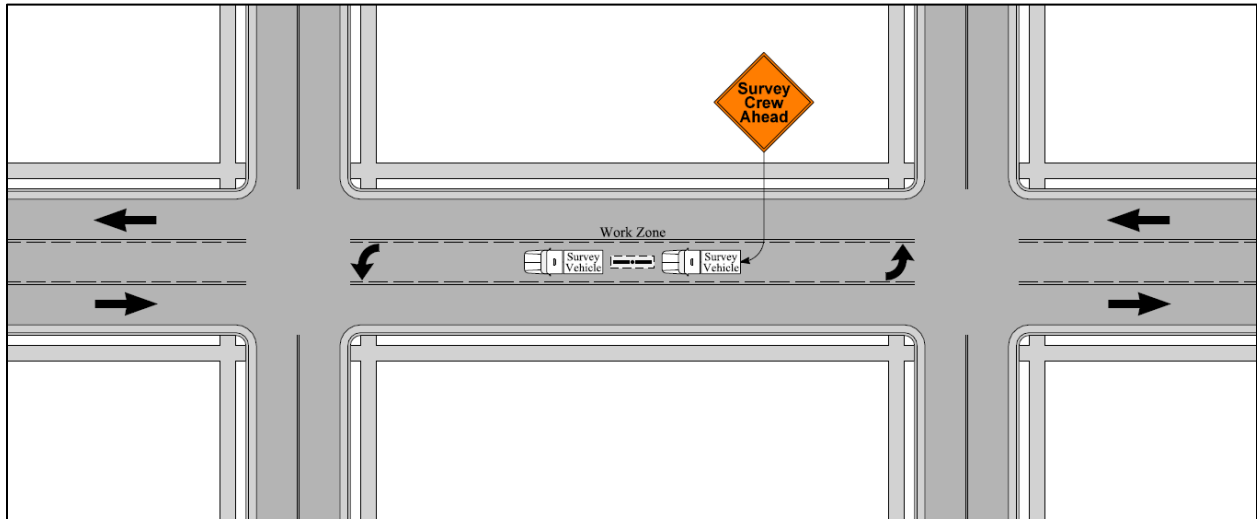


Figure IX-20. Painting photo targets in the center turn lane

Wing point targets are typically painted on side streets. Also, if there isn't a center turning lane or high traffic volumes prohibit painting targets on the mainline, then the flight line targets are moved to the side streets. If traffic volume warrants, two vehicles will be used for the painting on side streets. If the traffic on the side street is very light, then only one survey vehicle will be utilized.

Note: It may be necessary for one person to move behind the shadow vehicle and direct traffic around the work zone and vehicles. An orange flag may be used to increase visibility.

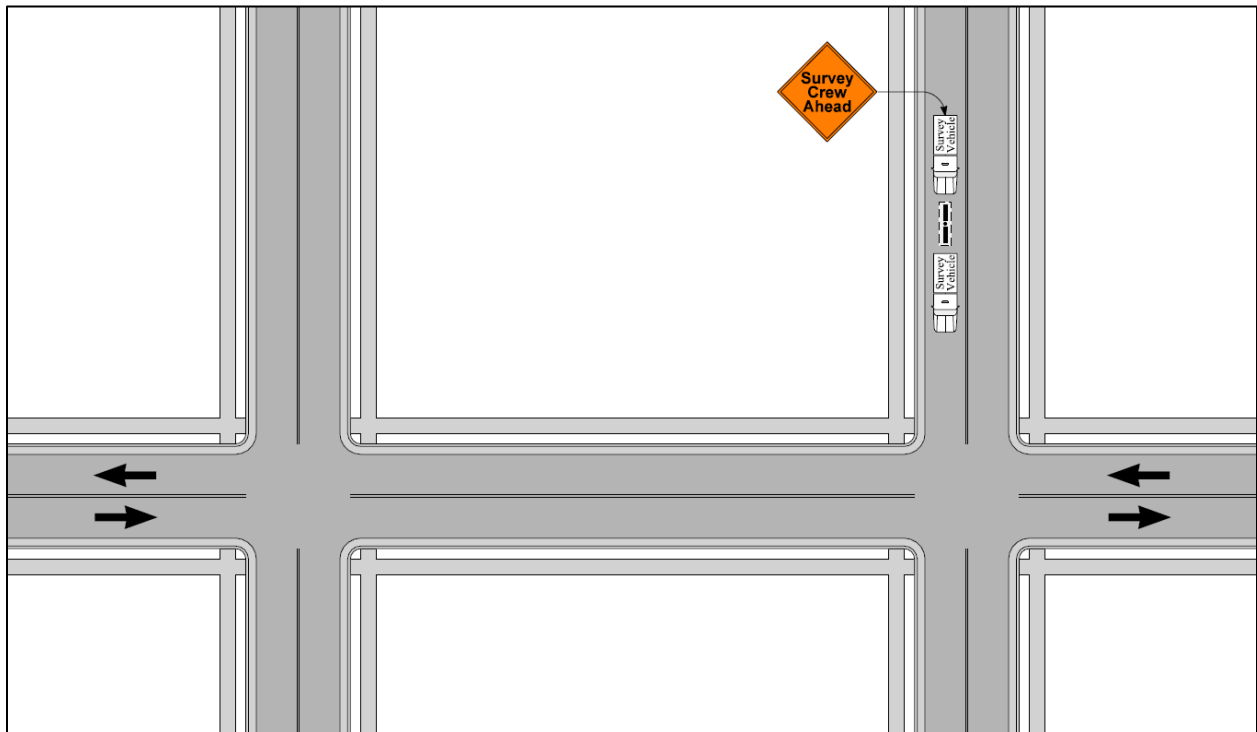


Figure IX-21. Painting photo targets on a side street

3. Collecting Project Control Data

When collecting GPS data at project control monuments, the work zones are typically off of the roadway. The survey vehicles are typically parked on side streets or in on-street parking areas near the work zone. Even while parked, each vehicle utilizes overhead amber lights and a light bar. The work takes between 15 minutes to 2 hours at each location and should be classified as short duration or short-term stationary.

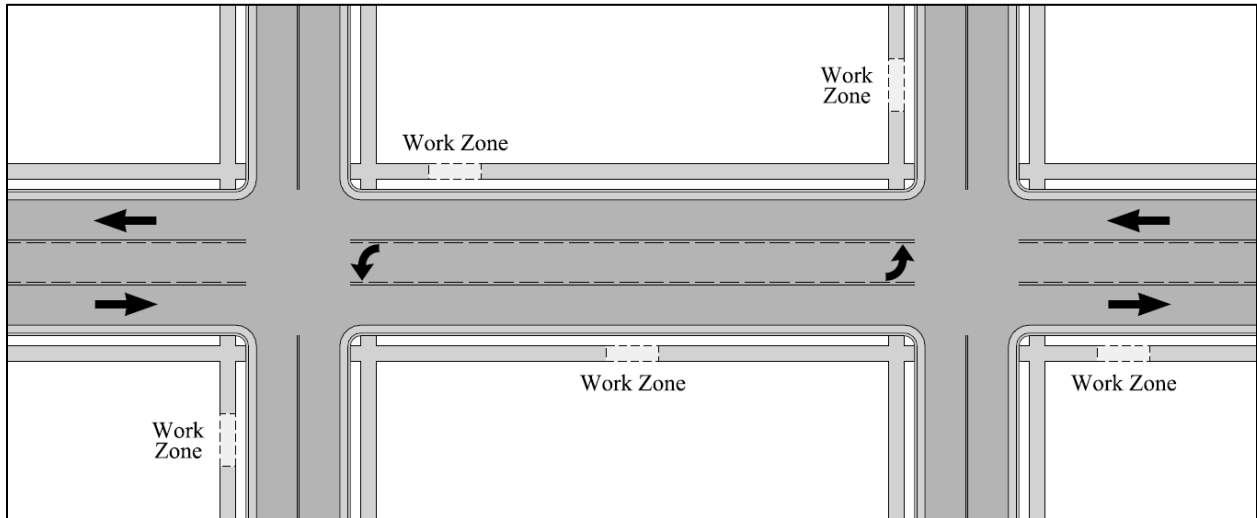


Figure IX-22. Collecting GPS data

4. Collecting Photo Control Data

When collecting photo control targets painted in the center turn lane, one survey vehicle is parked in front of the work zone while a shadow vehicle is parked behind the work zone. Each vehicle utilizes overhead amber lights and a light bar. In addition, a "Survey Crew Ahead" sign will be mounted on the back of the shadow vehicle. The work takes approximately 1 to 2 minutes at each location and should be classified as mobile.

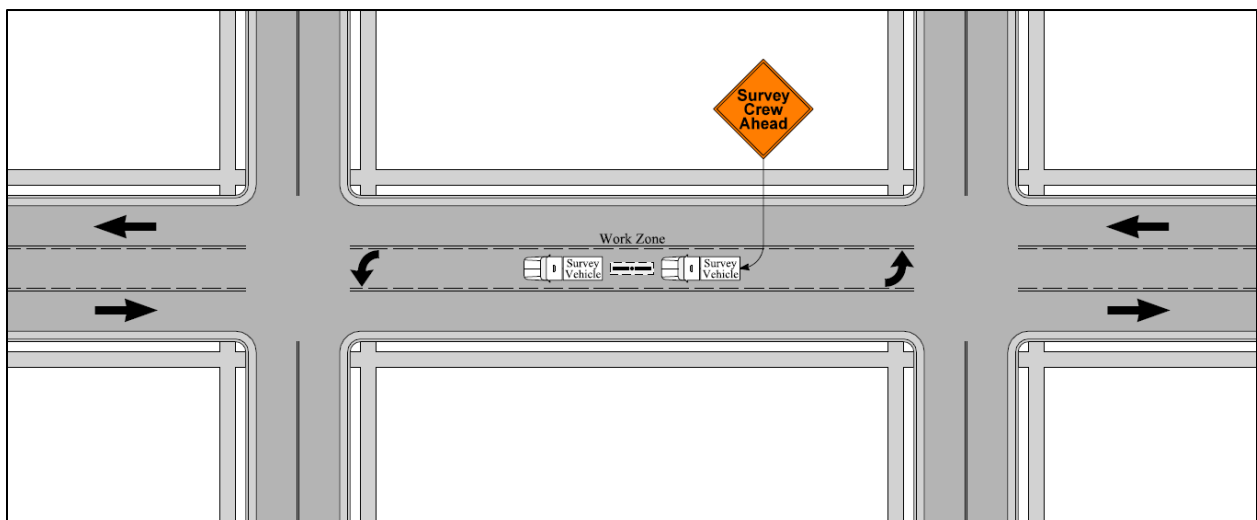


Figure IX-23. Collecting RTK data in the center turn lane

When collecting photo control targets on side streets, two vehicles will be used for the RTK collection when traffic volume warrants. A "Survey Crew Ahead" sign will be mounted on the back of the shadow vehicle. However, if the traffic on the side street is very light, then only one survey vehicle will be utilized.

Note: It may be necessary for one person to move behind the shadow vehicle and direct traffic around the work zone and vehicles. An orange flag may be used to increase visibility.

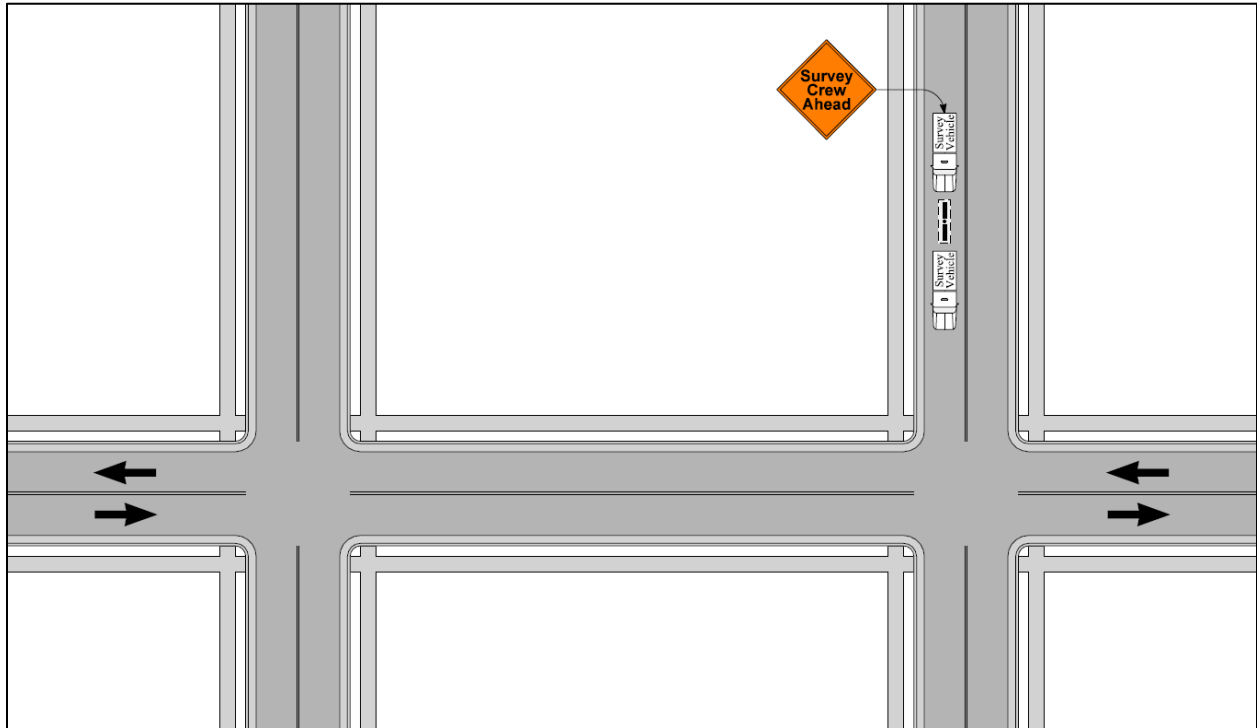


Figure IX-24. Collecting RTK data on a side street

5. Collecting Digital Level Data

When establishing elevations at flight line targets and project control monuments with a digital level, workers will walk mainly along the sidewalks. One person is operating a digital level, while the other is holding a level rod. At each flight line target, the rod person will walk out to the target while the instrument person is in the area of the sidewalk. The work takes approximately 1 to 2 minutes at each location and should be classified as mobile. When the rod-man is at the target in the street, a "spotter" will be required to provide a warning of potential traffic hazards. The spotter may use an orange flag for additional visibility.

In urban areas with a posted speed limit of 30 mph or less, a "Survey Crew Ahead" sign will be mounted on the back of a survey vehicle or on a sign stand a minimum of 100' from each end of the work zone. In urban areas with a posted speed limit of 35 mph to 45 mph, the "Survey Crew Ahead" sign will be placed a minimum of 350' from each end of the work zone.

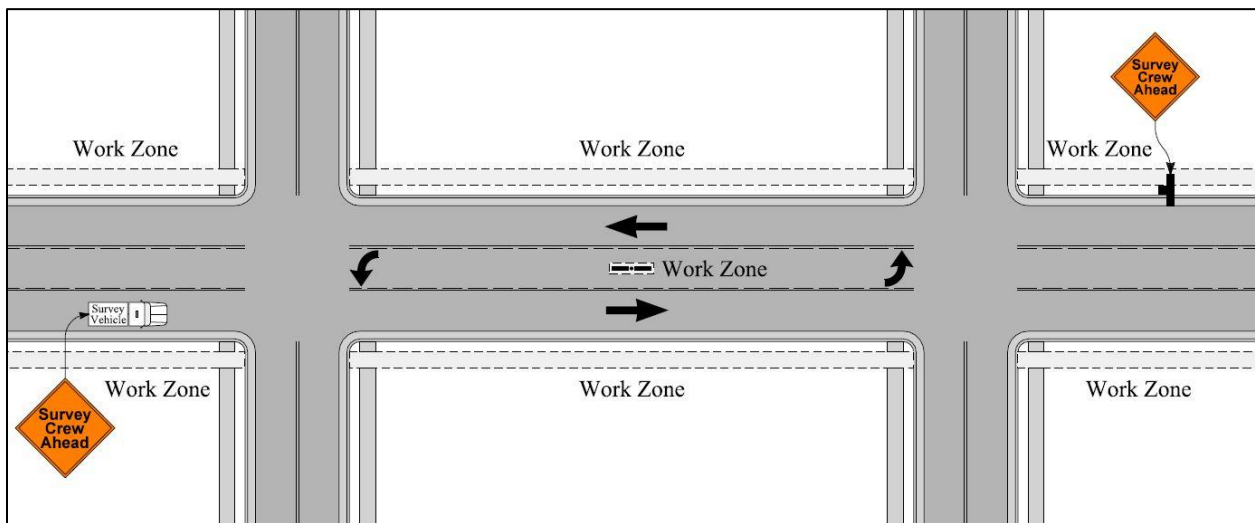


Figure IX-25. Leveling in an urban area

6. Collecting Topographic Data

In urban areas, centerline; edge of pavement; flow line of curb; back of curb; and sidewalk shots are collected every 25'. With this type of survey, a person will be placing the prism pole at each survey shot as indicated in Figure XI-26. Each shot will take approximately 30 seconds to 1 minute. The work should be classified as short-term stationary as a typical city block may take up to 2 or 3 hours to collect. When survey shots are needed within the travel lanes, a "spotter" will be required to accompany the rod-man to provide a warning of potential traffic hazards. The spotter may use an orange flag for additional visibility.

In urban areas with a posted speed limit of 30 mph or less, a "Survey Crew Ahead" sign will be mounted on the back of a survey vehicle or on a sign stand a minimum of 100' from each end of the work zone. In urban areas with a posted speed limit of 35 mph to 45 mph, a "Survey Crew Ahead" sign will be placed a minimum of 350' from each end of the work zone.

It may become necessary, with higher traffic volumes, to use two survey vehicles to shield the rod-man when collecting data within the travel lanes. Each vehicle utilizes overhead amber lights and a light bar. In addition, a "Survey Crew Ahead" sign will be mounted on the back of the shadow vehicle.

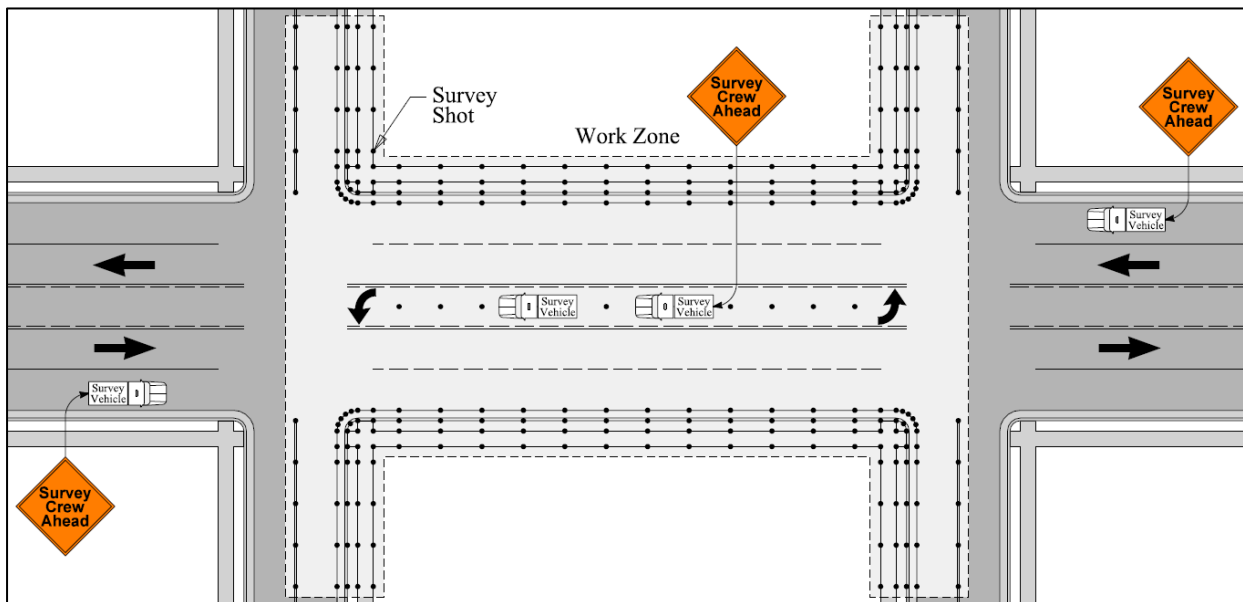


Figure IX-26. Collecting survey supplements

7. Collecting Utilities

In urban areas, all above and below ground utilities are often required to be collected. Examples of buried utilities include electrical, phone, fiber optic, TV, water, gas, storm sewer, and sanitary sewer. The collection of utilities is similar to the collection of topographic shots. When survey shots are needed within the travel lanes, a "spotter" will be required to accompany the rod-man to provide a warning of potential traffic hazards. The spotter may use an orange flag for additional visibility.

Additional traffic control will be required when invert depths are required at manholes located within the travel lanes. In these situations, one survey vehicle is parked in front of the work zone while a shadow vehicle is parked behind the work zone. Each vehicle utilizes an overhead amber light and a light bar. In addition, a "Survey Crew Ahead" sign will be mounted on the back of the shadow vehicle. When the posted speed limit is 30 mph or less, a "Survey Crew Ahead" sign will be mounted on the back of a survey vehicle or on a sign stand a minimum of 100' from each end of the work zone. When the posted speed limit is 35 mph to 45 mph, the "Survey Crew Ahead" signs will be placed a minimum of 350' from each end of the work zone.

The work takes approximately 10 to 15 minutes at each location and should be classified as mobile. On streets with higher traffic volumes, we rely on district construction or maintenance crews to assist with traffic control. It may be necessary for them to temporary close a lane.

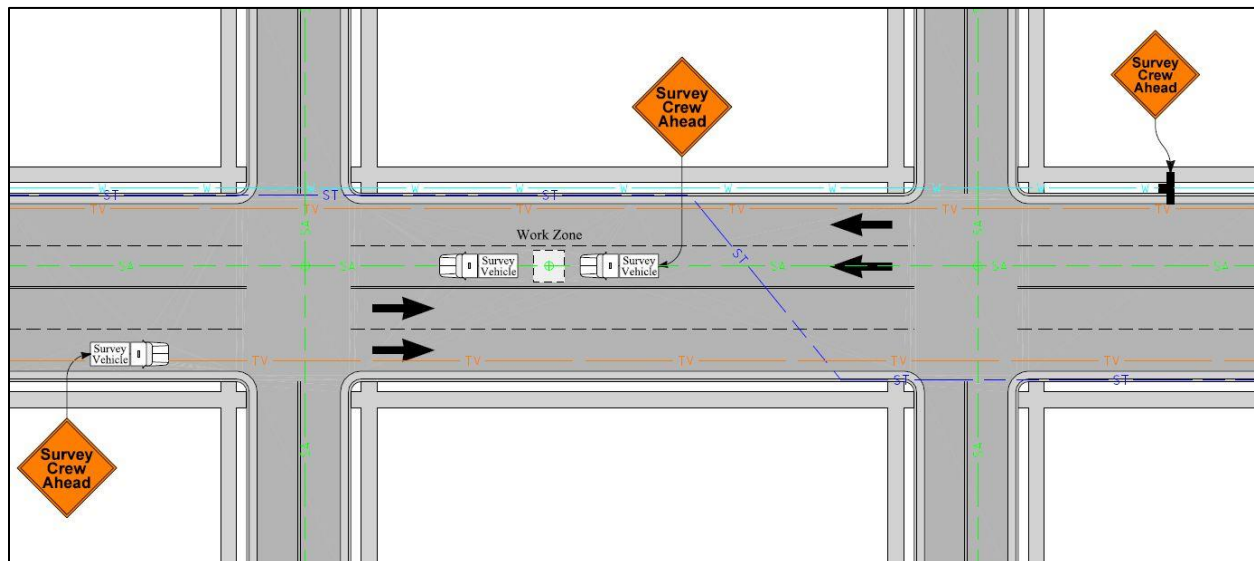


Figure IX-27. Collecting utilities

8. Terrestrial Scanning

When collecting topographic data with a terrestrial scanner it is sometimes necessary to set up in the street. This is the best way to collect the flow line of curb feature. A vehicle will be parked behind the work zone to shield the scanner and operator from traffic. The vehicle utilizes overhead amber lights and a light bar. In addition, a "Survey Crew Ahead" sign will be mounted on the back of the shadow vehicle. Another "Survey Crew Ahead" sign will be placed on a vehicle or sign stand a minimum of 100' from each end of the work zone to give motorists additional warning.

Traffic cones will be used to create an approximately 100' long taper behind the survey vehicle. Additional traffic cones will be placed alongside the work zone to prohibit traffic from entering the blocked lane. The work takes approximately 30 minutes and should be classified as short duration.

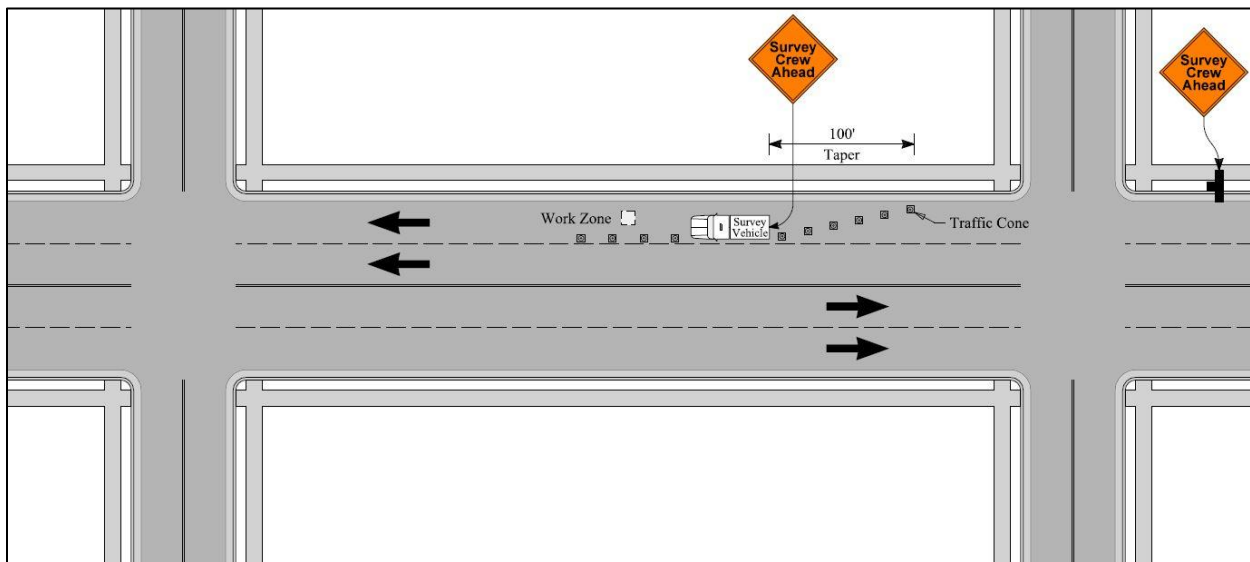


Figure IX-28. Mid-block setup

Traffic Control

As shown in Figure IX-29, a scanner setup within the travel lane is also necessary at the intersections. The same survey vehicle, warning signs, and traffic cone configuration will be used.

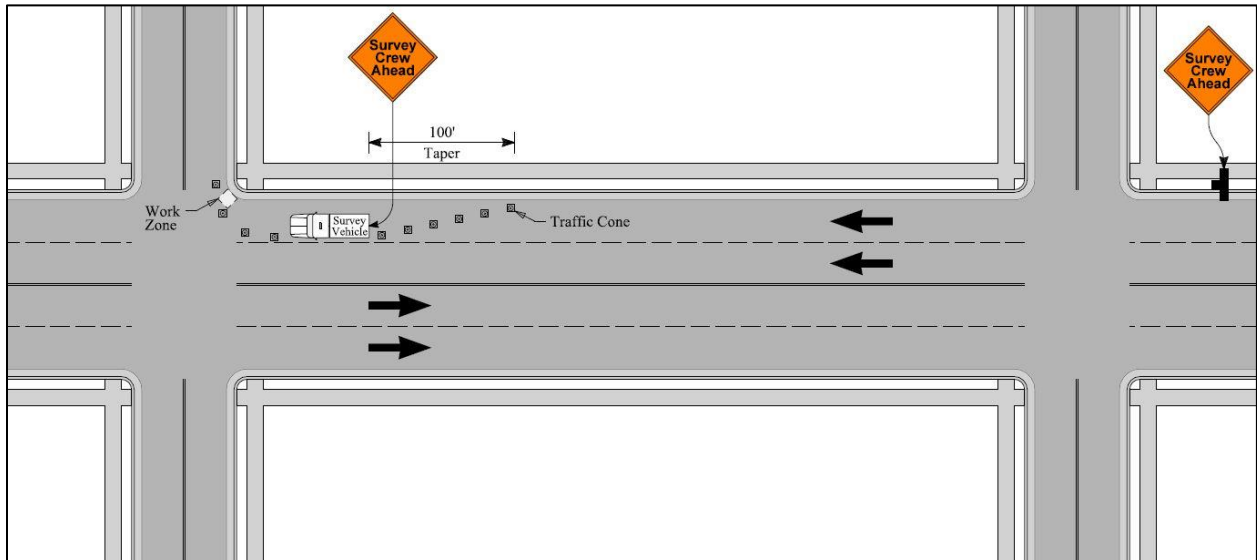


Figure IX-29. Intersection setup

When a scanner setup is required in the center turn lane, the work zone will be separated from traffic with cones. If traffic volume warrants, a survey vehicle will be parked behind the work zone to shield the scanner and operator from traffic. Two "Survey Crew Ahead" signs will be placed on a vehicle or sign stand on the side of the street in each direction.

Traffic cones will be used to create tapers in front of and behind the work zone to allow turning traffic to use the turn lane.

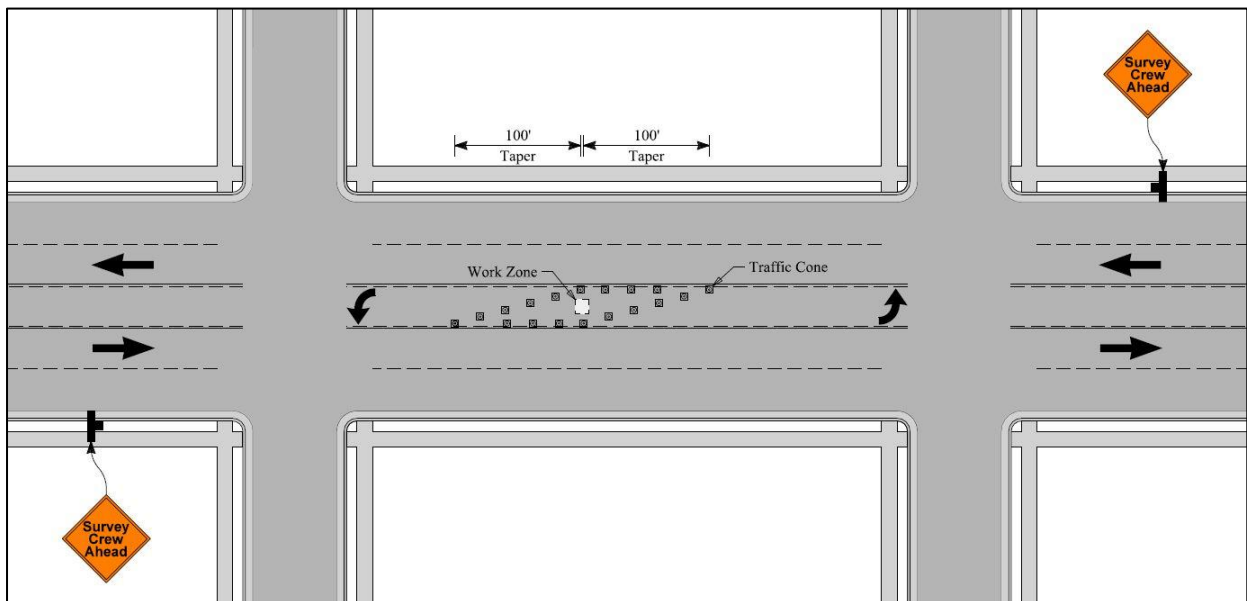


Figure IX-30. Scanning in the center turn lane