Philip Williams and Associates, Ltd., "Memorandum Regarding Channel Geomorphic Assessment of Grande Canyon" (June 12, 2007; 2007b)

PWA
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M E M O R A N D U M

Date:	June 12, 2007
To:	Matt Carpenter and Corey Harpole
Organization:	Newhall Land and Farming Company
From:	Andrew Collison
PWA Project #:	1820.02
PWA Project Name:	Newhall Ranch
Subject:	Channel geomorphic assessment of Grande Canyon
Copy(ies) To:	Lisa Austin, File

Purpose of Investigation

PWA conducted reconnaissance-level geomorphic assessments and collected sediment samples from the beds and banks of Grande Canyons near Valencia, CA, to support sediment transport modeling, geomorphic and channel design activities.

Data Collection

Fieldwork was carried out between February 7th and 9th 2006 with repeat visits to selected sites in summer of 2006. The channel was walked for its entire length within the Newhall Ranch project area. A total of 4 sediment samples were taken from the channel bed. Sediment samples were collected approximately every 1000 feet along the channels. Sites were selected by pre-programming GPS coordinates along the streambed at fixed intervals and then identifying geomorphically-typical reaches close to the site. At each sampling point the nearest mid–channel or point bar was selected and a sample taken from a position one third from the upstream edge of the bar, in accordance with sediment sampling protocols outlined by Reid and Dunne (1996) and Thomas and Gee (2005). Sediment taken from this location is believed to be representative of average-sized sediment that is in transport through the system. Samples were collected by digging a 6 inch pit in the bed and transferring the entire sample to a polythene bag. Bank samples were taken from actively eroding banks where they appeared to be the main source of sediment in the channel. Typically in all creeks studied the bed samples had a thin veneer of gravel but were dominated by sand beneath that. Samples were transferred to Cooper Testing Laboratory for particle size distribution. Most samples were clearly non-cohesive and were analyzed by wet sieving. A few appeared to be cohesive and were sampled using the hydrometer method to differentiate silt and clay from coarser sediment.

The sample locations and particle size distribution curves are shown in the attached figure, with typical sediment sizes and channel geomorphic assessment for context. A reconnaissance-level geomorphic assessment was conducted, primarily focused on the degree of channel incision (disconnection between the bankfull channel and floodplain). This was assessed by running a HEC-RAS model with the 5-year flow (model and data supplied by PACE) to determine the extent to which the 5-year flow was confined in a well defined bankfull channel or not. This was based on the observation of SCCWRP (Coleman et. al. 2005) that stable channels in this area contain the 5-year flow. Where the 5-year flow did not fill what appeared to be the bankfull channel and qualitative geomorphic evidence supported the assessment the channel was classified as incised or widening. Figures from the reconnaissance are attached to this memo.

Summary of Sediment Characteristics

All five samples were classified as 'sand'. Grande Canyon is mostly well graded sand with silt and gravel.

Summary of Geomorphic Assessment

Grande Canyon combines a series of reaches alternating between unconfined stable reaches with small inset floodplains and confined, slightly incised and unstable conditions with actively eroding outside bends. The upper reach has a well defined and relatively stable bankfull channel that contains the 5-year flow adjacent to a small inset floodplain (Images 345a-b). Downstream the channel is more confined and many outside bends are actively eroding into relict raised floodplain terraces, creating steep and failing banks (Images 354c, 346a, 346b, 346-7a, 3467b). Downstream of this reach the valley opens up and we again encounter more stable conditions (Images 347a, 347b) with small floodplains that persist towards the downstream end of the channel (Images 348b, 348c).

References

Coleman, D., MacRae, C. and Stein, E.D., 2005, Effect of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Streams.

Reid, L. M. and T. Dunne, 1996. Rapid Evaluation of Sediment Budgets. GeoEcology Paperback. Catena Verlag Gmbh. 164 p.

Thomas, William, and Gee, D. M. 2005. Sedimentation in Stream Networks (HEC-6T) – Supplement to the User Manual. 36 p.

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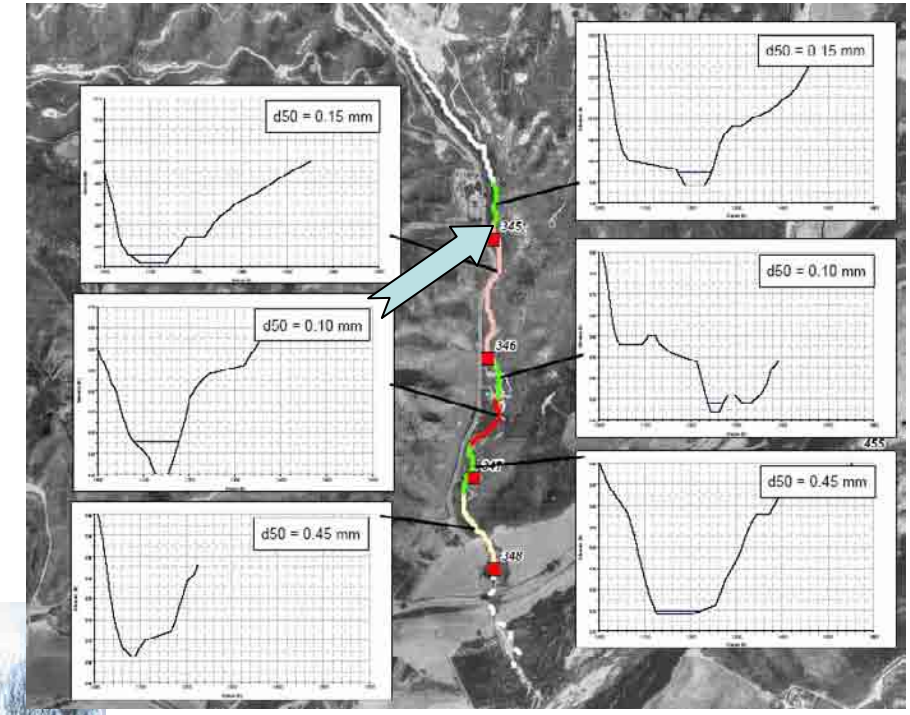
Grande Canyon

Geomorphic Reconnaissance

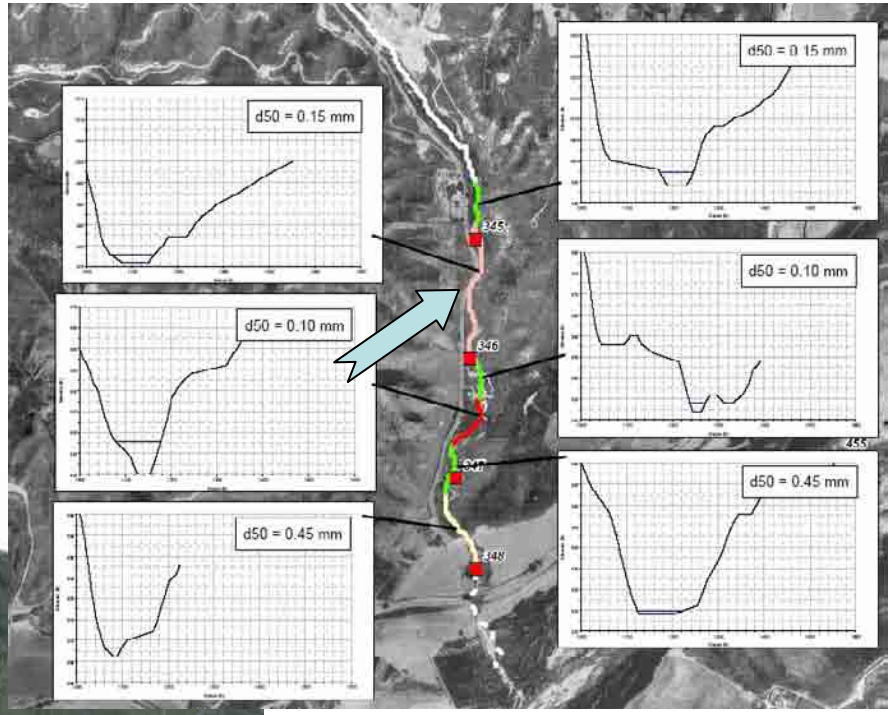
Bed sample

Grande #345

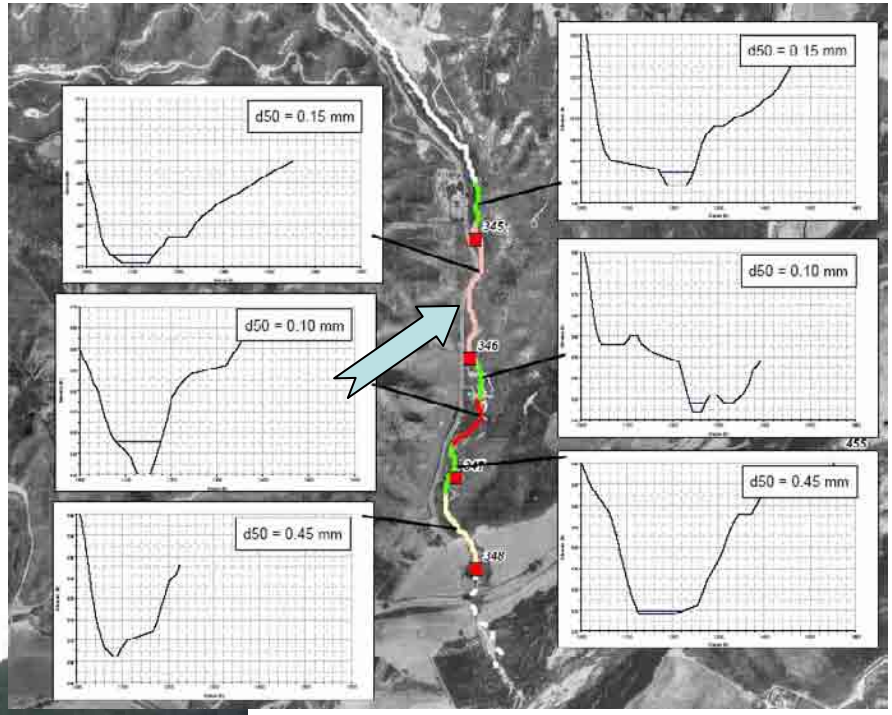
Stable – stable bankfull channel with inset floodplain



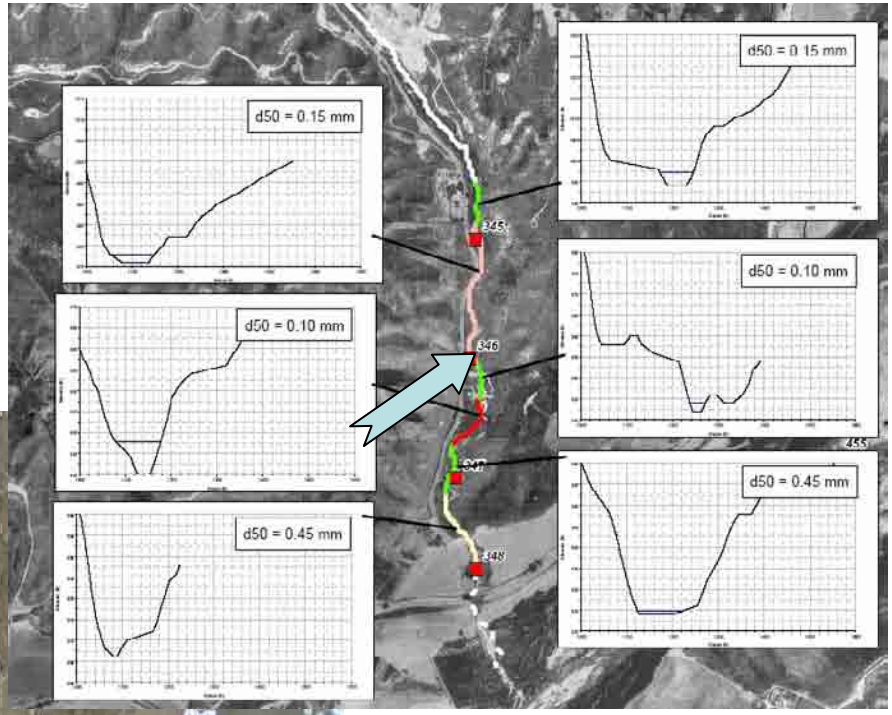
Stable – stable bankfull channel with inset floodplain – some overwidening



Widening with active bank erosion on abandoned floodplain terraces

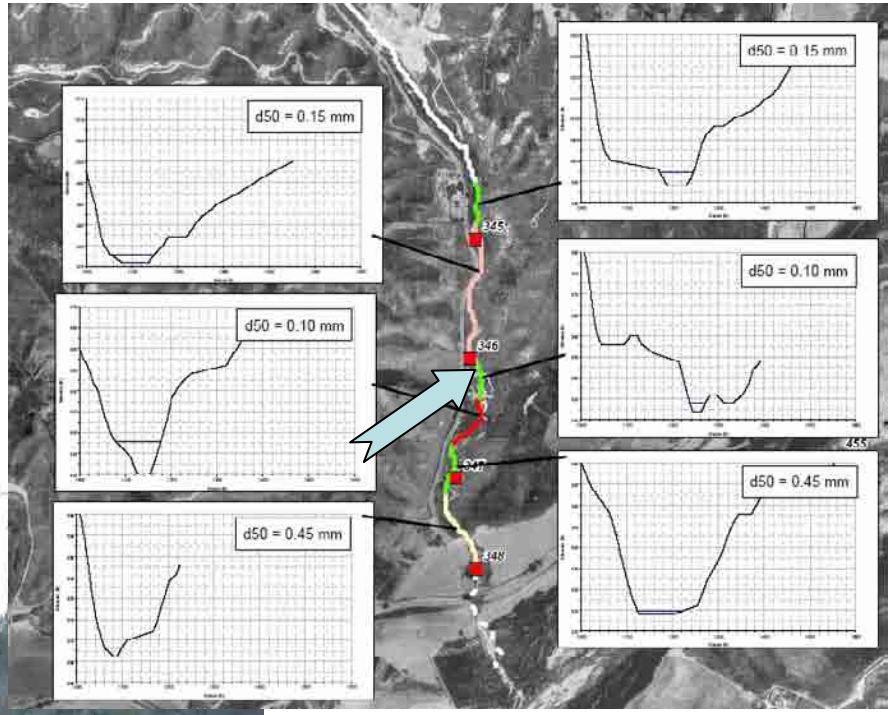


Sediment sample

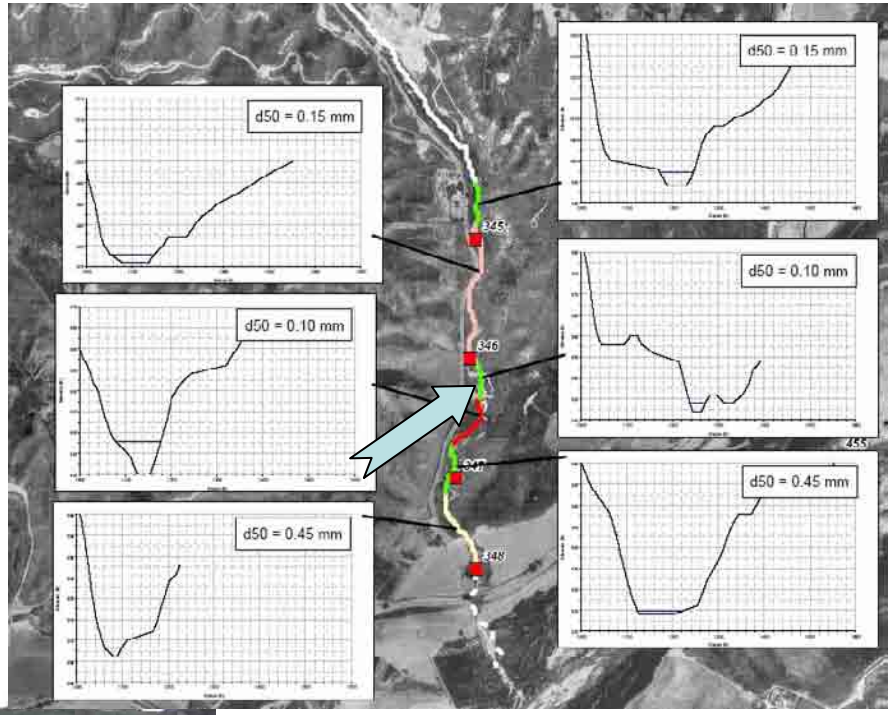


Grande #346

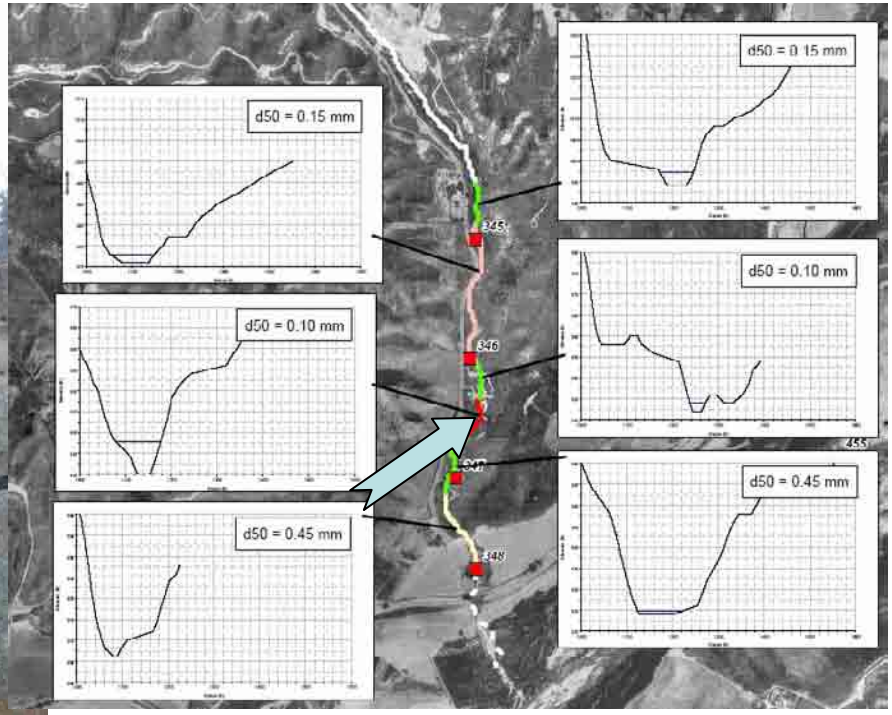
Widening with active bank erosion on abandoned floodplain terraces but new floodplain forming on inside bend



Widening with active bank erosion on abandoned floodplain terraces but new floodplain forming on inside bend

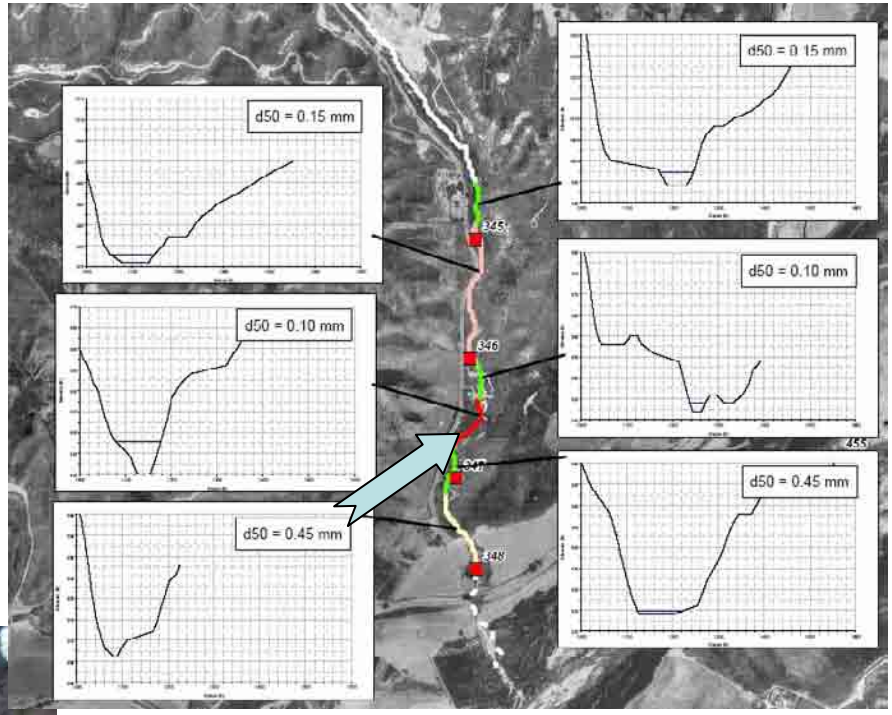


Unstable – eroding outside bend condition

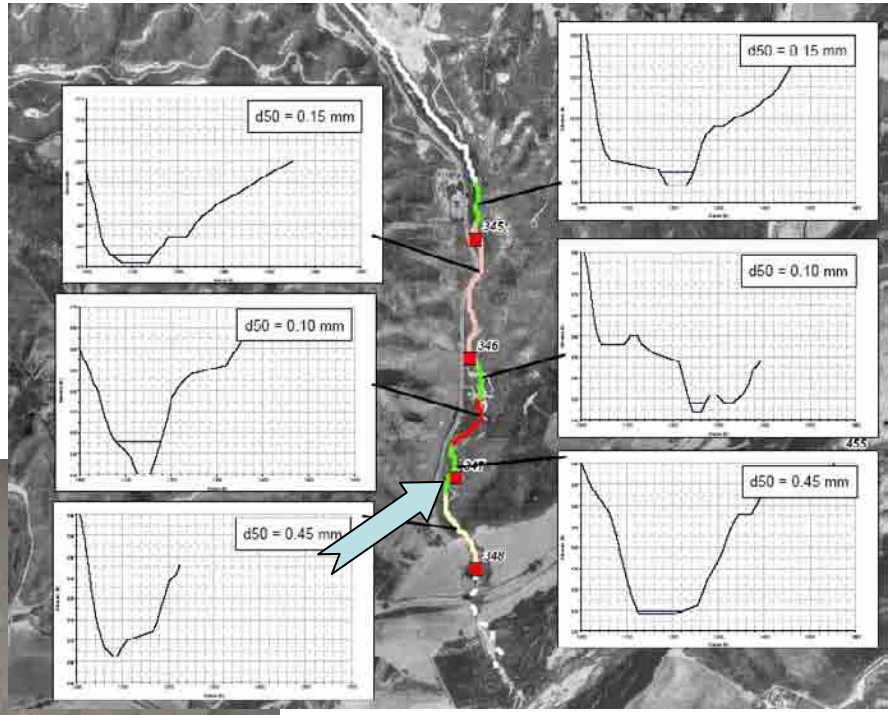


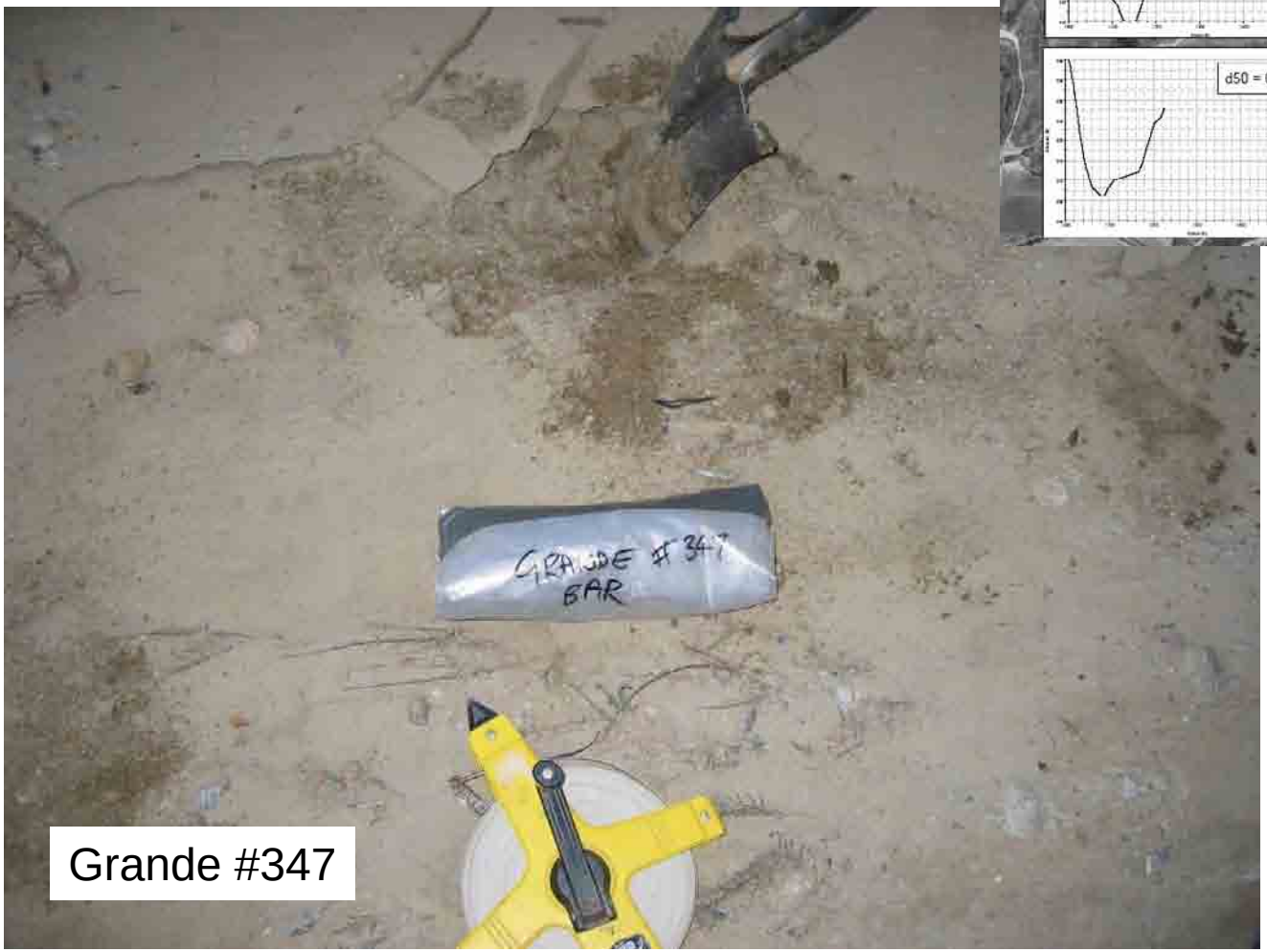
Grande #346-7a

Unstable – eroding outside bend condition



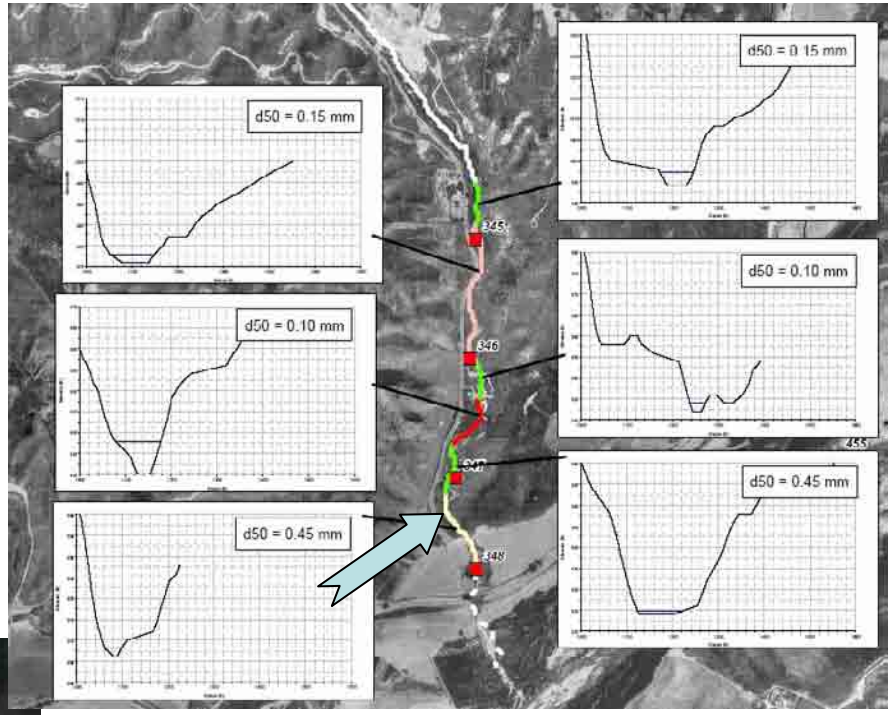
Sediment sample



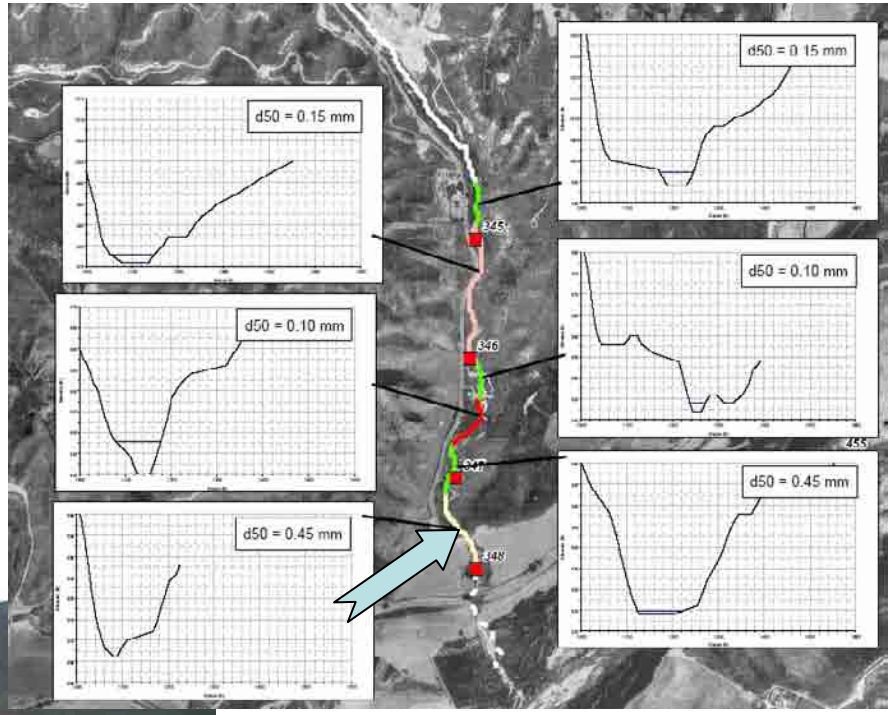


Grande #347

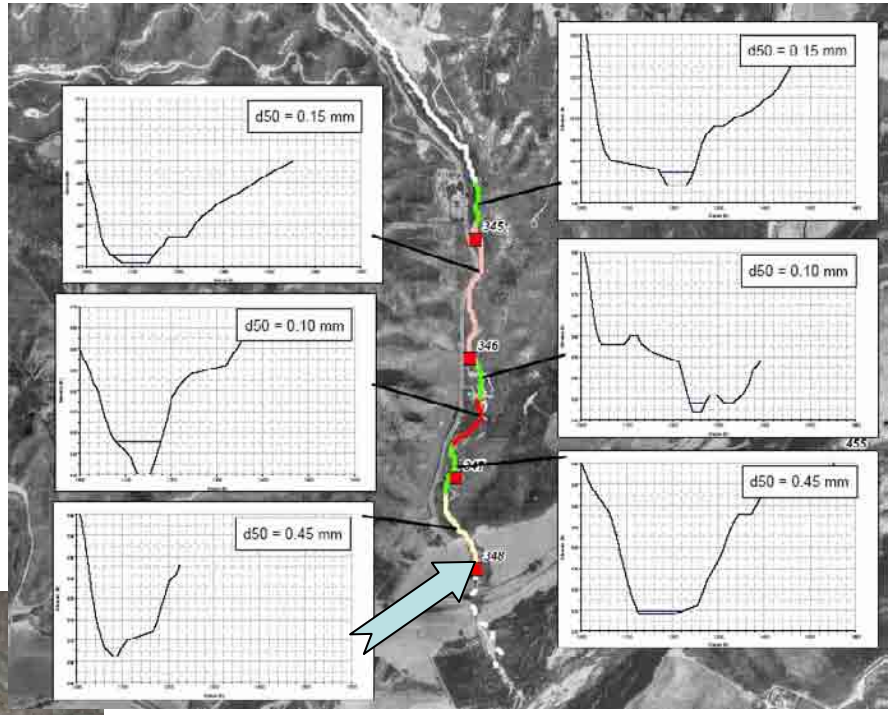
Moderately stable condition with eroding upper terraces and stable new inset terraces



Moderately stable condition with eroding upper terraces and stable new inset terraces

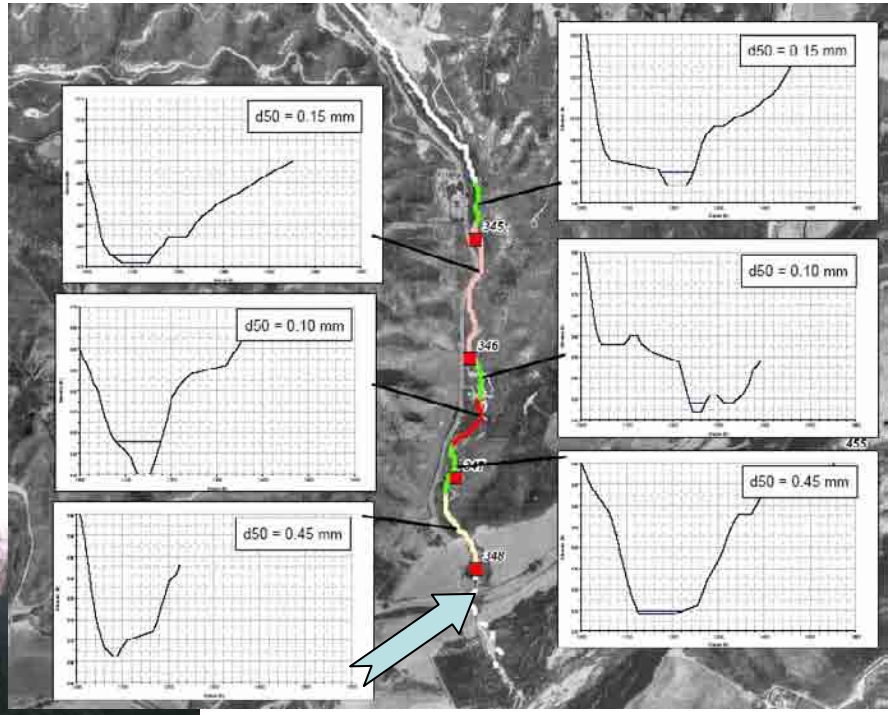


Sediment sample



Grande #348

Moderately stable condition



Moderately stable condition