

4

Construction Phasing



DESCRIPTION/GOALS

In conventional construction, the entire site is cleared of vegetation at the beginning of the project, and the soil remains exposed until construction is completed. This can often be several months. In construction phasing, on the other hand, the project is divided into distinct portions or "phases." Only one phase is cleared at a time, and only before it is needed for the construction of the phase. This "just in time" clearing cuts soil erosion dramatically by reducing the amount of time that soils are exposed to rain and wind.

TECHNIQUES

In order to develop a workable phasing plan, planners and engineers need to consider many factors such as: people living in the development while construction continues, erosion and sediment control and stormwater management within the phase and the feasibility of completing construction. Clayton (1997) outlines design considerations to develop a phasing plan. These are:

- Provide construction access in each phase separate from access for permanent residents.
- Determine if the site meets minimum "threshold" size (usually about 25 acres)



Source: Watershed Protection Techniques Vol. 2.48

APPROXIMATE

COST: No Construction Cost.

EFFECTIVENESS

	Low	Med	High
Erosion/Sediment Control			✓
Long-Term Pollution Reduction	✓		
Utilities/Stream Protection	✓		

EASE OF APPLICATION

	Difficult	Average	Easy
Installation	✓		
Maintenance	✓		

LIMITATIONS

- When it is impossible to balance cut-and-fill by phase
- Small sites
- Where alternative access is not feasible for both construction equipment and occupants

- Balance earthwork in each phase (e.g., "cut" and "fill" amounts are equal)
- Locate temporary soil stockpiles and staging areas to prevent additional soil disturbance
- Establish a "trigger" for beginning a phase (e.g., % of previous phase stabilized)
- Accommodate utility construction within each phase
- Incorporate road segments, temporary turn-arounds and emergency access within each phase
- Address both temporary and permanent stormwater management in each phase
- Clearly identify sequence of construction of each phase and entire project on plan
- Identify key construction elements for inspection.
- Ensure that later upstream phases address potential impacts to already completed downstream phases

LIMITATIONS/CHALLENGES

Many developers perceive that phasing is more expensive because of increased earthwork costs. In traditional clearing, equipment only needs to be brought to the site once, while phasing projects require clearing for each phase. It is unclear how much phasing costs because very little economic research has been done to answer this question. It is even possible that phasing can actually save money because construction loans can be taken out over time, reducing interest payments.

One physical limitation to phasing is site size. Phasing is generally recommended for sites larger than 25 acres, with exceptions for smaller sites where land will be idle for long periods of time. On small sites, the overhead cost associated with multiple clearing may be more significant. In addition, some of the required characteristics for each phase, such as stormwater management, may be difficult to meet on a small scale.

INNOVATIONS/IMPROVEMENTS

The primary innovations are from local jurisdictions who encourage phasing during construction. Some jurisdictions require phasing on larger projects, and others are considering incentives, such as faster review times for phased projects or reduced permit fees or bonds.

REFERENCES

Clayton, R.A. 1997. Practical Tips for Construction Site Phasing. *Watershed Protection Techniques* 2(3):413-417

Sample Estimate Using Phased Construction Program (Estimated Estimate for a 10-acre Urban Project using a Phased Program)	
Development Scenario - Conventional Program 10-acre site cleared in 1 month period, with phases sequenced to site and storm water.	
Assumptions Conventional construction, sequential excavation/retention of cleared areas until all work is complete for grading. Approximate 6% soil erosion factor, 100% ground saturation, with 1 month stabilization period. Stormwater run from construction directly to natural drainage effectiveness of 85% to adjacent forested areas. 10-acre site with 100% impervious cover.	
Estimate Item Estimate based on 10-acre conventional program. Estimated cost: \$1,000,000 (conventional estimate) + 10% fee	
Development Scenario - Phased Program 10-acre site graded in 10 months (phases run in 4 month periods, with phases sequenced to site and storm water).	
Assumptions Conventional construction, sequential excavation/retention of cleared areas until all work is complete for grading. Run phase complete (including 10% stormwater retention, with 1 month stabilization period). Stormwater run from construction directly to natural drainage effectiveness of 85% to adjacent forested areas. 10-acre site with 100% impervious cover. 10-acre site with 100% impervious cover.	
Estimate	
Estimate of all construction over 4 months period Estimate of site stabilization for 10 months Estimate of site stabilization for 10 months Estimate of site stabilization for 10 months Estimate of site stabilization for 10 months Estimate of site stabilization for 10 months	Total cost for site stabilization for 10 months 10% extra for 10% extra stabilization 10% extra for 10% extra stabilization 10% extra for 10% extra stabilization 10% extra for 10% extra stabilization 10% extra for 10% extra stabilization
Total: \$1,000,000	
Result: Phasing results in 10% reduction in total cost compared to conventional estimate.	

Source: *Watershed Protection Techniques* Vol. 1 #3