

Sedimentary structures in the Lockatong Formation adjacent to the base of the Palisades Sill

Alexander, Jane, Rivelli, Victoria and Thatcher, Sean. Department of Engineering Science and Physics, College of Staten Island, 2800 Victory Blvd., Staten Island, NY

Abstract

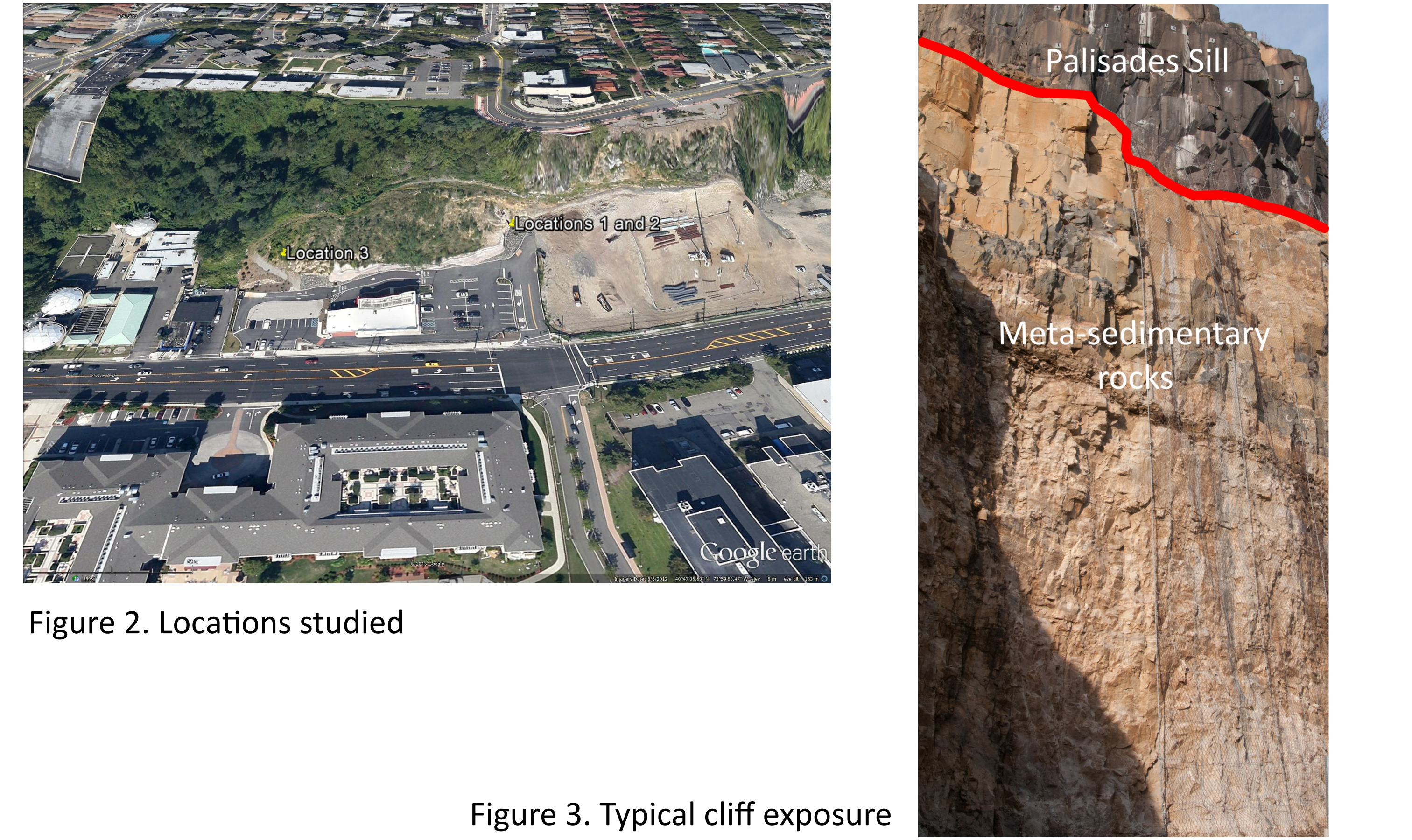
A new outcrop of the contact between the base of the Palisades Sill and the Lockatong Formation of the Newark Basin sedimentary sequence has been exposed by recent construction at North Bergen, NJ. Preliminary field investigations have revealed some interesting structures within the sedimentary rocks at this site. While in some places the original sedimentary structures, such as channel deposits, are clearly visible right up to the contact, at other locations the sediments have clearly been remobilized as the sill was intruded.

Two logs were made at locations where the original sedimentary structures are still visible. These included cross-bedded channel deposits with conglomerate at the base and more fine grained lake deposits. All have been metamorphosed, with hornfels facies present close to the contact with the sill. A third location 80 m to the south presented more distorted sediments. At the base of one channel deposit the sands were remobilized as the sill was intruded. This resulted in the formation of a clastic dike that cuts across the more fine grained horizontal beds at an angle.

Future work will focus on the mineralogical and geochemical changes that have taken place within the metamorphic aureole, investigating whether they are the same in areas where the sediments were remobilized as in areas where the original sedimentary structures are preserved.

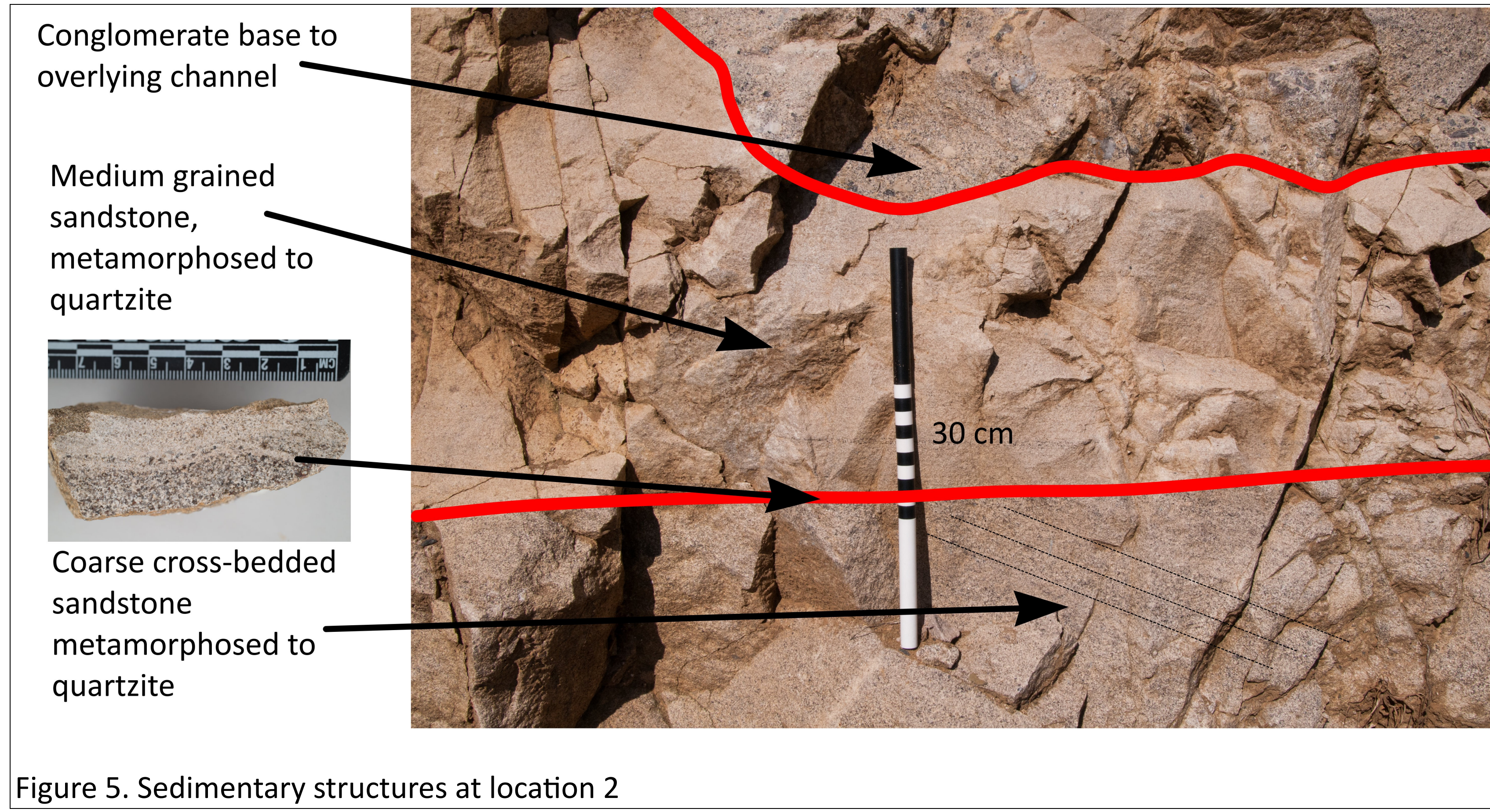
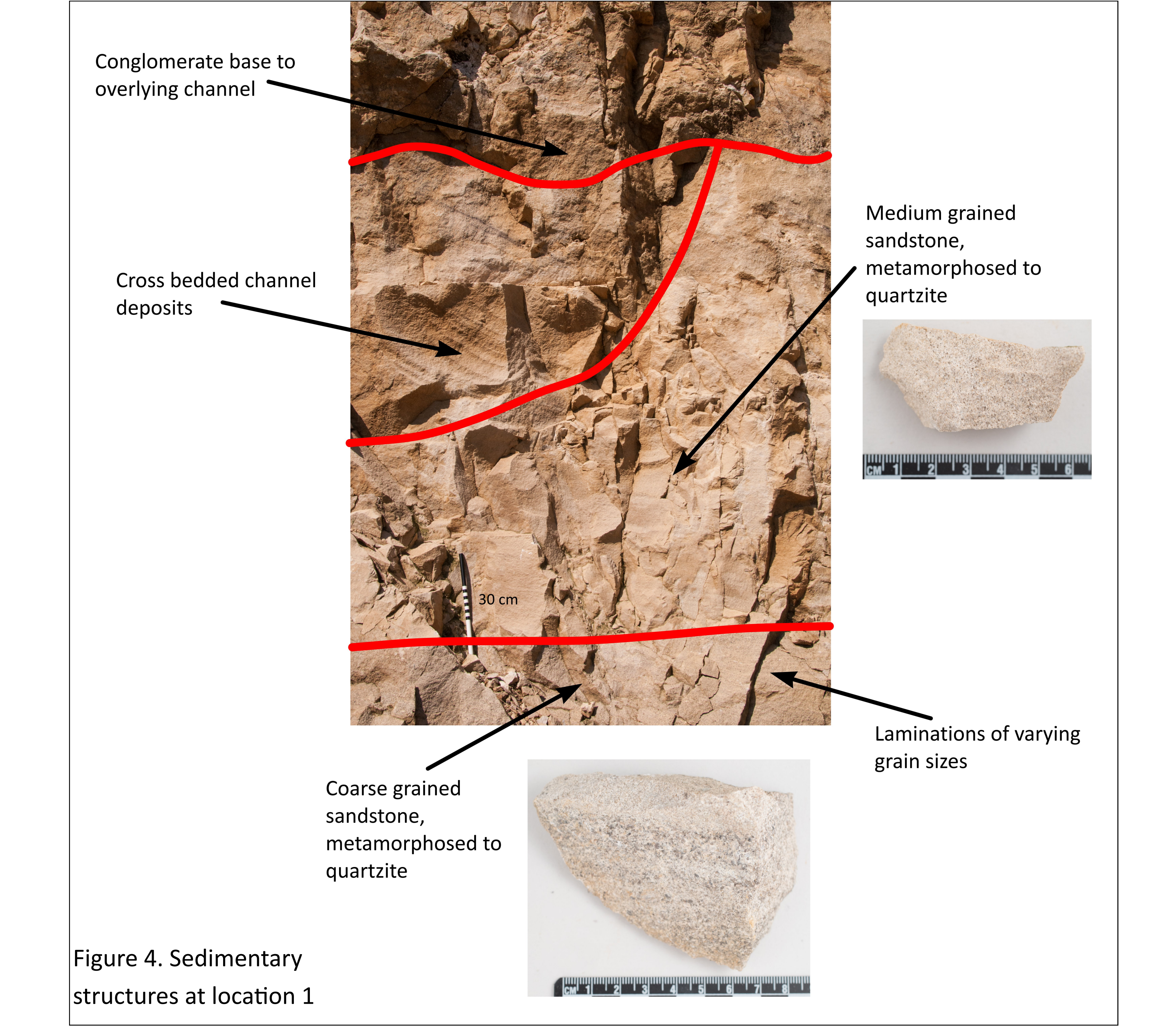
1.Introduction

Recent construction in North Bergen, NJ has exposed the contact between the Palisades Sill and underlying sedimentary rocks of the Newark Basin (Figures 1, 2 and 3). Preliminary studies of the base of the outcrop have involved logging the meta-sedimentary rocks at the base of the cliff face, field description of features indicating remobilization of sediments as the sill was intruded and an initial investigation of evidence for contact metamorphism.



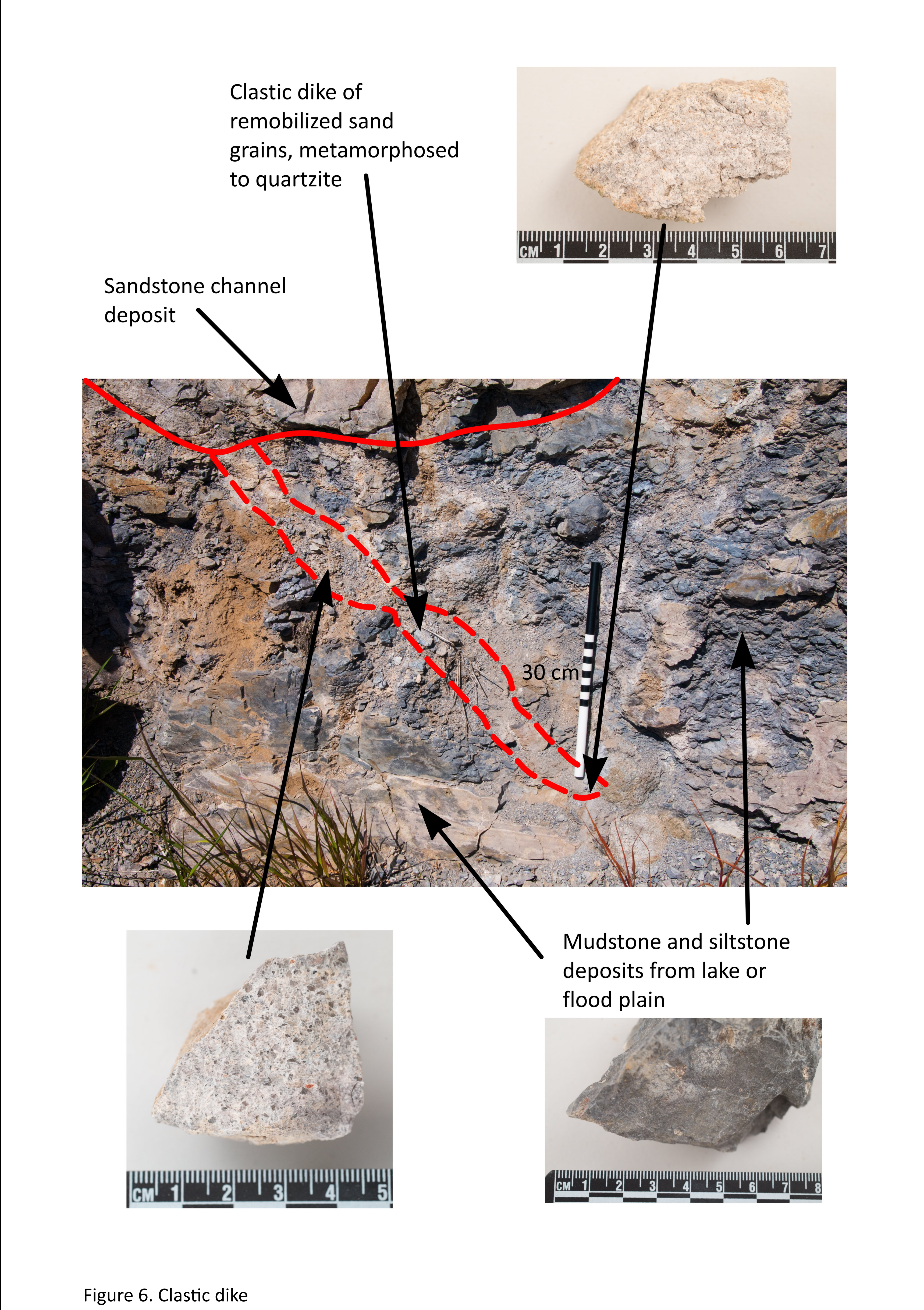
2. Sedimentary Structures

This unit has been mapped as the Lockatong Formation (Baskerville, 1994), however the presence of successive stream channels suggests that it may be more accurately described as the Stockton Formation. This cliff face would not have been exposed at the time of mapping. Sedimentary structures are clearly visible, despite contact metamorphism (Figures 4 and 5).



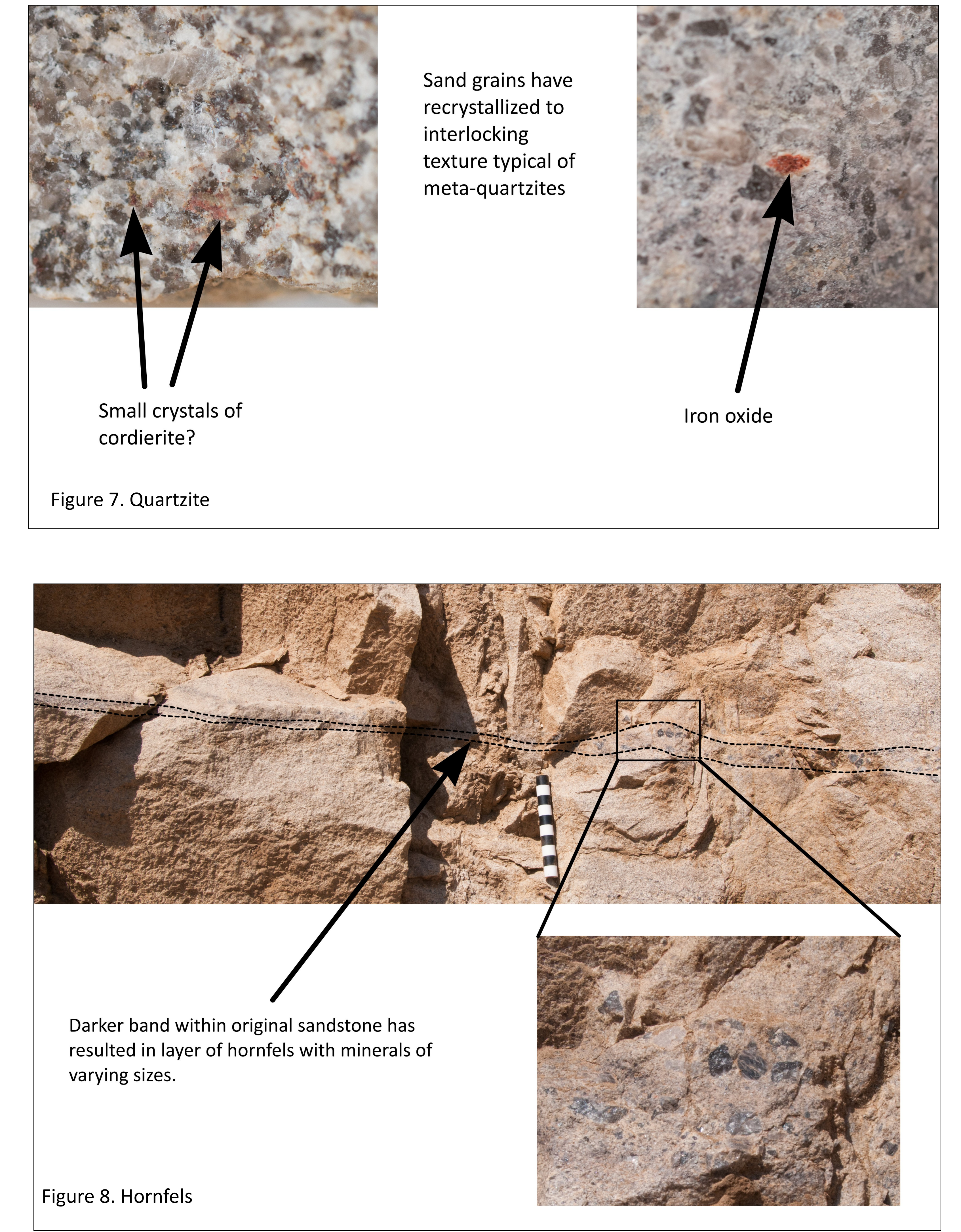
3. Structures Related to the Remobilization of Sediments

In some places there is evidence of sediment remobilization, particularly the more sandy layers, as the sill was intruded. This would suggest that the sediments were not fully lithified at the time of this event. Similar structures have been reported in Fort Lee by Merguerian and Sanders (1995). Figure 6 illustrates a clastic dike, remobilized from a channel sand deposit and cross-cutting underlying mudstones and siltstones.



4. Contact Metamorphism

Previous studies have concluded that there has been Na-metasomatism in rocks in contact with the Palisades Sill, and that this has resulted in the mobilization of other elements, including rare earth elements (e.g. Van Houten, 1971; van de Kamp and Leake, 1996; Greenhut, 2001). Preliminary investigation of field samples indicate the formation of meta-quartzite (Figure 7) from quartz-rich sandstones and hornfels (Figure 8) from siltstones and more arkosic sandstones. Further mineralogical and geochemical investigations are planned.



5. Conclusions and Future Work

This was a very preliminary field study of a newly exposed outcrop of Newark Basin sedimentary rocks at the base of the Palisades Sill. It has revealed many features worthy of further study.

Future work will include additional field sampling and logging of detailed transects through the metasedimentary rocks. These samples will be analyzed for major, trace and rare earth elements to ascertain changes resulting from the metamorphism. Thin sections will be made to allow an interpretation of mineralogical changes, and how these relate to the observed geochemistry. Sedimentary logs will be made as samples are collected in the field, so that it will be possible to separate variations due to metamorphism from sedimentological variation within the Lockatong and Stockton Formations, and to compare the sections where there has been sediment remobilization with those where there has not.

References

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