

SALT LAKE CLIMBERS ALLIANCE

Professional Anchor Replacement Initiative
Pilot Project

OPERATIONS MANUAL

v2.0 (2022)

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SLCA employment policies and procedures are found in the [Employee Handbook](#).

I. GENERAL HEALTH & SAFETY PLAN

1. OBJECTIVE

in accordance with the Occupational Health & Safety Act, the objective of the SLCA Anchor Replacement Initiative's General Health & Safety Plan is to provide workers with 'employment and a place of employment, which are free from recognized hazards that are causing or are likely to cause death or serious physical harm.' OSHA Act - USC 654(a)(1)

This includes guidance and training in basic health & safety measures, work processes, material handling and the use of personal protective equipment.

2. SCOPE

This General Health & Safety Plan is intended to be used in conjunction with the accompanying Fall Protection Plan - which specifically addresses fall protection and falling object protection, and the Work Plan- which specifically addresses anchor removal and placement procedures.

3. POLICY

It is the policy of the SLCA to protect its professional workers, training participants and volunteers from occupational injuries by demonstrating, implementing and enforcing safe work practices. The SLCA Anchor Replacement Program complies with OSHA requirements to protect workers from hazards by performing a Job Hazard Analysis, identifying general health & safety hazards, and providing the administrative, training, work practices and Personal Protective Equipment controls for those hazards. (CFR 1910.9 (a), (b); CFR 1926.20 (f)(1),(2); CFR 1926.21(b)(1-4)

4. BASIC HEALTH & SAFETY MEASURES

All workers should implement regular health, hygiene and infection control practices, including:

- Personal preparation for physically demanding work in an outdoor environment
- Not working if sick or unhealthy
- Frequent and thorough hand washing and/or sanitizing
- Good respiratory and sanitary etiquette around other workers
- Minimizing shared use of equipment
- Regular cleaning of shared equipment

- Limiting close contact between workers
- Use of Personal Protective Equipment

5. PERSONAL PROTECTIVE EQUIPMENT

'Simple type' PPE is used to protect workers against the general hazards associated with anchor replacement operations, as well as for good hygiene, and to limit infectious disease transmission. The PPE that is provided by or issued to individual workers as needed, for their own use, care and maintenance- includes:

(CFR 1910.132-.135, .138; CFR 1926.300(c), 1926.28(a))

- gloves for hand protection
- ear protection for drilling/grinding/hammering operations
- eye protection for drilling/grinding/hammering, and for UV light protection
- respiratory protection from particulate matter (drilling/grinding operations) and infectious disease transmission (when working in close proximity)

II. FALL PROTECTION PLAN

1. OBJECTIVE

The objective of the SLCA Fixed Anchor Replacement Fall Protection Program is to identify, evaluate and control the work-at-height, fall and falling object hazards to which workers doing anchor replacement work are exposed. This includes specific training, guidance and assessment in the use of fall protection and falling object protection systems as required by the Occupational Safety and Health Administration (OSHA) for General Industry and Construction. (CFR 1910.28, CFR 1926.501, .503)

The SLCA Fixed Anchor Replacement Fall Protection Program presents a 'qualified' fall protection program, whereby 'a fall protection plan is prepared by a Qualified Person and developed specifically for the site where the work is being performed.' (29 CFR 1926.502(k)(1))

2. SCOPE

This Fall Protection Plan is also intended to be used in conjunction with the accompanying Work Plan- which details the additional work processes, tools and materials used in the field placement and replacement of anchors.

3. POLICY

It is the policy of the SLCA to protect its professional workers, training participants and volunteers from occupational injuries by demonstrating, implementing and enforcing safe work-at-height and fall protection practices.

Fixed Anchor Maintenance and Replacement programs present an unconventional operation, more comparable to construction than general industry. Considerations for access, fall protection, work positioning and rescue require the use of both industrial and sport fall protection systems.

The [Work Safety Plan](#) includes ‘a written discussion of the measures that will be taken to reduce or eliminate the fall hazard for workers who cannot be provided with protection using conventional fall protection systems.’ (29 CFR 1926.502(k)(6))

For operations employing fall protection, a ‘Qualified Person’- the Anchor Replacement Coordinator- reviews the [Job Hazard Analysis](#) and then designs the Work Safety Plan.

‘Competent Person(s)’ - the Anchor Replacement Workers - execute the work project with the Coordinator, including implementation of the Work Safety Plan and the use of the specified fall protection systems. (29 CFR 1926.502)

4. PERSONNEL

A. Anchor Replacement Coordinator- aka ‘Fall Protection Program Manager,’ ‘Qualified Person,’ ‘Responsible Person.’ It is the responsibility of the Coordinator to implement this program by:

- Performing a thorough Job Hazard Analysis before all work at height operations, and providing a Work Safety Plan prescribing the tasks and systems to be used to control the hazards. (Appendix A- Job Hazard Analysis, Appendix B- Work Safety Plan)
- Performing regular and documented safety checks of operations and equipment. (Appendix D- Managed PPE Inventory)
- Enforcing SLCA safety policy and procedures on work sites and in training programs.
- Correcting any unsafe practices or conditions immediately.
- Training workers in recognizing fall hazards and the use of fall protection systems. (Appendix J - Fall Protection Handbook & Assessment)

- Maintaining records of worker training, equipment issue, and use of fall protection systems. (Appendix C- Worker Training Log)
- Investigating and documenting incidents that result in a ‘near-miss’ or worker injury. (Appendix F- Work Incident Report Form)
- Understand and adhere to policies and procedures outlined in the [SLCA Employee Handbook](#).
- Continuous improvement of the program according to updates in equipment, work practices and standards.

B. Anchor Replacement Technicians- aka ‘Workers, Volunteers and/or Training Participants’

For the informative purposes of this plan, all persons on a supervised project or site- whether employees, contractors, volunteers, or training participants- are considered ‘workers.’

It is the responsibility of all workers to:

- Understand and adhere to the procedures outlined in this Fall Protection Plan.
- Follow the instructions of the designated Lead Competent Person or Coordinator.
- Immediately bring to the Team’s attention any unsafe or hazardous conditions or practices that may cause injury to either themselves or others; and
- Report any incident that causes injury, regardless of the nature of the injury
- Understand and adhere to policies and procedures outlined in the [SLCA Employee Handbook](#).

5. [JOB HAZARD ANALYSIS](#)

A detailed analysis of the specific hazards involved in anchor maintenance and replacement work is referred to as the ‘JHA.’

The Job Hazards are reviewed in full with each employee during training, and briefly reviewed in the context of each specific Work Safety Plan.

6. HAZARD CONTROLS

The Work Safety Plan will prescribe from the following controls:

- Administrative control** may include coordination with the land manager, communication of work projects to the public community, and marked and signed exclusion zones or routes adjacent or beneath the work site.
- Removal or avoidance of the hazard** may include the use of specialized equipment, or the use of alternative access methods with lower hazard
- Substitution of work practices and/or equipment** that replace the hazard. (for example- the use of 'reach' or extension poles, aka 'stick-clips')
- Collective protection** for regular access and protection for multiple workers (for example- temporary lifelines)
- Tool and equipment lanyards, holsters and containers for **drop/loss prevention**
- Personal Protection Equipment (PPE)** for general health & safety (for example- eye & ear protection, gloves, masks) and for access and work positioning using fall protection systems. (for example- helmet, harness, belay device, lanyard, connectors)
- Travel restraint systems** control worker movement such that reaching the actual edge of the fall zone is not possible. (for example- shortened or fixed-length lanyards on exposed ledges)
- Fall restraint systems**, or positioning on an adjustable personal lanyard, are prescribed to allow for supported, hands-free work positioning when access to the exposed work environment is otherwise achieved and/or controlled, and the work task requires exposure to a fall hazard. (for example, the use of an adjustable personal lanyard to protect access to an exposed anchor station). Due to the risk of higher impact forces in an unintentional fall, no more than 2 feet of slack should be in the system.

- ❑ **Rope ascent/descent systems** are prescribed most commonly for both access and hands-free work positioning. For example, the combined use of a belay/descent device, ascender and foot sling allow for secure progression both up and down an anchored rope. Due to the risk of higher impact forces, the worker should remain in suspension at all times, with no more than 2 feet of slack in the system.
- ❑ **Secondary (aka ‘Backup’) rope systems** are prescribed to provide redundancy and to protect for prolonged work in fall restraint or rope suspension, or for any work tasks involving a potential cut hazard to the primary system, or the risk of user error. (For example- a secondary system is used whenever operating a drilling/cutting tool, or in a technical training or assessment session.)
- ❑ **Fall arrest lanyards** are prescribed to protect against an involuntary fall onto a lanyard and directly onto the anchor, minimizing fall distance and reducing the impact force on the worker with an integral absorber. (for example- ‘Y lanyards with energy absorbers used on anchors, lifelines or ‘via ferratas’)
- ❑ **Fall arrest devices or rope clamps** are prescribed for continuous restraint or progression on vertical lifelines to protect against an involuntary fall, minimizing fall distance and the impact force on the worker.
- ❑ **Belay systems** are prescribed to protect against an involuntary fall by a climber, minimizing fall distance and reducing impact force on the climber by using a dynamic rope with an attended belay and intermediate protection anchors.

7. PERSONAL PROTECTIVE EQUIPMENT (PPE) FROM FALLS AND FALLING OBJECTS

The SLCA will provide employees doing anchor replacement work with Personal Protective Equipment for fall protection and falling object protection. (CFR 1910.140; CFR 1926.104)

WORKER ISSUE.

Each worker will be issued a Fall Protection PPE kit (or provide appropriate personal equipment as qualified below) with the appropriate items for the prescribed fall protection and partner rescue systems. ([Appendix C- Tab 4, Individual Worker PPE Issue](#))

INSPECTION.

All PPE used to protect workers in the Fixed Anchor Maintenance Fall Protection Program is inspected and recorded in an individually traceable inventory, as warranted by intensity of use (or at minimum, annually.)

Workers will conduct regular pre- and post-use inspections, and a 'Competent' or 'Qualified Person' with training and knowledge in the selection, inspection and management of PPE, will conduct and record the inspections. ([Appendix C- Tab 3, WARI Fall Protection PPE Inventory](#))

PERSONAL USE EQUIPMENT.

Fall Protection systems prioritize the use of PPE provided from the managed SLCA inventory. If due to ergonomics or hygiene, a worker wishes to provide their own PPE for use in a fall protection system, it must be inspected and documented as 'fit for service' prior to use. (CFR 1926.95(b), (d) If the personal equipment is not suitable, appropriate PPE will be provided from the SLCA PPE inventory.

Workers use this [GoogleForm](#) to document their own competent inspection of personal use protective equipment. ([Appendix E- Personal Use PPE Form](#))

STORAGE.

All PPE used to protect workers in the Fixed Anchor Maintenance Fall Protection program is stored in a controlled access storage unit, with clearly designated storage for all 'in service' PPE.

QUARANTINE & RETIREMENT.

A separately designated quarantine container is available for removal and isolation of any items found to be unfit for service or requiring further inspection by the Coordinator. Workers are required to quarantine any of the issued or inspected PPE at any time if they have any uncertainty of the equipment origin, condition or suitability. Only the Anchor Replacement Coordinator may remove items from the quarantine storage, and will perform the necessary corrective actions or destroy the item(s) to prevent use.

The PPE INVENTORY & INSPECTION RECORD ([Appendix C- Tab 3, WARI Fall Protection PPE Inventory](#)) includes, for each item:

- Product manufacturer
- Model/name
- Unique identification number and/or batch color
- Date of manufacture
- Instructions For Use

- Notes on applicable PPE standards
- Instructions for care, maintenance & inspection
- Notes on use history and any corrective actions taken
- Dates of all Competent Person (documented) inspections
- Date of retirement / destruction

8. FALL PROTECTION SYSTEMS (29 CFR 1910.140, CFR 1926.502)

The need for Fall Protection and/or Restraint systems for Workers is assessed:

- prior to any workers being exposed (within 6 feet) to a fall hazard greater than 6 feet.
- when secure progression or positioning for work requires more than two points of continuous contact on the work surface.
- when carrying tools and equipment on steeper and/or exposed terrain.
- when 'hands-free' positioning is required for work tasks with fall exposure.

All components of a personal fall protection system:

- Are prescribed in the Work Safety Plan by the Anchor Replacement Coordinator and implemented by the Workers, who are trained in their use.
- Require PPE be used in accordance with the manufacturer's Instructions For Use.
- Require all Fall Protection PPE in use to be regularly inspected, maintained and documented by the Anchor Replacement Coordinator.
- Require the '*Competent*' use of several different anchor types:
 - trees
 - geologic structures: boulder, horn or constriction
 - removable metallic wedge or expansion anchors
 - existing, 'in place' wedge, sleeve, adhesive and piton anchors
 - documented, replaced sleeve or adhesive anchors

The strength requirements and components of available anchors are assessed and estimated by the Coordinator and specified for use in the Work Safety Plan.

To account for a margin of error in estimation and the use of existing anchors of unknown origin, multiple anchors may be equalized with PPE to a common focal attachment point to ensure adequate strength and redundancy.

Sport and Industrial Equipment.

Due to the nature of the environment and activities, SLCA anchor maintenance operations require a combination of both industrial and sport fall protection systems and techniques. **The primary function of each fall protection system is the same- to control and limit the potential fall distance, and reduce the impact force on the worker and the system (to below 6kN) in the event of a fall.** (CFR 1910.140(d)(2)(ii); CFR 1926.502(d))

Specification of systems in the Work Safety Plan is based on:

- Efficient, controlled access to the work site
- Characteristics of the work site
- Type of work task
- Equipment compatibility with other systems in use on the work site
- Worker size & weight (80kg for sport systems, 100kg for industrial systems)
- Worker’s individual level of training and experience
- Worker ergonomics and considerations for necessary climbing performance

FALL PROTECTION SYSTEMS include travel restraint, fall restraint, rope ascent/descent, backup ropes, fall arrest lanyards, vertical lifelines and attended belays:

SYSTEM	APPLICATION	PPE	ANCHORS
Travel Restraint	Exposed ledges or access routes	<input type="checkbox"/> sit harness <input type="checkbox"/> lanyard <input type="checkbox"/> autolocking connectors	estimated 2x bodyweight or 2kN / 450 lbs

Fall Restraint	Accessing exposed ledges and belay/rappel anchors	<input type="checkbox"/> sit harness +/- chest harness <input type="checkbox"/> rope (dynamic or low-stretch) <input type="checkbox"/> ascent/descent/belay device OR <input type="checkbox"/> adjustable rope lanyard <input type="checkbox"/> autolocking connectors <input type="checkbox"/> helmet	estimated 8x bodyweight or 8kN / 1800 lbs
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<p>Rope Ascent / Descent</p>	<p>Access to elevated and overhanging work sites and positions, and allowing for efficient and continuous repositioning.</p> <p>Sharp edges must be controlled with rope protection.</p> <p>Intended for continuous restraint- NOT arresting a fall. *No more than 2ft of slack may be introduced into the system between worker and anchor.</p> <p>May be combined with adjustable personal lanyards to provide redundant protection and 'hands-free' work positioning.</p> <p>May be combined with a secondary 'backup' rope for continuous, redundant protection</p>	<ul style="list-style-type: none"> <input type="checkbox"/> sit harness +/- chest harness <input type="checkbox"/> rope (dynamic or low-stretch) <input type="checkbox"/> ascent/descent /belay device OR <input type="checkbox"/> ascender (s) <input type="checkbox"/> foot loop(s) <input type="checkbox"/> rope lanyard(s) with adjuster <input type="checkbox"/> (auto) locking connectors <input type="checkbox"/> helmet 	<ul style="list-style-type: none"> • estimated 22x bodyweight and/or engineered 5000 lbs / 22kN • use of directional and re-belay anchors to protect rope path, and isolate work zones
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<p>Secondary / Backup Rope System</p>	<p>Secondary protection for rope suspension:</p> <ul style="list-style-type: none"> • sustained work in suspension • abrasive terrain • cutting/grinding tool operations • training and rescue scenarios • sharp edges controlled with additional rope protection • requires training for escape & rescue 	<ul style="list-style-type: none"> <input type="checkbox"/> waist + chest harness w/ sternal attachment <input type="checkbox"/> rope (low-stretch) <input type="checkbox"/> 'backup device' or (non-toothed) rope clamp <input type="checkbox"/> lanyard (only if compatible w/ device) <input type="checkbox"/> adjustable rope lanyard(s) <input type="checkbox"/> autolocking, tri-act connectors 	<ul style="list-style-type: none"> • estimated 22x bodyweight and/or engineered 5000 lbs / 22kN • directional and re-anchors protect rope path, and isolate work zones
<p>Fall Arrest Lanyards (with energy absorber)</p>	<p>Fall protection for:</p> <ul style="list-style-type: none"> • access to exposed ledges with significant fall potential • progression from anchor to anchor without a rope or along a lifeline. • clearance hazard with lanyard extension • requires training and rope system 	<ul style="list-style-type: none"> <input type="checkbox"/> waist + chest harness w/ sternal attachment <input type="checkbox"/> lanyards with energy absorbers (compatible w/ users' weight) <input type="checkbox"/> autolocking, tri-act terminal connectors <input type="checkbox"/> helmet 	<ul style="list-style-type: none"> • estimated 22x bodyweight and/or engineered 5000 lbs / 22kN

	for escape & rescue		
Vertical Lifelines	<p>Rope + rope clamp used to protect exposed hiking terrain and access routes to elevated work positions</p> <p>Direct connection unless energy absorbing lanyard is used</p> <p>Clearance hazard with lanyard extension</p> <p>May require training (and rope system) for escape & rescue</p>	<ul style="list-style-type: none"> <input type="checkbox"/> waist + chest harness w/ sternal attachment <input type="checkbox"/> low-stretch rope <input type="checkbox"/> fall arrest device or rope clamp capable of direct connection to chest harness <input type="checkbox"/> (optional) lanyard with compatible energy absorber <input type="checkbox"/> autolocking, tri-act connectors <input type="checkbox"/> helmet 	<ul style="list-style-type: none"> • estimated 22x bodyweight and/or engineered 5000 lbs / 22kN

<p>Attended Belay</p>	<p>Primary fall protection system for access via climbing:</p> <p>Used to protect lead and top-rope on climbing terrain by limiting both fall distance and impact force on the workers and system.</p> <p>Requires coordination w/ belayer and continuous hazard assessment to minimize fall distance and potential impact.</p> <p>Requires training for escape & rescue</p>	<ul style="list-style-type: none"> <input type="checkbox"/> waist harness <input type="checkbox"/> dynamic rope <input type="checkbox"/> belay device +/- assisted braking <input type="checkbox"/> 'quickdraw' slings + simple connectors <input type="checkbox"/> locking connectors <input type="checkbox"/> helmet <input type="checkbox"/> removable protection 	<ul style="list-style-type: none"> • estimated 22x bodyweight and/or engineered 5000lbs / 22kN belay/rappel anchors • 5000lbs / 22kN slings & connectors • Intermediate anchors (2-14kN / 550-3,150 lbs) minimize fall • dynamic rope and belay = absorber, <6kN impact
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9. FALL PROTECTION RESCUE SYSTEMS

The Work Safety Plan includes planning for resources and methods to be used by Workers in the event of an incident requiring rescue or assistance of an injured worker.

Rescue systems and procedures are situationally dependent, but are based on the application of principles:

- **Contact and stabilization** of an injured worker should take place as rapidly as possible. Depending on the severity of injuries and immediate risks to life, the speed of an improvised rescue may take priority over the choice of system.
- **Rescue and evacuation** of an injured worker should take place as rapidly as possible, with consideration of immediate life threats and the severity of injuries. Do not exceed the scope of worker rescue training or further exacerbate injury.

- The assistance of **available emergency medical and professional rescue** is specified in the Work Safety Plan, and should be considered when implementing a rescue. City and county technical rescue teams are available to assist in the SLCA operating areas, including Utah DPS helicopter hoist capabilities.
- Specified rescue systems are based on climbing **partner rescue** principles, utilizing techniques employing the workers' commonly issued PPE.
- Rescue systems, even improvised, should include a means of progress-capture or controlled function to allow for **'hands-free' operation**, and to control for potential user error.
- Additional friction should be applied to control **higher (e.g. 2-person) loads**, and **reversible-** or 'raise & lower' systems- offer more options.
- When indicated in the Work Safety Plan due to environment and work practices, the risk of a worker rescue system exposed to a **fall or cut hazard under suspension** must be considered. This may be mitigated through:
 - use of additional rope protection on exposed single rope systems
 - use of stationary rope systems versus moving rope systems
 - combined use of rope suspension and backup systems or lanyards
 - use of 'twin' or 'mirrored' rope systems

The Work Safety Plan will consider, qualify and prescribe systems for worker rescue from the following hierarchy of methods:

- **Reduction and Elimination.** If the work can be achieved with less (or no) fall hazard, this is preferable. If the scope of a rescue exceeds the technical training or capability of the workers, professional rescue services may be contacted or contracted for the work task.
- **Engineered Solution.** The Work Safety Plan indicates if engineered solutions are available to support rescue. For example, the SLC DPS helicopter with hoist capabilities may be available for access and evacuation of an injured worker.
- **Self-rescue.** Worker training may include techniques and compatible PPE for self-rescue from fall protection or elevated positions, if the worker is capable.

- **Releasable Solutions.** Work practices that restrict workers to suspension systems on releasable, belay/descent devices, allow for easier rescue of an injured worker. If qualified as compatible with the work environment and systems, releasable systems may also allow another worker to release and lower an injured worker.
- **Assisted Rescue.** If the injured worker is capable, another worker may assist, using a reach pole or throwline, with retrieval and connection to an independent rescue system that allows for the raising and/or lowering of the injured worker.
- **Unaccompanied Rescue.** If the injured worker is capable of assistance and does not need direct stabilization and accompaniment, another Competent Worker may access the injured worker, establish position and then lower the injured on their own system, or on an independent system.
- **Accompanied Rescue.** If the injured worker is unable to assist, or the nature of the injuries require direct treatment, Competent Workers are trained to implement an accompanied rescue. The Competent Worker accesses the injured worker on an adjacent or dedicated rope system, releases the injured worker from their system and onto the rescuer's system, and descends in tandem with the injured worker.

10. WORK SAFETY PLAN

The Work Safety Plan (in [PDF](#) for printing or use [digital form entry](#)) prescribes the specific work processes and fall protection to be used, including:

- Designation of workers and their roles in the work plan
- A review of the [SLCA's Job Hazard Analysis](#) for anchor replacement
- A survey of the work site, terrain and falling object hazard zones
- The scope of the work tasks to be completed
- The specific tools and materials needed to remove and place the anchors
- The Fall Protection systems to be used for access and work positioning

- The work progression on lead protection anchors
- Controls used to protect rope systems during tool use
- Additional PPE and equipment needed
- The Rescue systems to be used in the event of emergency
- Work site communications plan
- Signed acknowledgement (pre-work)
- NOTES (post-work) - including any incident and near miss reporting

11. TRAINING

All SLCA Fixed Anchor Replacement workers who may be exposed to fall hazards or hazards associated with work at height, shall have received qualified training, and documentation of training, on how to recognize such hazards and how to control their exposure. (CFR 1910.30 & 1910.132, CFR 1926.503, 1926.21)

The Fall Protection Handbook & Assessment includes instructions to practice the skills and an objective competency assessment for all anchor replacement workers, including:

- A Job Hazard Analysis of anchor replacement work
- Selection of appropriate PPE
- Care and maintenance of PPE
- Appropriate access methods
- Proper use of work positioning lanyards, fall restraint and fall arrest lanyards
- Proper use of Attended Belay climbing systems
- Proper use of Rope Ascent / Descent systems
- Proper use of secondary ('backup') rope systems
- Proper use of temporary lifelines
- Limitations on the use of the fall protection systems, and the use of natural or existing 'in place' anchors

- ❑ Controlled tool & material handling and drop/loss prevention
- ❑ Partner Rescue
- ❑ Implementing the Work Safety Plan

A record of individual workers, relevant training and experience, any technical certification(s), emergency contact information and training participation is maintained by the SLCA. ([Appendix B- Worker Training Log](#))

12. EMERGENCY ACTION PLAN

Each site-specific Work Safety Plan specifies the rescue systems to be used in the event of worker accident or injury.

INCIDENT RESPONSE:

- Confirm scene is secure.
- Contact injured (if possible).
- Access injured via rope system indicated in Work Safety Plan
- Hasty survey for immediate life threats: airway, breathing, circulation (bleeding), disability (fractures or neck/back injury) and environmental exposure.
- Stabilize immediate life threats (to the extent of training).
- If injuries are serious, and emergency assistance will be needed, **contact 911:**
 - Salt Lake County Sheriff Search & Rescue, NON-emergency dispatch only = (801) 743-7000,
- If cell service is unavailable, use the Garmin InReach GPS with Satellite Text for emergency communication.
- Stabilize and protect the patient. Use the field First Aid kit as needed.
- Identify possible evacuation route or possible hoist or landing zone(s).
- Maintain communications with 911 Dispatch.
- Guide responders to the injured's location.
- Once the evacuation is completed, complete an Incident Report

COMMUNICATION / PUBLIC RELATIONS

Once emergency personnel have been notified and the situation is stabilized, workers should contact the SLCA as soon as possible. All requests for communication or statements (except to responding authorities, as necessary) should be directed to:

- Julia Geisler, Executive Director, SLCA -
- Jason Hall, WARI Committee Chair, SLCA -
- Rick Vance, Board Chairman, SLCA -

FIRST AID RESPONSE

The Anchor Coordinator will maintain (Wilderness) or (Outdoor Emergency) First Responder and CPR training and certification (or qualified equivalent).

A small field first aid kit is available on site to assist in stabilizing injuries and includes:

- CPR mask or shield
- wound irrigation syringe
- dressings and bandages
- hemostatic bandages for excessive bleeding
- field tourniquet for uncontrollable extremity bleeding
- adhesive bandages for open lacerations
- If worker has provided medical alert for anaphylaxis- confirm availability of their epi-pen
- aspirin available cardiac emergency
- small, flexible splint for extremity stabilization
- lightweight emergency bivy/rescue sack

INCIDENT/ACCIDENT/NEAR-MISS REPORT

The [Anchor Replacement Work Incident Report](#) (and via [GoogleForm](#)) is used to document and collect personnel and witness information as soon as possible after an incident has occurred, and the injured has been transferred to professional care. The form report is used to document:

- When the incident occurred
- Which (if any) personnel were involved
- A description(s) of what happened (by the reporter)
- Other witnesses and their descriptions (if available)
- Identification of any responding professional services and transfer of injured to their care
- A description (and/or photo) and immediate quarantine of any PPE involved

II. WORK PROCESSES

1. OBJECTIVE

The SLCA Board of Directors approved the Wasatch Anchor Replacement Initiative (the “Initiative”) to proactively facilitate the replacement of fixed anchors in Wasatch climbing areas. The SLCA 2025 Strategic Plan furthers this objective - including the program development, technical training and implementation of paid professional crews to perform the anchor replacements. The Initiative also seeks to inform new route developers with [Best Practices](#), based on similar community standards for sustainable, long-term anchor placement.

2. SCOPE

This guidance on work processes is intended to be used in conjunction with the above General Health & Safety and the Managed Fall Protection Plan. The Initiative prioritizes the **replacement of existing bolt anchors**- aka ‘*hole for hole*’ - whenever practicable, for the goal of resource conservation and sustainable recreation management.

Climbing has primary and fundamental hazards. The use of any placed or 'fixed' anchors to protect climbers has inherent risks that cannot be removed, and are assumed entirely by the user.

3. POLICY

The Initiative aims to facilitate the responsible replacement of previously placed climbing anchors as part of preserving and conserving the climbing resources that are cherished by its membership community.

4. PROTOCOL: Sustainable use of temporary & removable anchors

The use of temporary and removable anchors- such as metal wedges and pitons- may be essential for both progression and protection in new route development.

However, in areas where the SLCA has formal responsibility for the stewardship and management of climbing anchors, including the 'long-term' maintenance or replacement of established climbing anchors:

- 'in-place' or 'fixed' anchors that are observed to be unreliable or not durable for repeated use;
- 'in-place' or 'fixed' anchors that are not specified by the manufacturer for permanent placement; and
- 'in-place' or 'fixed' anchors that are placed and in use contrary to the manufacturer's Instructions For Use;

may be removed and replaced with the appropriate bolt anchors designed for this application, placed specifically according to manufacturer's instructions, and intended for long-term durability.

If conventional passive wedges or active camming devices- specified for climbing fall protection (for example, strength rating > 4kN; i.e. not only for aid climbing progression) may be used reliably in the removed placement, then placement of a bolt may be deemed unnecessary.

In the cases where unreliable 'in-place' or 'fixed' anchors are removed, every effort is made to preserve the character of the route, the required physical movements and holds, and the nearest location of replacement anchors in reliable rock structure.

To assist with the planning, execution and sustainability of these management actions, the SLCA enacts the following protocols for operational guidance:

- The SLCA only places permanent anchors: mechanical and chemical bolt anchors, designed for rock climbing applications, and meeting relevant EN or comparable manufacturing standards.
- The SLCA does not place temporary removable anchors (pitons or metal wedges) as permanent protection.
- Textile slings on natural or geologic features are not considered or placed as permanent protection.
- Existing anchors in unusable, poor, corroded or indeterminate condition are removed and replaced.
- All bolt anchors on a route may be replaced at the same time to ensure consistent treatment and management over the long-term.
- Quickdraws (and 'fixed' cable or textile slings) are manufactured as individual Personal Protective Equipment, and are not placed or maintained by the SLCA. The placement, use & removal of individual PPE is the responsibility of each user.
- Anchors manufactured and marketed as temporary or removable safety anchors are not used as permanent anchors, and may be removed and replaced with bolt anchors.
- Removable anchors that are used contrary to manufacturer's instructions may be removed and replaced.

MANUFACTURER'S REFERENCES on the use of temporary & removable anchors:

Only Pitons meeting the EN 569:2007 Standard for Mountaineering equipment and safety requirements, and of hard steel construction indicated by a circled 'S' stamped on the item, are considered suitable for use as belay anchors in

PPE rope systems by manufacturers. This designation is limited primarily to larger angle pitons and only the largest 'lost arrow' style pitons.

Black Diamond pitons: Instructions For Use

- 'All aid iron must be in good condition and properly placed in sound rock to be reliable.'
- 'Pitons left in the rock or subject to repeated use can become less reliable over time. Do not trust fixed pitons.'
- 'Climbing gear does not last forever.'
- 'We strongly discourage secondhand use. You must know the history of your equipment to be able to trust it.'
- 'Only Black Diamond Angle and Lost Arrow Pitons conform to EN 569:2007. All other Aid Iron products do not conform to EN569:2007 or the PPE Regulation 2016/425. Bugaboos, Knifeblades and RURPS are not considered PPE by the manufacturer.'

https://www.blackdiamondequipment.com/on/demandware.static/-/Sites-bdel/default/dw4428a732/instructions/F19/M10526_C%20Aid%20Iron%20I-S-WEB.pdf

Petzl pitons: Instructions For Use

- 'For belay anchors, use pitons marked S. After a major fall on a piton, it may have sustained permanent damage which may not be visible to the eye: discard this piton. This product must not be pushed beyond its limits, nor be used for any purpose other than that for which it is designed.'
- 'The breaking load and the holding strength of the piton diminish over time. Piton strength can be diminished by frequent use.'
- 'A product must be retired when:
 - It has been subjected to a major fall (or load).
 - You have any doubt as to its reliability.
 - You do not know its full usage history.

- When it becomes obsolete due to changes in legislation, standards, technique or incompatibility with other equipment' _____

<https://www.petzl.com/US/en/Sport/Anchors/V-CONIQUE>

See 'Technical Notice'

5. RESPONSIBILITIES

Climbing anchors are not strength tested in-place, or during & after placement, to avoid damaging the placement. **Quality assurance is based on 'Competency' of the worker and adherence to correct placement hardware and procedures.**

It is the responsibility of the Anchor Replacement Coordinator to ensure that all workers have been trained and assessed as 'Competent' in their ability to remove and place anchors. (Appendix- Anchor Replacement Handbook & Assessment)

It is the responsibility of all Workers performing anchor placement or replacement to:

- Prioritize the importance of quality control in anchor replacement.
- Participate in a pre-work meeting and review the Work Safety Plan with the team.
- Assemble and prepare all necessary equipment and materials prior to starting work.
- Correct or communicate any unsafe practices or conditions immediately.
- Adhere to training and procedures.
- Place anchors and equipment according to manufacturer's instructions, including material storage, handling and inventory management.
- Complete work records and document all anchor placements and materials used.
- Continuously educate and improve through updates in work practices, standards and equipment.

6. PREPARATION & PLANNING

CONFIRMATION.

The Anchor Replacement Proposal includes prior assessment of the social and historical context of the anchor replacement:

- Has the first ascensionist(s) been contacted for their input on anchor replacement?
- Has input from the SLCA community been solicited for input on this anchor replacement?
- Do the first ascensionist or SLCA community members advocate for preserving the original character of the route, i.e 'hole-for-hole' replacement?
- Do the first ascensionist or community members advocate for replacement and/or repositioning of anchors as deemed appropriate by professional workers?
- Were the original protection anchors placed while lead climbing?

PRIORITIZATION.

Anchors prioritized for replacement include:

- Bolts less than 3/8in in diameter or known to be too short
- Archaic bolt styles (such as button heads, star drives, and lead)
- Outdated hangers (SMC, leepers, homemade, etc.) or thinner than a coin
- Severe rust and/or corrosion
- Damaged or bent bolts and hangers
- Bolts cantilevered out from the rock surface
- Bolts that will not tighten
- Knowledge of bolts of similar construction and age failing in the area
- Anchor systems with stacked washers and chain (instead of hangers)
- Hangers that spin freely
- Failed or missing bolt

Other factors to consider include:

- Is the current anchor(s) inadequate, damaged or missing?
- Does the route or area see a high volume of climber traffic?
- Is the route a popular 'project' and the anchors get intensive use?
- Is anchor replacement needed to manage impacts, or for rescue capability?
- Is the route a personal project that is open to improvement?

STRATEGY.

There are significant logistics and effort required to access and work position for anchor replacement. A missing tool or incompatible or expired materials can result in wasted effort, ineffective results and poor quality. *Prior planning and preparation is required before starting the actual work.*

Reconnaissance and observation reports on the type and condition of climbing anchors needing replacement enable more specific preparation for the type of tools and the amount of materials needed. Combined with the unpredictable outcomes of removal, preparation also includes always bringing available tools and materials for anchor removal, re-placement, patching, and new placement.

TEAM ORGANIZATION.

Teams of two partners (supported by the Coordinator or additional ground or logistical assistance) are the most effective. Technicians may belay each other lead climbing to install access ropes, and then work side by side, each on their own set of working and backup ropes. Partner teams also allow immediate assisted or unaccompanied rescue.

On vertical and slab terrain- where 'hole for hole' anchor replacement is also a likely priority- the two partners work side-by-side. Particularly for anchor removal, one worker performs a task while the second worker prepares and handles the tools from an organized work bucket. Alternatively, for drilling and placement, they may work on two tasks in sequence, with one positioned above the other.

Multi-pitch routes add additional 'big wall' complexity for daily access and the hauling and handling of tools and materials, in teams of two or potentially three.

On steeper terrain, the crew first teams up as climbers and belayers to install the work and backup ropes on individual routes, and then works on each of the routes individually, with tag lines and a 'ground person' for assistance, support and direction.

PROGRESSION

Once installed, ropes anchored at the highest point available may be used (with directional anchors) for work positioning on several routes below.

On straightforward, vertical and less than vertical terrain, or if mechanical anchors are used (and can be used immediately), work may be carried out on rope ascent or descent. In a 'hole for hole' adhesive anchor replacement, new anchors are placed on ascent, to avoid loading the anchors until cured.

On overhanging and traversing terrain (requiring the use of directional anchors), and if adhesive anchors are to be placed, the pre-existing anchors may be used first as directionals while new anchors are placed, then are removed in a second ascent progression after they have cured. In a 'hole for hole' adhesive replacement with adhesive anchors on steep terrain, removable bolts may be used instead as directionals in renewed and cleaned holes, on a descent progression.

Placement of adhesive anchors on the steepest overhanging sport climbing terrain requires four progressions:

1. Lead aid climb and install the working and backup rope strands through each anchor / fixed draw.
2. Ascend the working ropes (main + backup), carefully assessing the location of each replacement anchor, drilling and thoroughly cleaning each new hole, and 'lowering out' between each bolt.
3. Ascend the working ropes (main + backup), placing (and documenting) new adhesive bolts in each hole, and 'lowering out' between each bolt.
4. Ascend the working ropes (main + backup), removing and patching the old anchor holes- using rope protection and redundant lanyards for cutting & grinding, collecting (and documenting) the removed hardware, and 'lowering out' between each bolt. Extension chains are placed on the anchor if needed.

The [Work Safety Plan](#) specifies the progression of tasks for replacing lead protection anchors, considering the route characteristics, the type of anchors to be placed, and the scope of work:

- Removal- top down
- Removal- bottom up
- Replacement/Placement- bottom up

- ❑ Replacement/Placement- top down
- ❑ Removal & Replacement- (lead / follow on traverse)

7. WORK PROCESS FORMS & REPORTS

The planning and completion of anchor replacement is accounted for and executed by a progression of reports, starting with anchor observation reports:

1. **Anchor Condition Observation Form:** This [GoogleForm](#), [PDF](#) (or Appendix G) can be shared, or tasked to volunteer observers for reconnaissance, and is used to report a specific anchor, route or area requiring replacement or maintenance. It may also be used to monitor past work, and to confirm anchors not in need of work.
 - **Anchor Replacement Work Proposal:** Based on the observations, and including an assessment of the relative priority, historical and social context, is used to summarize the scope of replacement work needed and identify any interested and qualified workers. (Also in [GoogleForm](#), [PDF](#) or Appendix H.)
 - **Work Safety Plan:** Written and qualified by the Anchor Coordinator, the Work Safety Plan assigns a unique ID to the project, and is finalized in the pre-work meeting with the team. It surveys the site and specifically reviews the job hazards, tools and materials, fall protection systems and the work progression. It also identifies a communication and rescue plan for the team. (Also in [GoogleForm](#), [PDF version](#) or Appendix.)
 - **Anchor Replacement Work Log:** This internally shared [GoogleSheet](#) summarizes the work from proposal to completion, and the estimated and actual costs of labor, anchors and materials used.
 - **WARI Report Form:** The Coordinator completes the (private) [WARI digital form entry](#), and the work is archived and posted publicly on the [SLCA website](#).
 - **Anchor Replacement Work Incident Report Form:** This is used as soon as reasonable after the injured are stabilized or in professional care, to document any/all incidents or near-misses. This includes any/all dropped objects on the work site. (Also available in [GoogleForm](#), [PDF](#) or Appendix F.)

8. TOOLS & EQUIPMENT FOR ANCHOR REPLACEMENT

A full itemized inventory and sourcing for the tool kits is found in Appendix G ([WARI Tools & PPE Inventory](#))

PERSONAL PROTECTIVE EQUIPMENT.

As indicated in the Job Hazard Analysis, and reviewed in the Work Safety Plan, the appropriate use of hand, eye, ear and respiratory protection is required for all anchor removal and placement. A redundant fall protection and/or work positioning system is also used for all exposed drilling, cutting and grinding operations, and care should be taken handling hot drill bits and the risk of damaging the rope or worker.

HANDLING & DROP/LOSS PREVENTION.

As noted in the fall protection plan, all tools have lanyards or lanyard connections for drop/loss prevention. The Work Safety Plan indicates if the Hazard Zone below the work site is also to be signed and/or marked. To ensure worker understanding of the hazard, any unintentionally dropped object is to be reported as a 'near-miss' [Incident](#).

Tools and materials are transported and positioned in industrial work buckets/bags. A dedicated haul line, or the bottom/tail end of a secondary rope system is used to haul the bucket from above and position it adjacent to the work. For drop/loss prevention, the work bag at all times is either:

- positioned by the rope through a progress-capture pulley,
- tethered with a lanyard to an anchor or the worker's system,
- attached or tethered to their belay/descent device connector, or
- worn on the back in a pack

PLACEMENT of MECHANICAL BOLTS requires:

- Climbing hammer (*stainless steel* to reduce potential corrosive damage), w/ lanyard / tether
- SDS compatible hammer drill, w/ lanyard connection
- SDS concrete/masonry/rock drill bits, compatible with bolt diameter (1/2")
- Blow tube, w/ lanyard connection
- Wire pipe brush (1/2")

- Wrench and/or socket with ratchet, w/ lanyard connection
- Torque wrench or adapter (set to manufacturer's torque specifications), w/ lanyard connection
- Static/cable 'funkness' sling (if case of placement failure)
- +/- spare drill battery

REMOVAL of MECHANICAL BOLTS requires additional items:

- Extension "cheater" bar for socket wrench and/or ratchet, w/ lanyard
- Cordless impact driver + compatible deep well sockets and extractors
- Hacksaw w/ fresh blade
- Needle nose pliers, steel punches, and/or broken screw extractors
- Adjustable wrench (for unusual hex heads or stud nuts)
- Used Carbide tipped SDS bits (for sleeve or broken stud drilling)
- Metal tap (of compatible diameters) with wrench,
- Compatible draw studs to extract a threaded sleeve separately
- Slide puller w/ threaded draw stud connection, (w/ lanyard) OR
- Threaded cylinder extractor (aka Hurley Jr, Hurley Sr, Burley)
- small spray bottle of water for spinning and/or cooling hot bits
- (Optional- for buttonhead bolts): Thin flat bar and thicker pry bar, or alternative wedge (notched 'fork' piton, breaker bar, cold chisel), w/ lanyard
- Patching supplies: 2 part mixing epoxy and small bag of sand/rock dust from base of route, gloves, putty knife, paper towel, trash bag

PLACEMENT of ADHESIVE (aka 'glue-in') ANCHORS requires:

- Plastic/ hard rubber mallet (or *stainless steel* (only) hammer to reduce corrosion), w/ lanyard
- Place adapter/protector (for Climb Tech Wave bolts only- or use mallet)

- SDS compatible hammer drill, w/ lanyard connection
- SDS concrete/masonry/rock drill bits, compatible with bolt diameter (1/2")
- Blow tube, w/ lanyard connection
- Pipe/tube brush (1/2")
- Dispenser gun, w/ lanyard connection and holster
- +/- spare drill battery
- Epoxy anchor adhesive, per anchor manufacturer's specifications
- Insulated container for adhesive transport and storage of adhesive at site
- Compatible adhesive mixing/applicator tip(s) and reusable screw cap
- Cleaning supplies: disposable gloves, putty knife, paper towels, trash bag
- Removal tools in case of placement failure

REMOVAL of most ADHESIVE anchors is difficult if they are placed correctly. If replacement is needed, these are most likely abandoned, cut off, the remaining material removed to below the rock surface, and the hole patched and camouflaged with a mixture of epoxy and native sand/rock dust material.

Removal tools for adhesive anchors includes:

- 1/4" x 10" SDS bit for drilling out legs
- Hurley SR- threaded extractor, compatible with bolt hanger
- Climbing hammer w/ lanyard
- angle grinder with cut-off wheel(s) and guard, w/ lanyard
- Small cold chisel or metal punch
- (full face) visor / impact shield for grinder use
- extra battery
- extra cut-off wheel
- Patching supplies: 2 part mixing epoxy and small bag of sand/rock dust from base of route, gloves, putty knife, paper towel, trash bag

9. ANCHOR REMOVAL METHODS

EXTRACTION.

Four type of tools & methods are used. Prying or pulling on the hanger alone is less effective, as the hanger is levered and rotated by the force, which may actually increase the holding resistance, or damage the (softer) rock around the hole upon extraction:

- **Lever-** If the bolt is a simple drive-in, rivet, split-shaft or similar construction with no expansion, and/or in poor condition- a notched 'fork' piton, flatbar or similar lever may be inserted under the hanger and used to pry it out.
- **'Funkness'** - Additional advantage may be applied by using a 'funkness' (static cable) lanyard on the head of the hammer and clipped into the hanger, to pull the bolt out with repetitive, outward swings of the hammer.
- **Slide-Puller-** A stud bolt or a draw stud is threaded directly into the slide, then the sliding mass is used to pull the bolt out with the repetitive, outward forces.
- **Threaded Extractor-** Additional and more controlled advantage may be applied by using the 'Hurley' tool - a large threaded cylinder (custom made in a small, medium and large version). Once threaded onto a stud, a ratcheting wrench turns the hardened steel threads, driving the cylinder against the rock surface, and extracting the bolt straight out.
- Wedge/stud bolts may require additional extraction methods as detailed below, including removal of the hanger and direct connection to the individual components, resulting in a more efficient outward pull, directly on the bolt.

SPINNING & EXTRACTING.

Wedge (and similar) style bolts- with a nut on a threaded stud through the hanger- can be driven into a deeper hole, or broken off with a hammer, and patched. However, a method using a stud spinner and extractor can first be attempted in a 'hole for hole' replacement:

1. Loosen the nut or bolt head, then lightly tap on the stud with the hammer to disengage the wedge.
2. Remove the nut and hanger.
3. Place the threaded 'stud spinner' onto the stud.
4. Spin the stud with the drill at high speed, while lightly pulling in & out on the stud.

5. *Friction and heat will be generated. Use a small spray water bottle to cool the bit, add an abrasive slurry, and lubricate the hole.
6. The stud is scored to hold the cone in place and minimize expansion.
7. An extractor (slide or threaded) is used to extract the stud.
8. If there is still significant resistance to the extraction, the process may be repeated, depending on the priority of 'hole for hole' replacement efforts.
9. If unable to extract, the anchor may be abandoned and patched (see relevant section.)

TAPPING & EXTRACTING

Hex head sleeve bolts can be disassembled and the components removed from the old hole, however corrosion and wear may require additional tooling to remove the sleeve and cone components:

1. Loosen the bolt head, remove the bolt.
2. Remove the sleeve with a punch and locking needle nose pliers- if possible.
3. If the sleeve is corroded or stuck, cut threads into the sleeve with the (corresponding diameter) tap.
4. Remove the thread cuttings with a magnet, as necessary.
5. Insert and thread a corresponding diameter draw stud into the sleeve and use it with a slide or threaded puller to extract the sleeve.
6. Clean any debris left in the hole with a magnet.
7. Insert a compatible thread draw stud, or an alternate bolt (w/ same threads) into the remaining plug, and use to extract the plug, OR
8. If the cone is damaged, cut threads into the cone with the appropriate diameter tap.
9. Clean any debris left in the cone hole with a magnet.
10. Insert and thread a (corresponding diameter) draw stud into the cone and extract it with a slide or threaded puller.

11. ALTERNATIVELY- a damaged cone or sleeve may be removed by carefully drilling out the hole and cone to full depth with a used drill bit. * This can result in an inconsistent hole that is best replaced with an adhesive anchor.

HOLE RE-USE ASSESSMENT

Replaced anchors must be reliable and intended for a 50 year lifespan. Expansion bolts and adhesive bolts rely on specific tolerances of hole diameter for correct and full-strength placement. Assuming the rock quality is good, the quality of the hole has to be assessed if it is to be reused:

- What diameter is the hole?
- Is the hole damaged, misshapen or enlarged?
- Is the hole deep enough for the replacement anchor?
- How difficult was the existing anchor to remove? If the hole is the appropriate diameter, it will be difficult. If it was easy, it may be oversized.
- Clean the hole repeatedly with the corresponding diameter ($\frac{1}{2}$ ") pipe brush. It should fit snug in the hole.
- Blast the hole repeatedly with a blower to remove any debris.
- Confirm the diameter by inserting a (new) drill bit by hand and rotating and checking for excessive play.
- A $\frac{3}{8}$ " diameter (or smaller) wedge/stud hole can be enlarged with a clean, straight $\frac{1}{2}$ " diameter hole and replaced with a new $\frac{1}{2}$ " sleeve bolt.
- * The hole for a $\frac{1}{2}$ " diameter sleeve bolt replacement must be carefully evaluated before re-use with another $\frac{1}{2}$ " diameter sleeve bolt. **If in doubt of the quality of a re-used $\frac{1}{2}$ " hole, replace it with an adhesive anchor instead, or abandon and patch the hole.**
- A worn SDS bit can be used to attempt the drilling removal of the sleeve and cone in a $\frac{1}{2}$ " hole. However, this can result in heat, binding and a higher possibility of failed removal and risk of damage to tools, equipment and worker. The Initiative does not prioritize this method unless the circumstances for a 'hole for hole' replacement are exceptional.

ABANDONMENT & PATCHING

SLCA policy- unless otherwise advocated by the first ascensionist or community input- is to attempt 'hole-for-hole' replacement whenever practicable, using the above methods. If the methods fail to remove the anchor, the bolt or assembly is too corroded or damaged to extract, or removal will lead to a hole of questionable quality or reliability, then one of several options is used to abandon and camouflage the hole:

- If the bolt is a wedge/stud bolt, once the nut and hanger have been removed- if the hole is deep enough, it may be driven deeper into the hole until below the surface of the rock, if possible, and patched. (For this reason, placement of wedge/stud bolts should be drilled additional depth to allow for countersinking if/when replaced. However, the SLCA Initiative does not place wedge bolts.)
- If the bolt is a hex head, a ratchet and breaker bar can be used to over torque the bolt and break the head off. If broken above the surface of the rock, the remaining material may be hammered or drilled out with a steel cutting bit and/or metal punches to create a 'pocket' for the epoxy and native sand/dust mixture.
- If the bolt is a sleeve anchor, the bolt and hanger may also be removed and the sleeve hammered below the rock surface, then patched.
- Due to the inefficiency, and risk of damaging the hole, equipment or worker, the Initiative does not prioritize drilling out a metal sleeve unless the circumstances of a 'hole for hole' replacement are exceptional.
- In the worst case of a bottomed out stud bolt or the destructive removal of an adhesive anchor, the stud or bolt may be scored at the rock surface with a hacksaw blade, and a hammer and cold chisel used to knock the bolt back and forth in small strikes, until it breaks. Care should be taken never to hammer the bolt over flat, which is harder to remove. If broken above the surface of the rock, the remaining material may be drilled out with a steel cutting bit and/or metal punches to create a 'pocket' for the epoxy and native sand/dust mixture.

PATCHING SUPPLIES

- 2 part mixing epoxy putty or gel syringe with mixing tray
- small plastic bag of sand/rock dust from base of route, or prior drilled holes
- rubber gloves
- putty knife

- ❑ paper towel

9. REPLACEMENT ANCHORS & MATERIALS

For consistency, quality and efficiency, the SLCA Anchor Replacement Initiative replaces bolt anchors with one of three types of bolts, depending on the application:

ANCHOR TYPE	APPLICATION	INVENTORY
stainless steel, 'medium' 1/2" sleeve anchor	<ul style="list-style-type: none"> - solid, dense rock types - relatively quick placement - immediate use 	Powers SS 1/2" x 2 3/4"
stainless steel, 'long' 1/2" sleeve anchor	<ul style="list-style-type: none"> - all rock types, incl- - desert (softer) sandstone, - immediate use - possible replacement 	Powers SS 1/2" x 4 3/4"
stainless steel, ('glue-in') anchor w/ spec adhesive	<ul style="list-style-type: none"> - limestone & all rock types (other than softer sandstone), - overhanging terrain, sport routes - delayed use (cure time) - corrosive environments - long-life solution 	ClimbTech Wave SS Dewalt epoxy adhesive Hilti epoxy adhesive

Additional qualified hardware for anchor placement includes:

HARDWARE	APPLICATION
stainless steel screw link	rappel anchor, connecting chains or rings to anchor hanger
stainless steel chain	hanger w/ screw link > anchor extensions
stainless steel rings	hanger w/ screw link > retrievable rappel anchor

Additional consumable materials used during adhesive anchor placement include:

MATERIAL	APPLICATION
adhesive construction epoxy (+ dispenser gun)	<ul style="list-style-type: none"> - per anchor manufacturer's recommendation - 'glue-in' anchor placement
epoxy tube mixing tips	<ul style="list-style-type: none"> - mixes appropriate amount of epoxy during application - easily clogged > use several spare tips
latex / nitrile gloves	<ul style="list-style-type: none"> - protect hands from epoxy - protect PPE from epoxy - clean placement
putty knife	<ul style="list-style-type: none"> - clean placement
paper towels	<ul style="list-style-type: none"> - clean placement - protect PPE from epoxy
trash bags	<ul style="list-style-type: none"> - clean placement - clean work site & environment

10. ANCHOR PLACEMENT

QUALITY ASSURANCE

Climbing requires a primary assumption of personal risk, inherent to the activity.

However, anchors are placed by the Initiative to replace unreliable anchors and reduce the risk of failure. New anchors are intended to be reliable (to the extent possible) with a lifetime of at least 25 - 50 years.

Anchors are placed specifically according to the manufacturers' Instructions For Use:

ANCHOR / MATERIAL	PRODUCT INFORMATION
Fixe PLX Stainless Steel Hanger	https://fixehardware.com/index.php/fixe-plx-duplex-ss-1-2-bolt-hanger.html

ANCHOR / MATERIAL	PRODUCT INFORMATION with INSTRUCTIONS FOR USE
Powers Sleeve Bolt	https://climbtech.com/products/power-bolt-sleeve-anchor-stainless-steel/?sku=PWR-SSA-500X275
ClimbTech Wave Bolt	https://climbtech.com/products/wave-bolt-glue-in/
Dewalt Powers AC100+ adhesive	http://anchors.dewalt.com/anchors/products/chemical-anchors/injection-system-chemical-anchors/ac100plus_gold.php
Dewalt Powers AC200+ adhesive	http://anchors.dewalt.com/anchors/products/chemical-anchors/injection-system-chemical-anchors/ac200plus.php#productspecs
Hilti HIT RE 500 v3 adhesive	https://www.hilti.com/c/CLS_FASTENER_7135/CLS_INJECTABLE_ADHESIVE_ANCHORS_7135/r4929903

- To avoid corrosion from the use of mixed metal materials, *only stainless steel* anchors and components, including hangers, washers, screw links, chain and rappel rings are placed by the Initiative.
- The placement is performed by workers with documented training in anchor removal and placement.
- The placement is performed by workers with documented assessment of their competency in anchor removal and placement.
- The placement date and methods used are documented.

- Training (and assessment) in the use of industrial fall protection systems allow the workers better positioning and quality of work ('craftsmanship').
- A system of community 'anchor observations' and reporting continues to inform the condition of the replaced anchors.

REUSE vs REPLACEMENT.

Per SLCA policy, a 'hole-for-hole' replacement is considered first in the project planning. In the event the removal fails, and is abandoned, the worker will locate an adjacent area of rock that is suitable for anchor placement, and confirm the new placement is within reach of a climber (in position, on the route.)

Note: Manufacturer's specification for spacing between the Powers sleeve anchors (in medium density concrete) is (2 x depth) for maximum strength in shear and tension, or a minimum distance of (1 x depth) for 50% strength. In absence of Manufacturer's specification for Wave adhesive anchors, minimum spacing for these anchors is 6 inches (+ 1 bolt length).

If selecting a new placement location, evaluate the rock quality and consistency by:

- Visually look for cracks and other signs of weakness around the planned bolt location, or a larger block that may loosen over time.
- Using the hammer, tap near where you intend to place the bolt and surrounding area and listen for changes in sound.
- While drilling, feel for changes in rock density and any signs of weakness.
- If the bolt type, diameter, and length is appropriate for rock, it should tighten up with a few turns of wrench, without spinning or ejecting from the rock.
- Re-check the tightness of any adjacent bolts to confirm the new holes have not created weaknesses in the area.

SLEEVE ANCHOR PLACEMENT. (Powers Stainless Steel)

- Confirm that the drill bit is the appropriate diameter for the ½" bolt. Worn drill bits can become undersized, partially in hard rock.

- ❑ If a new hole, find a region flat enough so the hanger will mount flush to the rock surface, oriented to the direction of load, and connectors will be loaded properly.
- ❑ Confirm the depth of hole and mark with tape on the drill bit. The hole should be at least the full depth of the anchor bolt (but no more than ½” deeper for adhesive anchors.) NOTE- On new routes, wedge/stud bolts may be drilled to ~ 1-1 ½” more than full depth to allow for abandonment and patching if a future replacement effort fails. These bolts are not placed by the Initiative.)
- ❑ Drill a hole perpendicular to the rock surface to the desired depth. Support the drill- use the handle accessory if possible- such that the hole does not ovalize in soft rock.
- ❑ To ensure a clean and appropriate diameter hole- drill the hole in a continuous motion, stopping the drill for removal to clean out the debris, or to re-insert. Care should be taken not to enlarge the hole with repeated drilling, insertion and removal.
- ❑ Clean out the hole thoroughly with the blow tube and pipe brush, for at least 4 alternating cycles of each method, and until clean.
- ❑ The bolt should be pre-assembled with compatible stainless steel hanger and washer. Confirm that the full assembly is intact, is all stainless steel materials, and that the bolt has been unscrewed enough that the cone is not expanding the sleeve.
- ❑ Insert the bolt in the hole, being careful to orient in-line with the hole, and use a hammer to tap the bolt cleanly into the hole, preserving the correct orientation.
- ❑ Once the bolt is cleanly established in the hole, use the hammer to drive the bolt to full depth, being careful to strike the bolt cleanly and straight in-line.
- ❑ One the bolt is fully inserted, orient the hanger smoothly against the rock surface, and in the appropriate direction for loading. Stabilize the orientation until the expansion is engaged by tightening with an adjustable wrench or socket for a few turns, which then holds the hanger in place.
- ❑ Confirm the bolt is engaging and not spinning, extruding or levering out of the hole.
- ❑ Tighten with ratchet and torque adapter, until the limiter releases: 20-25 ft lbs (per manufacturer’s Instructions for Powers Sleeve bolts.)

- ❑ It is possible to over tighten expansion bolts, particularly with long wrenches, or a drill driver. This creates unnecessary stress on the bolt and can damage the placement. ***For quality control - sleeve anchors should ONLY be placed and/or re-tightened with the properly calibrated torque wrench.*** This action is then documented in the work report.
- ❑ Confirm that the hanger does not spin.
- ❑ Never seal a mechanical bolt with caulk or adhesive.

PROBLEM SOLVING:

FAILURE TO EXPAND / TIGHTEN

If the bolt will not tighten, then most likely the cone or sleeve locking mechanism is spinning in the hole, tracking through softer rock, or the rock is expanding and fracturing around the bolt. Use a funkness sling or extractor to try to remove the bolt. If it does not come out, assess if the locking mechanism is now re-engaged by the outward pulling, and the bolt is expanding correctly. If so, complete the placement. If the bolt comes out with the extractor, confirm that the hole is intact, and the correct diameter and depth. Discard the bolt and place a new one. If it will not function properly either, abandon and patch the hole.

BOTTOMING OUT

Shallow holes are the result of poor craftsmanship: a miscalculation of bolt length, insufficient battery power to complete the drilling, or failure to remove debris before placement. Sleeve bolts may be removed and extracted, and the hole drilled deeper. If a suboptimal hole cannot be re-drilled and corrected, then the hole should be abandoned and patched.

ADHESIVE (aka 'GLUE-IN') ANCHOR PLACEMENT. (ClimbTech Wave Bolt)

In general, due to the hardening & cure times, work practices should be planned for quick transitions if placing multiple anchors, and to delay loading of newly placed adhesive anchors until cured.

For example, a rebolting work sequence for adhesive anchors on overhanging terrain may first remove all anchors on an anchored rope descent system, placing

intermediate or removable bolts as temporary directional anchors, and then place the adhesive anchors on re-ascent of the rope system, working from the ground back up. Due to the limited handling time of epoxy adhesive in warmer temperatures, all tools and materials should be prepared and available as needed, before any work begins.

- Ensure the adhesive is not expired, is stored properly after purchase, and is protected from temperature extremes in transport and on site. **Record the brand, lot number and expiration date of the adhesive in the Work Safety Plan under ‘notes’.** (See Anchor Replacement Handbook for adhesive selection criteria)
- Adhesive should be selected according to anchor manufacturer’s specifications, with primary consideration for the temperature and conditions during transport, handling, placement and curing:

Application temperature	Adhesive
14 - 104° F	Dewalt AC 100+
14 - 104 ° F (better use in cold temps)	Dewalt AC 200+
23 - 105 °F (cures below 32°F)	Hilti HIT RE500 v3 (*requires Hilti applicator)

- Preparation includes a dedicated work bag or holster for clean storage of the dispenser gun when moving on rope, rubber gloves, eye protection, industrial wipes, waste storage bag, additional mixing nozzles and small ‘test’ storage containers or ziplock bags (see below.)
- Confirm the drill bit is the appropriate diameter for the chosen bolt. Worn drill bits can become undersized, partially in hard rock.
- If reusing an open hole, spin the bit by hand to confirm a clean, full-depth and appropriate diameter hole. If there is residue or debris, it may need to be redrilled, taking care not to expand the hole. If the hole is oversized or misshapen, a new hole is necessary for a reliable placement.
- Find a region flat enough so the hanger will be flush to the rock, and the connectors will not be loaded improperly.
- Drill a ½” hole perpendicular to the rock surface, no more than ½” deeper than the bolt’s length (Wave bolts = drill 4.5” deep)

- ❑ Support the drill- use the handle accessory if possible- such that the hole does not ovalize in soft rock.
- ❑ To ensure a clean and appropriate diameter hole- drill the hole in a continuous motion, stopping the drill for removal to clean out the debris, or to re-insert. Care should be taken to not enlarge the hole with repeated drilling, insertion and removal.
- ❑ Clean out the hole thoroughly with the blow tube and pipe brush, for at least 4 alternating cycles of each method, and until clean.
- ❑ Care should be taken to protect PPE, the rock face and the work site below from excess adhesive.
- ❑ **Ensure the mixing nozzle on the adhesive is working properly by first applying a small amount in or on a test container or ziplock bag.** Save and monitor this sample for correct hardening in the specified time.
- ❑ Ensure full depth of adhesive by inserting the mixing tip all of the way into the back of the hole and releasing epoxy while slowly withdrawing the nozzle from the hole. Fill the hole approximately three-quarters full, and stop releasing before withdrawing the nozzle, being careful not to overfill the hole. Some epoxy will be displaced by the placement, ejected out of the hole (and need to be cleaned up) as the new bolt is inserted.
- ❑ Ensure the proper orientation of the hanger or eye, and that connectors will not be loaded improperly, and insert the new anchor bolt by hand, as far as possible.
- ❑ Using a plastic/rubber mallet or the placement tool, first tap and then hammer the bolt to full depth, ensuring contact between the rock surface and hanger. Care must be taken not to damage the hanger or eyelet while hammering, and to strike the bolt straight in-line. If resistance is met, or the bolt becomes bent or damaged, stop and reassess the hole, and/or place another bolt. ***A non-marring mallet is preferred, or stainless hammer must be used on all stainless anchors to prevent corrosion from the hammer strikes.***
- ❑ Use wipes and the waste bag to remove and clean any excess adhesive ejected from the hole during placement. (*Be tidy and keep in mind this is a 50yr placement.*)
- ❑ Ensure the hanger or eyelet is clean and free of any adhesive residue.
- ❑ Properly cap, store and protect the adhesive between placements.
- ❑ Monitor the test sample to confirm hardening and curing.

- ❑ Communicate to the climbing community the need to avoid use of the anchor(s) until adequately cured. Restrict access with signage and flagging if necessary.
- ❑ Document and archive the placement.

BELAY / RAPPEL ANCHOR PLACEMENT

With a user expectation of complete reliability, the replacement of belay/rappel anchors prioritizes reliability and function over ‘hole-for-hole’ replacement. This may allow for some minor relocation of a belay/rappel anchor, provided it does not significantly alter the character, length or difficulty of the route.

Note: Manufacturer’s specification for spacing between the Powers sleeve anchors (in medium density concrete) is (2 x depth) for maximum strength in shear and tension, or a minimum distance of (1 x depth) for 50% strength. In the absence on manufacturer’s specifications, internal guidance on spacing between adhesive anchors is 6 inches.

STAINLESS STEEL ONLY

To minimize corrosion from mixed metal materials, the Initiative places only compatible, stainless steel anchor hardware for belay/rappel anchors and chain extensions.

In addition to a secure belay stance, a rappel anchor should also allow for clean rope retrieval:

- Screw links are used to attach rings or lengths of chain to the hangers, and allow for future replacement of rope bearing components as needed. Odd numbers of chain links are often used for proper orientation of the focal point.
- Screw links are tightened by hand with a wrench- and secured with liquid thread locker (Red LocTite) on placement. Anchors may be constructed with an equalized focal (aka ‘master’) point if top-rope usage is likely, or shared chain ends if primarily for rappel.
- Construction with two, horizontally separated anchor rings (only) may twist the rope upon retrieval, but is a lower impact use of materials. Users are encouraged to use two quickdraws for top-rope applications, and to thread the rings only for rappel. Adhesive anchors may be favored in some placements to minimize

rotational forces on the hangers that can result in loose or spinning hangers, or vandalism and removal of hangers.

- Chain lengths extend anchor points over any sharp edges or terrain features, and minimize rope friction & damage.
- Extended anchors allow for multiple parties to more readily 'pass' one another and share an anchor for both ascent and descent.

11. ANCHOR REPLACEMENT TRAINING & ASSESSMENT

The Anchor Replacement Handbook includes instructional diagrams and checklists for all work processes, and a competency assessment for all workers, including:

- Anchor observations
- Replacement anchor prioritization, proposal and planning
- A [Job Hazard Analysis](#) of all anchor replacement work
- Implementing the [Work Safety Plan](#)
- Quality Assurance measures
- Selection of appropriate PPE for anchor replacement
- Anchor types used for replacement by the Initiative
- Manufacturer's Instructions For Use of anchors & materials
- Tool and material handling
- Extraction methods
- Wedge / Stud Anchor placement & removal
- Sleeve Anchor placement & removal
- Adhesive Anchor placement & destruction/removal
- Removable Anchor temporary placement & removal
- Hole abandonment & patching methods
- Post-work reporting

A record of worker training sessions, workers' relevant training and knowledge, any technical certification(s) and emergency contact information is maintained by the SLCA in the Worker Training Log ([Appendix C](#))

IV. APPENDIX

Forms, reports and resources- available in PDF and Google formats, and also in the rolling document below:

- A. [Job Hazard Analysis for Anchor Replacement](#) - p. 43- 47
- B. [Work Safety Plan](#) - p. 48- 52
- C. [Worker Training Log](#) - p. 53
- D. [Managed Fall Protection PPE Inventory](#) - p. 54
- E. [Personal Use PPE Inspection Form](#) - p. 55- 56
- F. [Work Incident Report Form](#) - p. 57
- G. [Anchor Condition Observation Form](#) - p. 58- 59
- H. [Anchor Replacement Work Proposal Form](#) - p. 60- 63
- I. [Tools & Equipment](#) - p. 64
- J. [Fall Protection Handbook and Assessment](#)
- K. Anchor Replacement Handbook and Assessment- TBD 2020.07.15

APPENDIX A -



JOB HAZARD ANALYSIS FOR ALL ANCHOR REPLACEMENT OPERATIONS

DESCRIPTION OF WORK:

The removal of unreliable, failing or failed mechanical and 'glue-in' bolt anchors used for climbing, and the placement of reliable replacement anchors. This includes secure work positioning, and tool & material handling 'at height.'

Hiking and scrambling are used to access anchors whenever possible, on terrain not exposed to a fall hazard.

On terrain requiring exposure to a fall hazard, belayed climbing and rope ascent/descent systems are used as fall protection to access and position for the work.

REQUIRED PPE:

General Health & Safety	Fall & Falling Object Protection
-------------------------	----------------------------------

<ul style="list-style-type: none"> <input type="checkbox"/> Gloves (work) <input type="checkbox"/> Impact resistant & UV protection 'safety glasses' <input type="checkbox"/> Ear plugs <input type="checkbox"/> Mask (particulate) 	<ul style="list-style-type: none"> <input type="checkbox"/> Helmet <input type="checkbox"/> Harness (waist/sit + chest) <input type="checkbox"/> Belay +/-or Descent device <input type="checkbox"/> Ascender <input type="checkbox"/> Personal lanyards <input type="checkbox"/> Backup device / secondary rope clamp <input type="checkbox"/> Progress-capture pulley <input type="checkbox"/> Connectors (simple + locking) <input type="checkbox"/> Dynamic climbing ropes <input type="checkbox"/> Low-stretch ascent/descent ropes <input type="checkbox"/> Tools & materials lanyards <input type="checkbox"/> 'CAUTION' tape/signage
---	--

The complete [Fall Protection PPE Inventory](#) and description of individual worker kits, is found in the Operations Manual.

HAZARD ANALYSIS:

A summary of the general work tasks, hazards and controls used in the Anchor Replacement Program:

OBJECTIVE HAZARDS

TASK	HAZARDS	CONTROLS
Unload vehicles	<ul style="list-style-type: none"> • Back injury • Vehicular collision 	<ul style="list-style-type: none"> • Avoid heavy lifting, get help • Park off the road, in designated areas • Unload vehicle on opposite side of road
Hike to crag carrying equipment	<ul style="list-style-type: none"> • Slips, trips, falls 	<ul style="list-style-type: none"> • Wear appropriate, closed-toe footwear • Don't carry materials in hand

Working outdoors	<ul style="list-style-type: none"> • Hypothermia • Hyperthermia • Dehydration • Sunburn • Exhaustion 	<ul style="list-style-type: none"> • Planning / timing • Wear appropriate clothing • Drink & eat • Wear sunscreen and sunglasses • Communicate needs with partners • Physical preparation
Working at dusk/dawn	<ul style="list-style-type: none"> • Visibility difficulty 	<ul style="list-style-type: none"> • Use headlamps
Working above/below others	<ul style="list-style-type: none"> • Falling tools or materials 	<ul style="list-style-type: none"> • Use tool lanyards • Use material handling bags • Wear helmet • Mark an exclusion zone with "CAUTION" tape • PR/ Communication

ACCESS & FALL PROTECTION HAZARDS

TASK	HAZARDS	CONTROLS
Working 'at-height' on rope	<ul style="list-style-type: none"> • Anchor failure • Rope failure • Connection failure • Belay failure • User failure 	<ul style="list-style-type: none"> • Use redundant anchors • Use rope protection • Use 'captive' rope devices • Use secondary systems • Continuous connection • Double-check safety systems • Review and communicate plan • Skills training assessment
Climb routes via lead climbing	<ul style="list-style-type: none"> • Falling • User error 	<ul style="list-style-type: none"> • Alternative access? • Use reach pole • Use both aid and free climbing techniques

		<ul style="list-style-type: none"> ● Review plan & belay commands ● Both climbers tied in ● Skills training assessment
Descend ropes	<ul style="list-style-type: none"> ● Falling ● Rope abrasion ● Disconnection from rope ● User error 	<ul style="list-style-type: none"> ● Use rope protection ● Use re-belay anchors ● Use secondary systems ● Use 'captive' rope devices ● Use adjustable lanyard to connect to anchors ● Use a backup grab for 'hands-free' work ● Secure rope ends ● Continuous connection ● Double-check safety systems prior to use ● Skills training assessment
Ascend ropes	<ul style="list-style-type: none"> ● Falling ● Rope abrasion ● Disconnection from rope ● User error 	<ul style="list-style-type: none"> ● Use rope protection ● Use re-belay anchors ● Use 'captive rope devices ● Use lanyard on ascender ● Use adjustable lanyard to connect to anchors ● Continuous connection ● NO slack in rope or lanyards ● Double-check safety systems prior to use ● Skills training assessment
Ascend Ropes (cont'd)	<ul style="list-style-type: none"> ● Falling ● Rope abrasion ● Disconnection from rope ● User error 	<ul style="list-style-type: none"> ● Use rope protection ● Use re-belay anchors ● Use 'captive rope devices ● Use lanyard on ascender ● Use adjustable lanyard to connect to anchors ● Continuous connection ● NO slack in rope or lanyards ● Double-check safety systems prior to use ● Skills training assessment

WORK HAZARDS

TASK	HAZARDS	CONTROLS
Remove bolts with hand tools / hammer	<ul style="list-style-type: none"> ● Eye injury ● Hearing injury 	<ul style="list-style-type: none"> ● Wear gloves ● Wear safety glasses

	<ul style="list-style-type: none"> • Hand injury 	<ul style="list-style-type: none"> • Wear ear plugs
Remove bolts with drill or grinder	<ul style="list-style-type: none"> • Cut rope • Eye injury • Hearing injury • Hand injury • Respiratory Injury 	<ul style="list-style-type: none"> • Use secondary safety system • Wear safety glasses / visor • Wear ear plugs • Wear gloves • Wear dust mask
Drill & clean hole for new bolt	<ul style="list-style-type: none"> • Eye injury • Hearing injury • Hand injury • Respiratory injury 	<ul style="list-style-type: none"> • Use secondary safety system • Wear safety glasses • Wear ear plugs • Wear gloves • Wear dust mask
Place new expansion bolt	<ul style="list-style-type: none"> • Eye injury • Hand injury 	<ul style="list-style-type: none"> • Wear safety glasses • Wear gloves
Place new adhesive bolt	<ul style="list-style-type: none"> • Eye injury • Chemical contact 	<ul style="list-style-type: none"> • Wear safety glasses • Wear latex/nitrile gloves • Use holster for applicator • Bring paper towels & trash disposal bags

EMERGENCY RESPONSE

- Confirm scene is secure.
- Contact injured (if possible).
- Access injured via alternate rope system indicated in Work Safety Plan
- Hasty survey for immediate life threats: airway, breathing, circulation (bleeding), disability (neck/back) and environmental exposure.
- Stabilize immediate life threats (to the extent of training).
- If injuries are serious, and emergency assistance will be needed, **contact 911:**

- Salt Lake County Sheriff Search & Rescue, NON-emergency dispatch only = (801) 743-7000,
- If cell service is unavailable, the Garmin InReach GPS with Satellite Text is used for emergency communication
- Stabilize and protect the patient. Use the field First Aid kit as needed.
- Identify possible evacuation route or possible hoist or landing zone(s).
- Maintain communications with 911 Dispatch.
- Guide responders to the injured’s location.

PERSONNEL

Name	Phone	Emergency Contact + Phone	Medical Alert?

APPENDIX B-

SALT LAKE CLIMBERS ALLIANCE - ANCHOR REPLACEMENT INITIATIVE

WORK SAFETY PLAN

PROJECT I.D., SITE SURVEY, MATERIALS & EQUIPMENT, FALL PROTECTION, RESCUE

PLAN

*all fields required

1. PROJECT I.D. * 'RouteYear'- e.g. *PlumbLine2020*

2. Date: _____

3. Team Leader (+ contact phone #):

4. Additional Workers (+ contact phone #'s):

5. Have all workers reviewed the SLCA's Job Hazard Analysis for anchor replacement? Yes

SITE SURVEY

6. Location:

7. Rock Type & Quality:

8. Approximate elevation: _____

9. Direction (aspect) the site faces? Is shade available on site?

10. The terrain is: *Check all that apply.*

Single-pitch

- Multi-pitch
- Overhanging
- Traversing
- Accessible from below (only)
- Accessible from above (only)
- _____

11. Scope of work: * *Check all that apply.*

- Replacement of lead protection anchors
- Replacement of belay/rappel/top-rope anchors

12. Due to falling object hazard, public users will be advised by: * *Check all that apply.*

- Via digital & social media
- At the Trailhead
- Below the work site
- Above the work site

TOOLS & MATERIALS

13. Which set of anchor removal tools will be needed: *Check all that apply.*

- Wedge/stud bolt removal
- Sleeve bolt removal
- Adhesive anchor removal
- Grinder
- Breaker bar / lever
- Hardened steel or retired drill bits (for hole patches)

14. Anchor placement tools: *Check all that apply.*

- Sleeve anchor placement kit (w/ torque wrench)
- Adhesive anchor placement kit (w/ glue gun)
- Drill, bits
- batteries
- Patch epoxy + on-site rock dust/sand
- Rope or cordage (temporary natural anchors)

15. How many replacement sleeve bolts? _____

16. How many replacement adhesive bolts? _____

17. How many stainless screw links + rings? _____

18. Are chain extensions needed? How many? _____ Approximate length? _____

FALL PROTECTION SYSTEMS

19. ACCESS METHOD: *Check all that apply.*

- Alternative access to the top via hiking, scrambling or protectable climbing
- Lead Climbing (free & aid) with an attended belay up the work route or an adjacent route
- Rope ascent from below (previously installed rope)
- Rope descent from above

20. WORK POSITIONING METHOD: *Check all that apply.*

- Adjustable lanyard on adjacent or temporary anchors
- Rope Ascent/Descent system (on existing or temporary anchors)
- Travel restraint barrier or marker
- Lead climbing with a belay

21. Work progression (for lead protection anchors): *Check all that apply.*

- Removal- top down
- Removal- bottom up
- Replacement/placement- bottom up
- Replacement/placement- top-down
- Lead climbing removal & replacement- (traverse)

22. Controls used to protect the rope ascent/descent system during drilling, grinding or adhesive work: *Check all that apply.*

- Secondary adjustable lanyard on adjacent or temporary anchors
- Secondary / Backup rope system
- Rope protection

23. In addition to individual worker issue, additional PPE & equipment needed: *Check all that apply.*

- Dynamic climbing rope _____ M (#____)
- 'Static' (low-stretch) ascent/descent rope _____ M (#____)
- Releasable, adjustable lanyard (#____)
- Removable bolt (#____)
- 'CAUTION' flagging and signage

24. What is the RESCUE PLAN for any injured worker? *Check all that apply.*

- Releasable ascent/descent system
- Assistance via alternative (non-climbing) access or equipment
- Accompanied rescue on adjacent rope system
- Direct rescue using the injured persons rope system

25. Which COMMUNICATION devices will be used? *Check all that apply.*

- Cell phone
- GPS (w/ Satellite texting)
- handheld VHF/UHF radios

26. Reviewed by (signatures):

27. NOTES (post work review, adhesive materials batch information)

APPENDIX C - The [Worker Training Log](#)

is maintained on an internally shared digital spreadsheet with the following information for each worker:

- Name
- Position/Title
- Contact Information
- Emergency Contact & relationship
- Emergency Contact Information
- Prior Training and Experience
- Professional Certifications (any applicable)
- Date of Certification(s)
- First-Aid / Medical Training
- Date of Training
- Date Employee Handbook Signed
- Date of Competent Fall Protection Assessment
- Date of Competent Anchor Replacement Assessment

A second tab records all individual training sessions and employee participation:

- Date of Training Session
- Description of Of Training Session
- Participants
- Assessment results (if applicable)

APPENDIX D- The [Fall Protection PPE Inventory](#) is maintained on dedicated tabs in a shared digital spreadsheet with the following information:

- Manufacturer / Brand
- Model / Item Name
- Size & Color
- Unique serial number or batch ID
- Manufacture Date
- Standards & Applications
- Instructions For Use
- Care & Maintenance
- Corrective Actions
- Condition (FIT or UNFIT)
- Responsible Person
- Date(s) of Inspection(s)

Appendix E -
Personal Use Fall Protection PPE Inspection

If you prefer to use your own Fall Protection PPE (harnesses, helmets, lanyards, devices, connectors), use this form to inspect it and report that it is fit for service.

1. User Name:

2. Item Manufacturer & Model:

3. Item serial # and/or unique identifier:

4. Date of purchase / in-service: _____

5. Where was the item purchased?

6. Does the item meet any qualifying standards or testing certifications? Is it marked on the product?

7. What is the product's known **HISTORY**?

- Personal use only (and care/maintenance) since purchase from known seller
- Part of a Fall Protection program's Managed PPE Inventory (with documentation)
- Unknown / Not Available / 'Lost & Found' *THESE ITEMS CANNOT BE USED FOR THIS WORK.

8. Has the item been **exposed to intensive or exceptional use**?

- Yes
- No
- Maybe

9. What year was the item manufactured? _____

Any '**plastic**' or **textile product** (example = helmet, harness, lanyard, rope) that is **more than 10 years old** (from date of manufacture), **cannot be used** for this work.

*Metallic items have an indefinite service life, subject to intensity of use & inspection.

10. Have you performed a **VISUAL CHECK** of all components, looking for signs of damage, deformation, discoloration, corrosion, or excessive wear?

- textiles and structural stitching (should be contrasting color)
- metal components
- 'plastic' components
- attachment points
- adjustment mechanisms and adjacent areas
- 'comfort' components

11. Have you performed a **TOUCH & FEEL CHECK** of all components, looking for signs of damage, deformation, discoloration, corrosion, or excessive wear?

- textiles and structural stitching (should be contrasting color)
- metal components (material loss > a dime thickness (1mm) = RETIRE)
- 'plastic' components
- attachment points
- adjustment mechanisms and adjacent areas
- comfort components

12. Have you performed a *full-load (ground level)* **FUNCTION CHECK** of all components?

- interlocking components are in full alignment
- attachment points readily available
- full range of all adjustment mechanisms
- all 'automatic' actions are consistently reliable (100%)
- all functions work as designed, under full load

13. As a 'Competent Person' with training, knowledge and experience in the use and care of this PPE, I determine this item is:

- FIT FOR SERVICE

UNFIT FOR SERVICE - (Retire & Destroy)

*Only PPE from the Managed Fall Protection inventory, or personal equipment that has been inspected and reported as 'Fit for Service' with this form, can be used on work sites.

15. User signature: _____

Appendix F -

Anchor Replacement Work Incident Report

Use this form to report all work-related incidents, accidents and near-misses, including dropped objects.

1. Reporting person:

2. Reporting person's contact information:

3. Date of Report: _____

Time of Report:

4. Date of Incident: _____

Time of Incident:

5. Personnel involved:

6. Describe what happened:

7. Were other witnesses present?

8. Name and agency of any professional response (if applicable):

9. Signature:

Appendix G - **Anchor Condition Observation Form**

Use this form to report anchor observations to the SLCA's Anchor Replacement Initiative for help in identifying, prioritizing and monitoring replacement projects.

1. Where is the anchor(s) located? Please specify area and route.

2. Date of observation: _____

3. Is the anchor(s) a:

- Lead climbing anchor
- Belay / Rappel anchor

4. What is the CONDITION of the anchor(s)?

- UNUSABLE (For example-hanger has been flattened, or is missing)
- POOR (For example- physical damage, heavy corrosion, significant wear, improvised material)
- ADEQUATE (functional, but light wear or corrosion, uneven chains, improper spacing, mixed materials)
- GOOD (For example- no visible damage or wear, well constructed)
- VERY GOOD (Replaced or placed with known history and/or documentation)

5. What type (construction) is the existing anchor(s)?

- Mechanical Wedge Anchor (threaded stud)
- Mechanical Sleeve Anchor (hex head)
- Stainless Steel material
- Adhesive / Chemical Anchor
- Titanium material
- Drive-in friction or wedge anchors ('buttonheads' or flat heads)
- Piton
- Removable artificial protection
- Natural- (tree)
- Natural- geologic structure (thread, pinch, horn)
- NONE- no anchor exists currently

Not sure / unknown

6. Were any corrective or maintenance actions (for example, retightening of bolt heads) performed during your observation?

7. Which (if any) corrective actions would you suggest for this anchor(s)?

8. Observer's Name: _____

Thank you for your submission!

Please provide a phone or email contact below so that we may contact you for additional information if necessary, to guide our replacement efforts.

Appendix H -
Anchor Replacement Work Proposal

Use this form to propose an anchor replacement or placement project.

1. What is the proposed work area, and/or specific route and where is it located?
Please note any environmental, social or historical significance or context.

2. Name: _____

3. Preferred Contact Information: _____

4. Date of Proposal: _____

5. Have you (or a partner) submitted an ANCHOR OBSERVATION FORM for this area or route?

Yes

6. What would be the SCOPE of WORK?

- Replace lead protection anchor(s)
- Replace anchor/belay ('top') anchor(s)
- Placed new anchor(s) for social/environmental impact mitigation, or rescue capability

7. What is the RELATIVE PRIORITY of the proposed work?

- 1. Current anchor(s) is inadequate, damaged or missing
- 2. The route or area sees a high volume of climber traffic
- 3. The route is a popular 'testpiece' and anchors gets intensive use and loading
- 4. Anchor replacement needed to manage impacts, or for rescue capabilities
- 5. The route is a personal project and needs improvement.

8. What is the HISTORICAL CONTEXT of the proposed work?

- Has the first ascensionist(s) been contacted for their input on anchor replacement?
- Has input from the SLCA community been solicited for input on this anchor replacement?
- Did the first ascensionist or community advocate for preserving the original character of the route?
- Did the first ascensionist or community advocate for replacement and/or repositioning of anchors?
- Were the original protection anchors placed by lead climbing?

9. Has the LAND MANAGER or PROPERTY OWNER been notified or endorsed anchor (re)placement work?

WORK AREA

10. Describe the work area:

- single-pitch route
- multi-pitch route
- overhanging
- traversing
- only accessible from above
- only accessible from below

11, Which direction (ASPECT) does the work area face? _____

12. What is the approximate ELEVATION of the work area? _____

13. What is the ROCK TYPE and QUALITY of the work area?

WORK PLAN

14. Which ACCESS METHOD(s) could be used to access the anchor(s)?

- Alternative access to the top via hiking, scrambling or protectable climbing terrain
- Lead Climbing (Free or Aid) with an attended belay up the work route or an adjacent route
- Rope descent from another anchor above
- Rope ascent of a previously installed rope system

15. Which FALL PROTECTION and WORK POSITIONING METHODS could be used for 'hands-free' work on the anchor(s)? :

- Adjustable lanyard on adjacent or temporary anchors
- Rope suspension on an Ascent/Descent system (using adjacent or temporary anchors)
- Travel restraint lanyard or edge barrier (no fall exposure)

16. What type of REPLACEMENT ANCHORS would be placed?

- Mechanical wedge anchors
- Mechanical sleeve anchors- medium
- Mechanical sleeve anchors- long
- Belay/Rappel anchor(s)
- Screw links
- Steel rings
- Extension chains

17. For work on lead protection anchors, which would be the work progression?

- Removal- top down
- Removal- bottom up
- Replacement/placement- bottom up
- Replacement/placement- top-down
- Lead Climbing- traverses, ground-up access only

18. HOW MANY anchors, screw links, rings and chains (in total) would be required?

WORKERS

19. Who would be doing the work? (**Teams of 2 required for partner rescue doing any on-rope work.)

20. All workers are:

- trained and/or experienced in the use of rope ascent/descent systems and transitions?
- trained and/or experienced in technical anchor replacement tools and techniques?
- capable of self- and partner rescue?
- Informed about their health & safety, and equipped to mitigate disease transmission

THANK YOU FOR YOUR WORK!

APPENDIX I - [Tool & Equipment Inventory](#), per work kit

	TTOOL	#	ANCHOR	APPLICATIONS
1	Item #	1	1/2 Removal	Tapping 1/2 5pc sleeves
2	7/16-20 Draw Stud	1	1/2 Removal	funking 1/2 5pc sleeves
3	3/8-16 Draw Stud	1	1/2 Removal	funking 1/2 5pc cones
4	9/16" 6-pt. Socket-1/2"Dr (Flush-face)	1	1/2 Removal	Removing 1/2 bolts
5	M9x1 Tap	1	3/8 Removal	Tapping 3/8 5pc sleeves
6	M9x1 Draw Stud	1	3/8 Removal	funking 3/8 5pc sleeves
7	5/16-18 Draw Stud	1	3/8 Removal	funking 3/8 5pc cones
8	1/2" 6-pt. Socket-1/2"Dr (Flush-face)	1	3/8 Removal	Removing 3/8 bolts
9	Glue Gun	1	Glue-In	Powers Glue
10	Shop towels	2	Glue-In	Glue cleaning
11	Wavebolt Placement Tool	1	Glue-In	Placing Wavebolts
12	SDS Wedge Bolt Spinner	1	Hurley	Spinning Wedge Bolts
13	Hurley Sr	1	Hurley	Bolt Pulling
14	Hurley Jr	1	Hurley	Wedge Pulling
15	5/8 gearwrench	1	Hurley	Hurley (new design)
16	Ratcheting Tap Holder	1	Main	Tapping 3/8 5pc sleeves
17	Magnet Pen (Ø5/16" MAX)	1	Main	removing tap shavings
18	1/2x6" SDS Carbide Drill Bit	3	Main	drilling new hole
19	Used 3/8x6"SDS Carbide Drill Bit	1	Main	drill out sleeves/cones
20	1/2" Ratchet	1	Main	removing bolts
21	6" Crescent Wrench	1	Main	general wrenching
22	Needle-nose pliers (combination)	1	Main	general wrenching
23	1/2" Tube Brush	2	Main	brushing holes
24	Patch Putty	1	Main	hole patching
25	Pin Punch	1	Main	RB removal
26	1/2" Removable Bolt	2	Main	Directionals
27	Powers Hand Air Pump	1	Main	Hole Cleaning
28	Yosemite Hammer (Stainless)	1	Main	Placing bolts
29	Slide Hammer (3Lb)	1	Main	funking
30	Loctite 271	1	Main	quick links
31	Beal Genius Bucket	1	Main	Storage
32	Beal Genius Bag	1	Main	Storage
33	Petzl BoltBag	1	Main	Storage
34	Trash Bag	1	Main	Spent Glue / Tips
35	Rotary Hammer Drill	1	Main	drilling new hole

36	Tote	1	Main	Holding kit
37	BD Spinner Leash	1	Main	Gear Tether

APPENDIX J - [Fall Protection Handbook & Assessment](#)

APPENDIX K - [Anchor Replacement Handbook & Assessment](#)