STORM ABIS™ User Guide

PUB-01905
Rev. A
Software Version 1.0
September 2022

DRAFT

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Revision History

This section provides information about additions or modifications made to this document for each revision:

Revision	Date	Description
A		Initial Release (STORM v 1.0)
A – DRAFT	9/20/2022	Draft for review.

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Chapter 1. Introduction

The STORM ABIS™ solution from IDEMIA® is an Automated Biometric Identification System (ABIS) used for fingerprint and palm print examination in support of tenprint enrollment and latent print investigation.

This chapter introduces the guide and then introduces the STORM ABIS application (which the guide just refers to as STORM from now on).

About This Guide

This guide is for trained tenprint and latent examiners. Its purpose is to enable you to become informed about STORM's particular user features, so you can better leverage your friction ridge expertise in your work with tenprints and latents.

Tenprint examiners can get information on features such as: Quality Control queue, Tenprint Comparison queue, and the Person Management feature.

Latent examiners can get information on features such as: the Latent Case Management feature (including Create New Case, Image Import, Latent Analysis, and Latent Search) and Latent Comparison and Evaluation (either right after Latent Search or from Latent Comparison queue and Reverse Latent queue).

This guide is also for the subset of examiner experts serving an administrator role in the system. The admin features are for administrators to set underlying thresholds and processing rules.

Main Topics

- Start and Overview – Next in this chapter.
- Transaction Lists – Last pages of this chapter.
- Tenprint Quality Control – Chapter 2.
- Tenprint Comparison – Chapter 3.
- Person Management – Chapter 4.
- Latent Case Management – Chapter 5.
- Latent Comparison – Chapter 6.

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Start and Overview

Algorithms for matching friction ridge are at the heart of ABIS technology, robust tools and human experts are ultimately crucial for its success.

The STORM application incorporates automated biometric search processing (against entire databases) with manual work queues and expert analysis and comparison tools.

Launch App and Log In

To Launch the App and Log In

1 Open the Google Chrome browser.

2 Copy the web address from your welcome email and paste it into the address bar. Press Enter .

The Login page opens.

Figure 1. Login Box

3 In the Login box, enter the username and password from your welcome email.

4 Click **LOGIN**.

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STORM Landing Page Overview

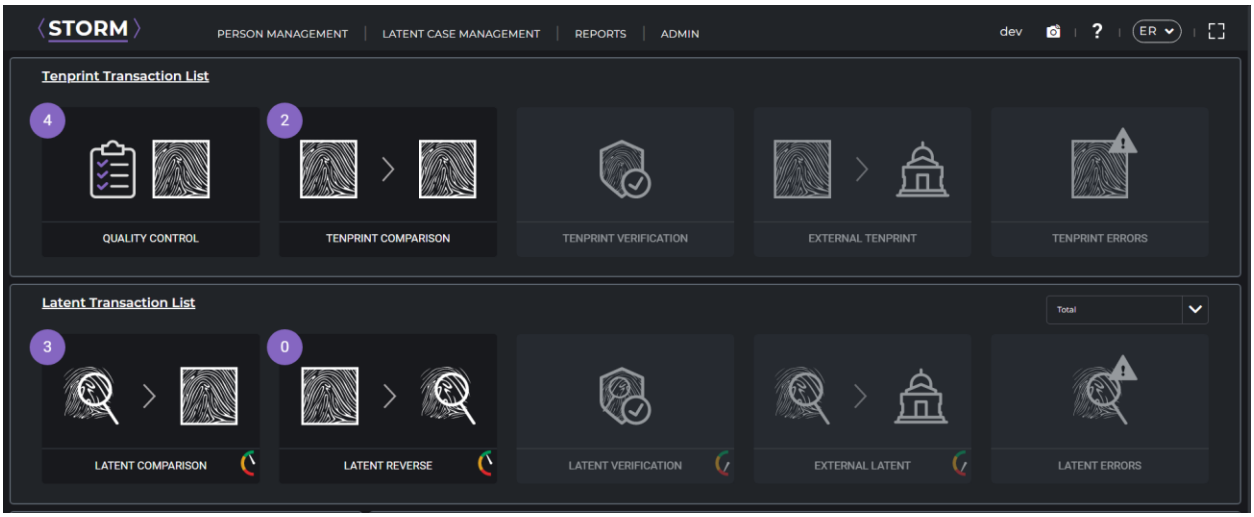


Figure 2. STORM Landing Page

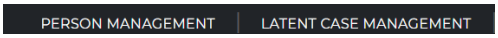
In Top Right – App Controls

Environment name (e.g., dev); Support snapshot; Help; User initials and menu; and Full Screen ⛶.

NOTE: For the best view (without scrolling) click ⛶.

Press Esc to exit full screen.

Across the Top – Data Management and App Administration

- Person and Case Management 

- Reports and App Administration

Main Work Panels

- Tenprint Transactions and Work Queues
- Latent Transactions and Work Queues

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Tenprint Transactions and Work Queues

The Tenprint examiner is called upon to ensure the quality of tenprint submissions and to verify the identities of people, for both civil applicants and criminal bookings.

- The **Tenprint Transaction List** opens a list of *tenprint incidents*, the STORM records related to Tenprint submissions (aka transactions). The list includes tenprint incidents in various states of processing, including QC and Compare. You can choose one of those incidents to work on.
- The **Quality Control** function is used to open the next QC incident, providing a queue-based workflow for manually examining and correcting the results of automatic **quality assessment** and **sequence checking** of tenprint and palm print images from recent submissions. The tenprint examiner uses built-in tools to zoom, pan, and enhance the images, and to correct sequencing. After correcting a submitted record, the automated tenprint biometric identification search processing proceeds.
- The **Tenprint Comparison** function is used to open the next Compare incident, providing a queue-based workflow for manually comparing prints from submissions with candidate prints from automated search of the STORM database. The tenprint examiner analyzes, compares, and evaluates the search print against each candidate to find a match. The examiner uses the built-in tools to zoom, pan, place features, and evaluates each candidate as an Ident (ID), Inconclusive (INC) or Non-Ident (NOID).

Record and Case Management

- **Person Management** – Provides the ability for Tenprint Examiners to search and view tenprint incident records and the person records (either existing or new) associated with them as the result of automated processing. Enables examiners to correct any problems with how incident records were associated with person records.
- **Latent Case Management** – Provides the ability for Latent Examiners to **Add Case**, **Upload Images**, create Latents and perform **Latent Analysis**, and do biometric search with them against the tenprint images of the STORM database. Then you can to continue to do **Latent Comparison**. Latent Case Management also provides the ability to search existing latent cases and open one from the list.

Latent Transactions and Work Queues

The Latent examiner is called upon to analyze, compare and evaluate possible latent prints received from evidence within case work in addition to verification as needed.

- The **Latent Transaction List** itemizes each individual latent print as a separate *latent transaction*, the STORM entities within Latent Cases that are in progress. The list includes latent transactions in various states of processing, including Compare and Reverse Compare. You can choose one of those transactions to work on.
- The **Latent Comparison** function is used to open one latent transaction at a time to manually compare recently uploaded unknown latent prints to candidate tenprint images from the STORM database. The latent examiner compares and evaluates the latent against each candidate and forms their conclusion, by evaluating candidates as an Ident (ID), Inconclusive (INC) or Non-Ident (NOID).
- The **Latent Reverse** queue is used to open one latent transaction at a time from the results of automated search of new tenprint images from recent submissions against ***the existing Unknown Latent File*** images in the STORM database. The latent examiner compares and evaluates the latent against each tenprint candidate and forms their conclusion by evaluating candidates as an Ident (ID), Inconclusive (INC) or Non-Ident (NOID).

Reports and Activity

- Reports function (across the top) – (Future capability)
- Favorite Reports (panel) – A placeholder for quick access to the reports you use the most.
- Search Activity (panel) – A graphic display of the number of transactions completed by you and your unit based on a select period of time.

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Admin

Admin – Ability to set rules and thresholds for automatic processing:

- Tenprint Quality Check – Settings for sending tenprints to **Quality Control**; specifically for: Sequence consistency check (between Rolled and Slap); Rolled Finger thresholds; and Slap Finger thresholds
- Palm Thresholds – Settings for sending palmprints to **Quality Control**
- Comparisons – Tenprint Comparison thresholds (for sending tenprint incidents to **Tenprint Comparison**); Reverse Latent thresholds (for sending tenprint incidents to **Reverse Latent**)

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Transaction Lists

This section introduces the Tenprint Transaction List and Latent Transaction List functions.

Tenprint Transaction List

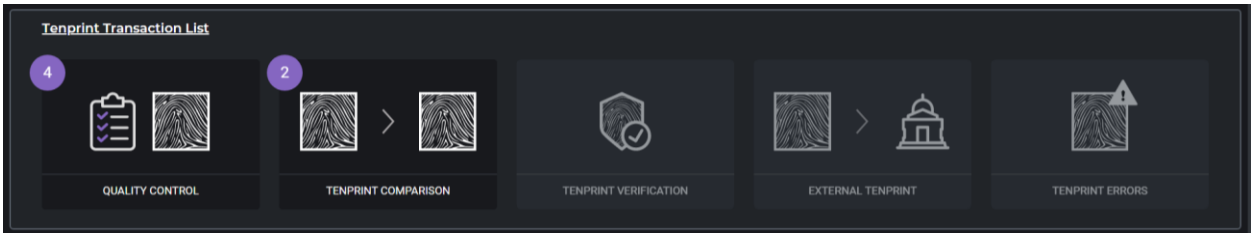

Figure 3. Landing Page – Tenprint Panel

On the landing page, click the **Tenprint Transaction List** link to open the Tenprint Transactions screen. This is a list of all *incident records* for tenprint transactions in various *transaction states*, including “QC” and “Compare”, which correspond to examiner workflow stages.

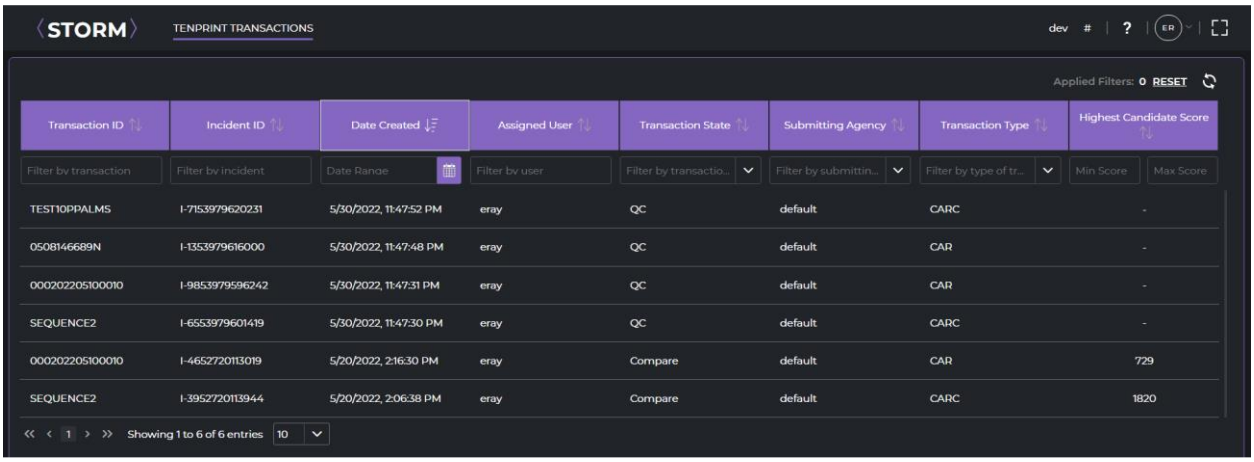

Figure 4. Tenprint Transactions List

STORM’s Incident Records

Incident IDs are STORM’s unique identifiers for the records that populate this list.

- STORM’s records related to the original Tenprint submissions are given the unique *Incident ID* in addition to the original Tenprint submission’s *Transaction ID*.
- *Transaction States* include both “QC” and “Compare”, the two states that involve user interaction (and for which separate user workflow queues can be accessed separately from the landing page.)
- Incident record includes of all of the images (of different types and finger positions) for a transaction.

Filter, Sort, and Select Tenprint Records

From the list, you can choose a specific transaction incident to work on.
Prior to doing so, you can filter and sort the incident list.

Tenprint Transaction List Identifiers

- Transaction ID – The identifier corresponding to the original Tenprint submission; the submission’s Transaction Control Number (TCN).
- Incident ID – STORM’s unique primary identifier for items in this list; formatted: **I -** ##############

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Latent Transaction List

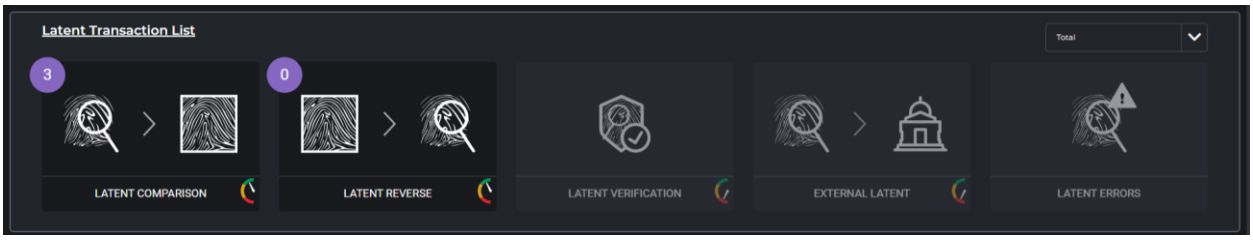

Figure 5. Landing Page – Latent Panel

Click the **Latent Transaction List** link to open a list of all latent transactions that are in process.

Includes Latent transactions in various *transaction states*, including both “Compare” and “ReverseCompare”, which correspond to examiner workflow stages.

From the list, you can choose a specific latent transaction to work on.

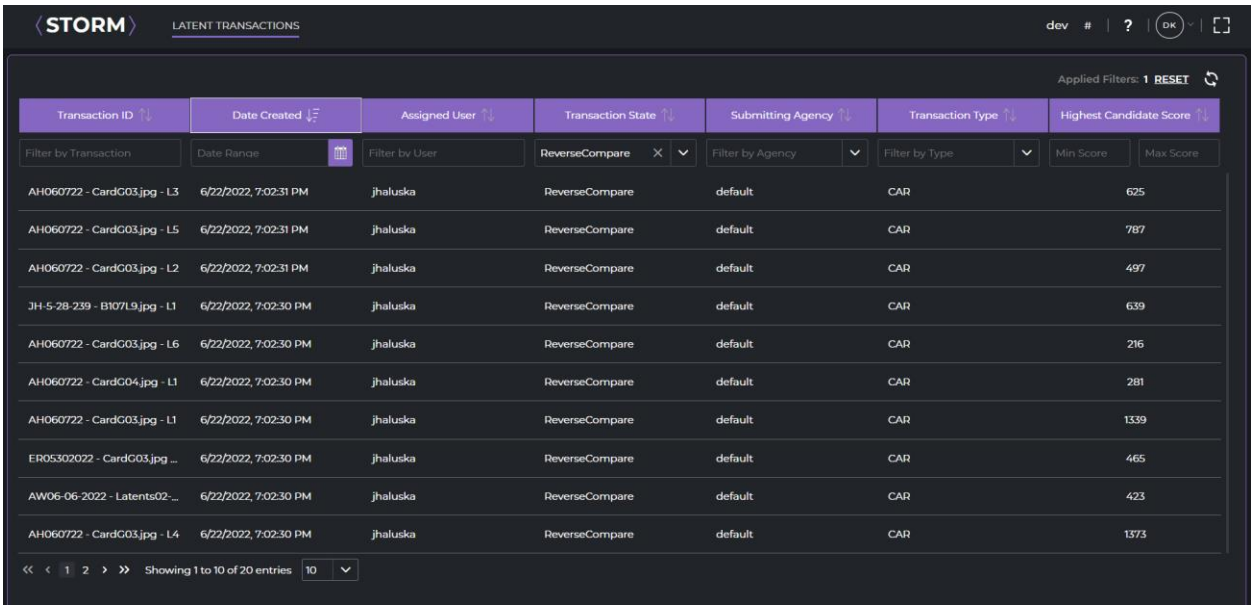

Figure 6. Latent Transactions List

Latent Identifiers

Latent transactions are identified by Transaction ID, which is a compound **Case-Image-Latent** identifier.

It is constructed hierarchically as follows: *case#* **-** *imageFilename.ext* **-** *latent#*.

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Chapter 2. Tenprint Quality Control

This chapter covers the Tenprint Quality Control feature. It requires you inspect tenprint incident records flagged by automated sequence and quality checking (according to set thresholds).

In each transaction record, inspect the prints and correct issues with image position sequencing, Interest Zone placement, alignment and coverage, and pattern classification issues. View transaction data and record descriptors. Finally, reject or save the record.

To open the Quality Control screen:

Click the **QUALITY CONTROL** tile to open the oldest transaction record that was prevented from continuing with the next, automated search, stage of the process because of a quality issue.

NOTE: Alternatively open a specific QC incident from the Tenprint Transaction List; see page 12.

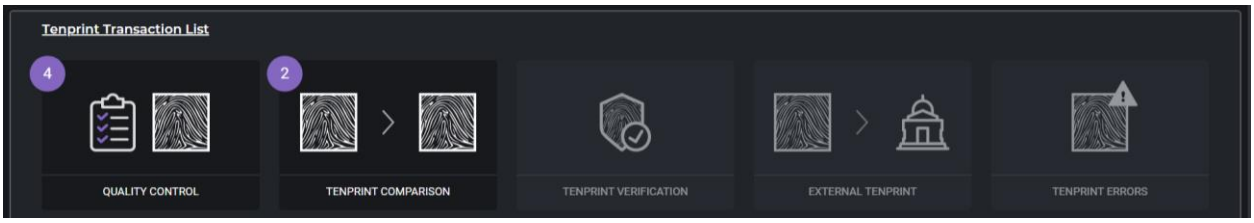

Figure 7. Landing Page – Tenprint Panel

Quality Control Screen

The Quality Control screen opens and displays the most relevant set of images needing examiner attention. The left edge of the Quality Control screen displays tabs for switching among finger and palm images (if there are any) and data (transaction data and record descriptors).

Figure 8. Quality Control Screen – Top Left

On the finger and palm tabs, dots show warnings as follows:

- A red dot shows the number of prints in potential sequence errors.
- *If there are no sequence warnings,* a gold dot shows the number of low minutiae/quality warnings.

NOTE: If Palms have sequence errors and Fingers do not, the Palms tab is displayed first.

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Image Layouts

The main part of the Quality Control screen contains *image blocks* for the various positions of fingerprints (roll and slap) or palms. The Fingers layout displays the roll prints and then the slaps and thumbs.

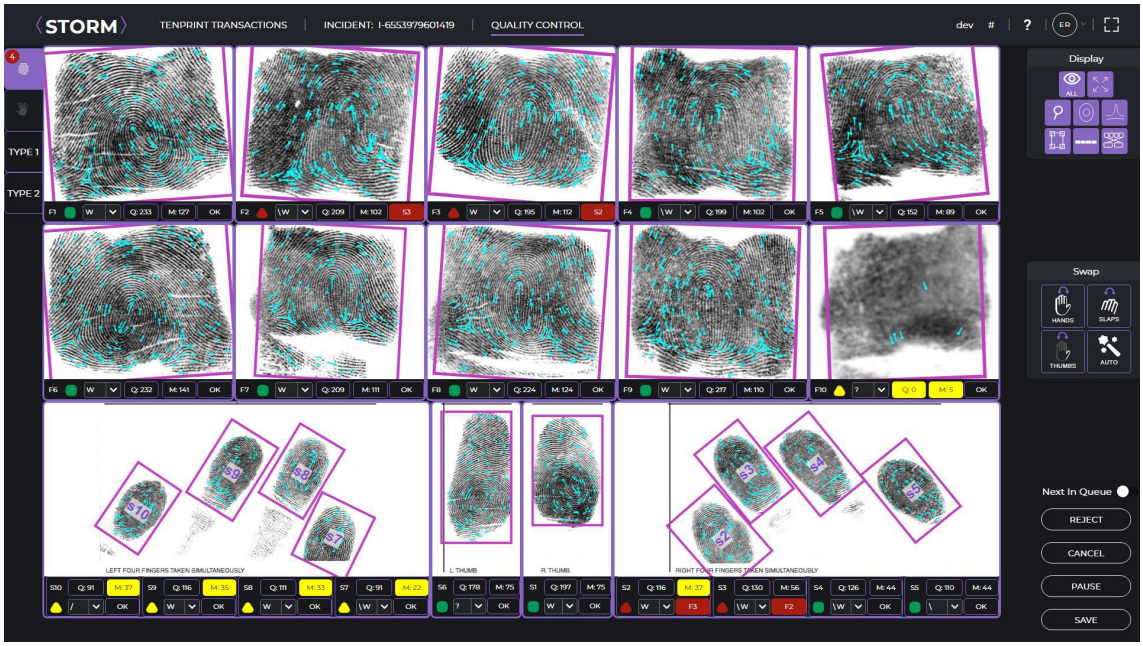

Figure 9. Quality Control – Finger Images Layout

The Palms layout displays the palm images, if available. It displays the right and left upper and lower palm prints, the writer's palm prints, and if available, major case friction ridge detail.

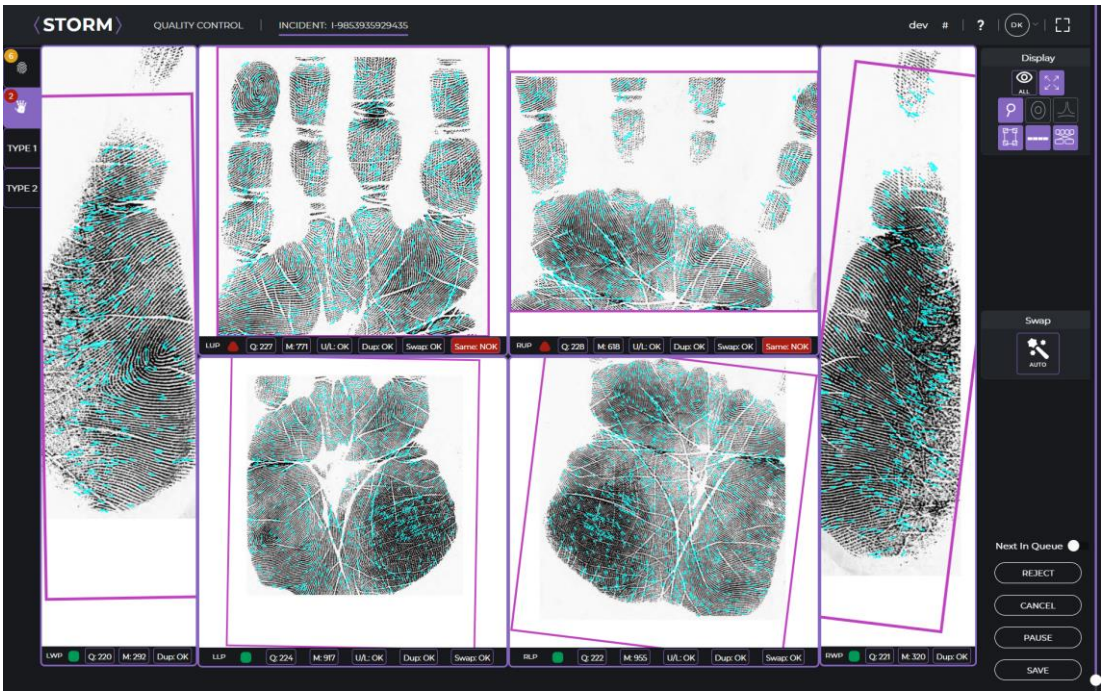

Figure 10. Quality Control – Palm Images Layout

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Info Bar Data

In both the Finger and Palm tabs, an info bar is displayed below each image block by default.

NOTE: Hide or show the Info Bars with the Display tool (on the right).

In both the Finger Images tab and the Palm Images tab, the info bar presents the following

- Fingerprint position (i.e., F1 – F10, and S1 – S10) or
  Palm print position (i.e., LWP, LUP, RUP, LLP, RLP, RWP)

  Alert symbol (i.e., sequence error, low quality or minutiae, exemption, none)
- Print Quality (e.g., Q:233 or Q:197)
- Minutiae Count (e.g., M:127 or M:75)

In Finger Image Tab

Below each rolled finger (and each segmented slap finger/thumb), the info bar adds the following data:

- Pattern classification (i.e., \, /, W, A, ?) for right loop, left loop, whorl, arch, unknown)

  Dropdown selector (⌄) for opening a menu to select additional patterns to add (as secondary and tertiary) and to deselect patterns to remove (simultaneously promoting any remaining patterns)
- Roll-to-Slap sequence check result, either: “OK” (no sequence error is detected) *or* a red box with the corresponding slap or finger number (e.g., S3 or F2)

In Palm Image Tab

Below the indicated palm image blocks, the info bar adds the following types of data:

- All six image blocks:
  - Duplicate check result, either: “Dup: OK” (no sequence error is detected) *or* a red box with the other palm print position
- Center four LUP, RUP, LLP and RLP add also:
  - U/L (Upper/Lower) check result, either: “U/L: OK” (no sequence error is detected) *or* a red box with the other position
  - Swap check result, either: “Swap: OK” (if they match) *or* a red box with the corresponding position
- Upper center LUP and RUP only add also:
  - Same check result: “Same: OK (no error is detected), a red box with “Same: NOK”, or “N/A”

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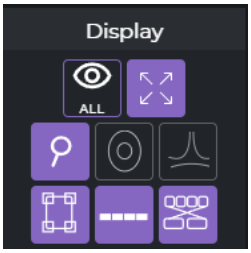
Display Settings

In the upper right, **Display** enables you to select all or individual display features for expand-to-fit, minutiae, cores, deltas, interest zones, and information bar.

For Fingers



For Palms

Figure 11. Markings Display Tools

NOTE: Hover over a tool icon to display that tool's name.

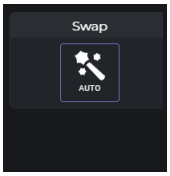
Table 1. Finger Images – Markings Display Tools

Tool Icon	Keyboard Shortcut	Tool Name	Fingers Only	Description
ALL		Show/hide all	(Fingers only)	Display all or none of the following elements
		Expand images (on/off)		Expand images to **tightly fill** their image blocks; or shrink images to *completely fit* within their image blocks
	Alt – S	Show/hide minutiae		Display minutiae in interest zone
	Alt – C	Show/hide cores	(Fingers only)	Display cores in interest zone
	Alt – D	Show/hide deltas	(Fingers only)	Display deltas in interest zone
	Alt – I	Show/hide interest zones		Display interest zone
		Show/hide info bar		Display info bar under each finger
		Show/hide RTS error lines		(Future capability to display lines that connect matching rolled and slap fingers that have sequence errors)

General Swap Tools

(Future capabilities.) General **Swap** tools located on the right, below **Display** are:

For Fingers



For Palms

Figure 12. General Swap Tools

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Fit Image Block Content

Within each image block is an image and an *Interest Zone* (aka *IZ*).

NOTE: Optionally hide and show IZ with the Show IZ Display tool on the right.

You can change how the content (image and IZ) fills and fits the image block. You can:

- Change an automatic setting for all image blocks – to either shrink or expand their contents
- Manually zoom and move individual images and their IZ– to fit well in their image blocks.

Change Expand Setting for All Images

You can switch *off* the *Expand* setting so that all images – and their IZ – fit entirely within their image blocks. Switch it ON again to fill the image block with the image.

NOTE: Changing Expand (either selecting or deselecting) undoes any manual zooms and moves of images.

To zoom to fit all automatically, use the Expand Display tool (on the right):

- Deselect the Expand tool to shrink the content of all image blocks to *completely fit* inside.
- Select the Expand tool to expand the content of all image blocks to **tightly fill** their image blocks.

NOTE: IZ do not need to be showing for zoom-to-fit to work.

Zoom and Pan Images

You can manually zoom and move individual images – and their IZ – within their image block.

To manually zoom and move the image:

1. Mouse over the image block.
2. Zoom or move:
   - To zoom in or out – Scroll the wheel up or down.
   - To pan in any direction –

– **drag** the image. (The cursor changes to .)

NOTE: IZ do not need to be showing for manual zoom or move to work.

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Adjust Interest Zones

Resize and rotate individual IZ so that each surrounds its fingerprint and tilts in the same direction.

NOTE: For four-finger slaps, adjust the IZ for each segmented slap finger (i.e., S2 – S5 and S7 – S10). Rotate the IZ to match the direction of the fingers.

Figure 13. Finger Images – Interest Zones Per Segmented Finger

NOTE: You cannot move, resize, or rotate an individual IZ from within the Edit window; IZ adjustments must be done here.

NOTE: IZ need to be showing. If they are hidden, select the Show IZ Display tool.

To resize and rotate an IZ:

1 Mouse over the IZ.
- The arrow cursor switches to ✥.
- Handles are shown in the corners and side mid-points on the IZ outline.
- The ↻ icon appears under the top side mid-point.

2 Change the IZ as needed:
- To move it – Click and drag.
- To resize it – Click a handle and drag.
- To rotate it – Click the ↻ and drag.

3 After adjusting an IZ, move the mouse away from the image block to allow the system to automatically re-encode IZ minutiae.

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Fix Sequence and Pattern Issues

Drag to Swap Image Block Contents

You can manually swap individual fingerprints that are placed in the wrong image blocks.

To directly swap contents of two image blocks:

1 Point inside the image block to show the “Drag-to-Swap” tool icon in its bottom right corner.

2 Click and drag the image – and its IZ–to the image block with which to swap.

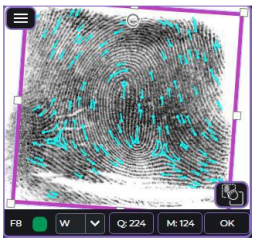

Figure 14. Image Block with Drag Tool Icon

Change Pattern Classifications

Pattern classifications are automatically assigned to each roll and slap finger. (A question mark indicates that the pattern classification is unknown.)

NOTE: Each finger has a primary pattern classification (the first pattern displayed) and possibly one or two reference classification patterns that follow. Example of the classification display with just a primary pattern: ****. Example with a reference pattern: **\W**. Example with three patterns: **\WA**.

To manually add and remove pattern classifications:

1 Click the pattern dropdown selector (⌄) to open the dropdown menu.

2 Add and remove patterns by selecting and deselecting them in the menu:
- To append a pattern, select it in the menu. It is immediately appended to the displayed pattern. Repeat to append third pattern.
- To remove a pattern, deselect it in the menu. It is immediately removed from the displayed pattern. Repeat to remove another pattern.

3 Click the pattern pullup selector (⌃) to close the dropdown menu.

Figure 15. Finger Images – Fingerprint Pattern Selector Menu

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Set Exemptions

You can set or change the Exemption status for an individual finger or palm print.

NOTE: Setting an Exemption might remove the Interest Zone and/or the features for that finger or palm.

To set or change an Exemption:

1 Point inside the image block to show the menu icon in its top left corner.

2 Click the menu icon .

3 Select Exemption >.

4 Select the status value you want. (None removes the exemption.)

NOTE: Setting an Exemption might remove the Interest Zone and/or the features for that finger.

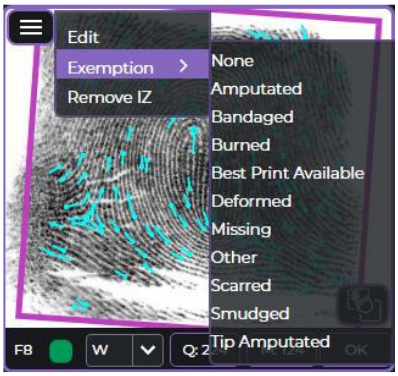

Figure 16. Menu: Exemption, Remove IZ

Remove an IZ

You can manually remove the Interest Zone (IZ) for a finger.

To manually remove Interest Zone:

1 Click the menu icon .

2 Select Remove IZ.

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Edit Images

You can edit the images for fingers and palms.

To edit an image:

1 Double-click the finger, four-finger slap, or palm image (anywhere in the image block):

NOTE: Alternatively, click the menu icon and click **Edit**.

This opens the QUALITY CONTROL | EDIT screen.

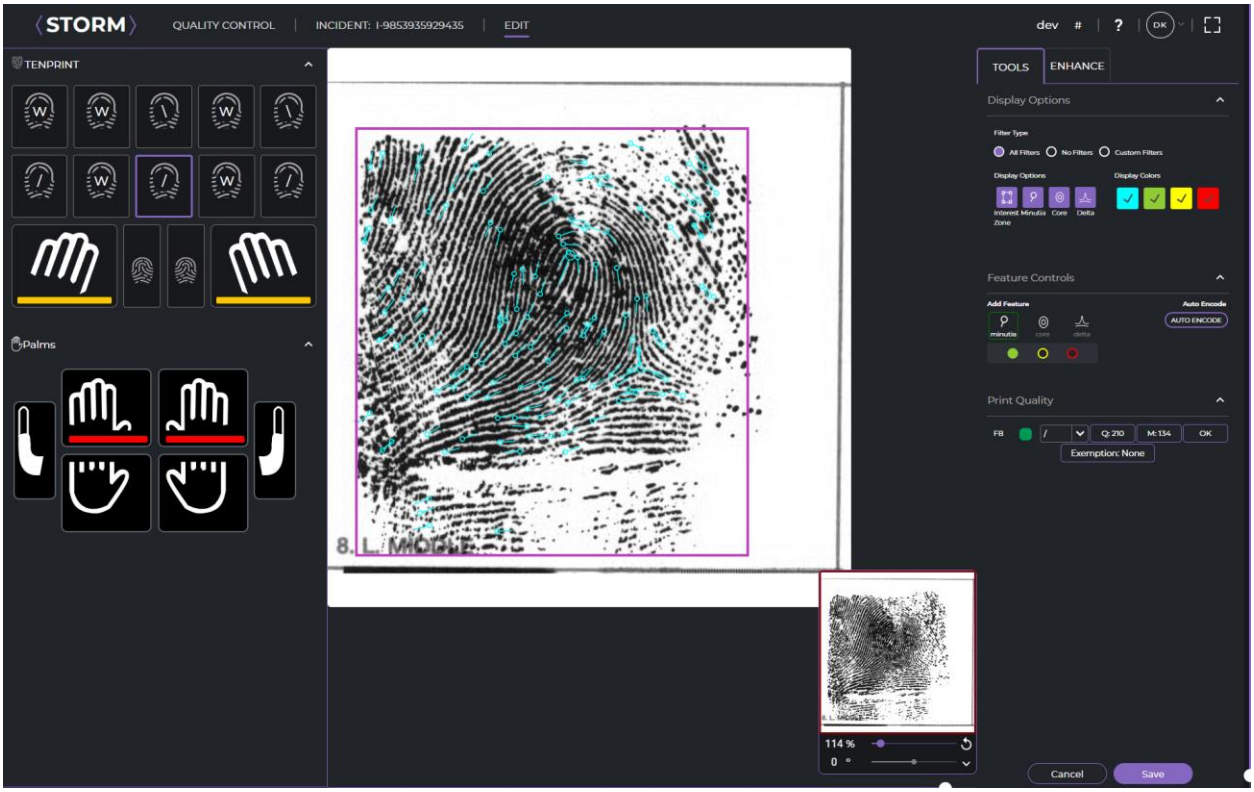

Figure 17. Edit Screen – Roll Finger

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2 If you opened a four-finger slap, the Edit screen opens showing all four fingers.

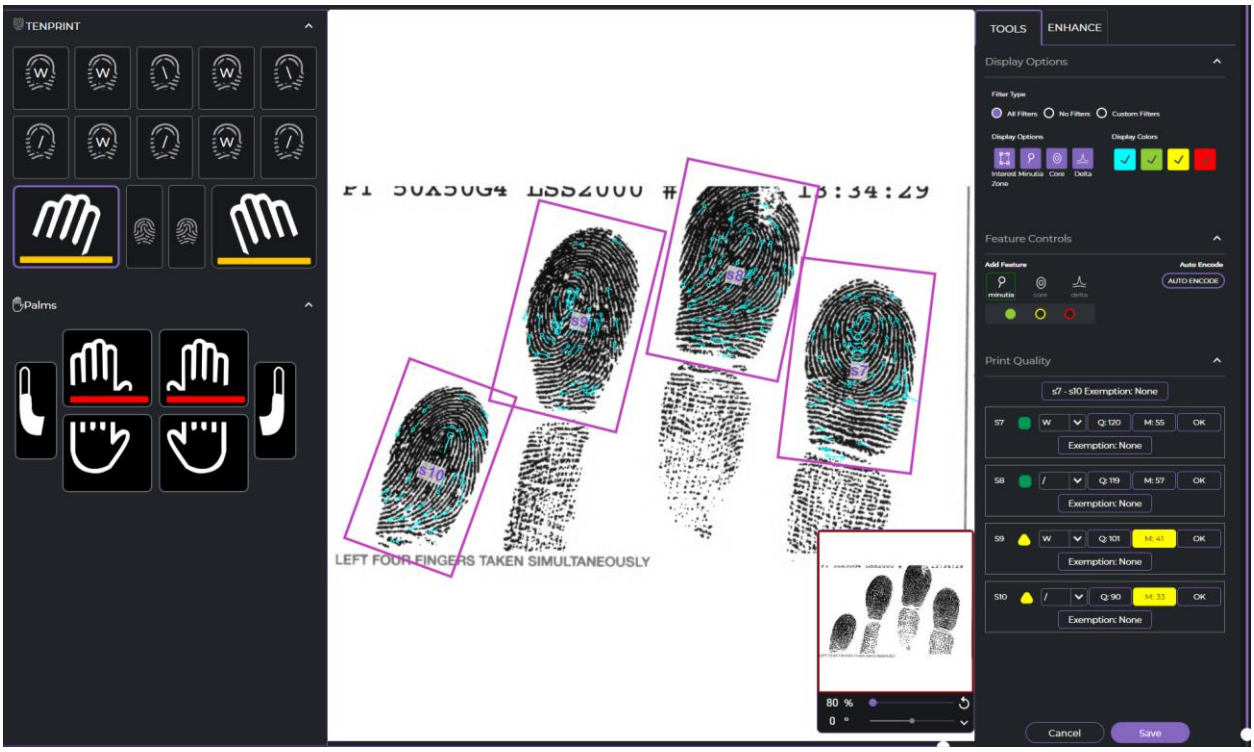

Figure 18. Edit Screen – Slap Four Fingers

a. To open a particular segmented finger, click that finger image.

Figure 19. Edit Screen – S10. Left Little

b. To close the segmented finger, click **ALL FINGERS**.

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3 To switch to edit a different finger and/or palm print, click the desired icon in the image position selector in the left panel. The selected position is outlined in purple.

Figure 20. Edit Screen – Tenprint Image Position Selector

4 To zoom and pan, use the small-scale Navigation inset or, on main image, use mouse and keyboard.

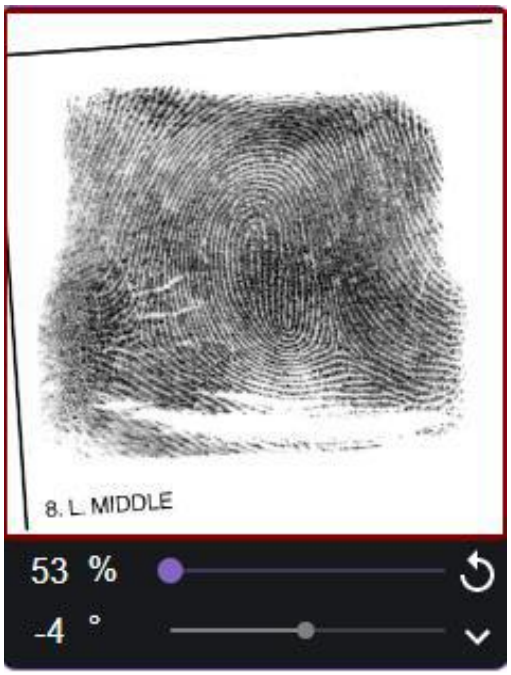

Figure 21. Edit Screen – Image Navigation Inset

- To pan – Click and drag the image in the Navigation inset.

  Alternatively, on main image, hold down Ctrl and drag the image.
- To zoom in and out – Drag the percent (%) magnification slider.
  Alternatively, mouse over the main image and scroll the wheel up or down.

NOTE: You cannot move, resize, or rotate an individual IZ from within the Edit screen.

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5 On the right, use the **Tools** tab Display Options section to fully or selectively show or hide markings.
- Use Filter Type to set All or No Filters, or the last Custom Filters selections of options and colors
- Use Display Options to individually hide or show: Interest Zone, Minutiae, Core, and/or Delta
- Use Display Colors to hide or show auto-encoded (Cyan) or examiner-encoded confidence levels

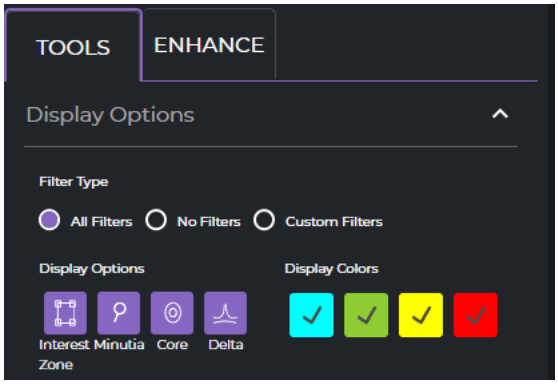

Figure 22. Edit Screen – Tools Tab, Display Options

Table 2. Tools Tab – Display Options

Tool Name	Tool Icon	Keyboard Shortcut	Description
NOTE: "Filter Type" is an overall control reflecting – and affecting – all the individual filters (options and colors).			
All Filters		Switches between "No Filters" and "Custom Filters" (spacebar)	ON indicates all filters are on, all features showing. Default setting.
No Filters			ON indicates no filters are on (all features hidden).
Custom Filters			ON indicates *some* filters were switched off, others on. If off, switching back ON restores last individual filters.
NOTE: All the filters below are set to ON – show feature type – by default. If ON, the icon is color-filled, as shown. Click icon (or press key) to switch between ON and off. (If ON/off mix of filters, "Custom Filters" turns ON.)			
Interest zone		I *I for Interest*	Show/hide interest zone
Minutiae		S *S*	Show/hide minutiae
Core		C *C for Cores*	Show/hide cores
Delta		D *D for Deltas*	Show/hide deltas
Auto-Encoded		A *A for Auto-*	Show/hide auto-encoded features
Green		G *G for Green*	Show/hide examiner-encoded features
Yellow		Y *Y for Yellow*	
Red		R *R for Red*	

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6 To add markings for features you find, use the **Tools** tab Feature Controls section:

a. Under Add Feature, select the feature type option and then the color for confidence level.

b. On the image, click and hold at the feature location, then drag to set tail direction. Repeat with others of the same type and color.

c. Repeat to add more with different colors and/or types.

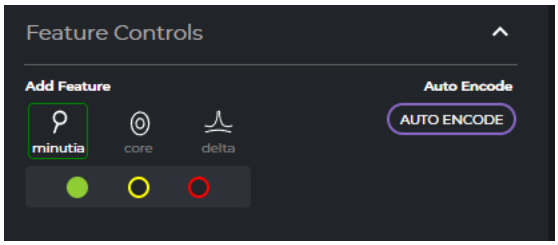

Figure 23. Edit Screen – Tools Tab, Feature Controls

Table 3. Tools Tab – Tools Tab, Feature Controls, Add Feature

Tool Name	Tool Icon	Key	Description
NOTE: Only one feature and one color can be selected at a time. The selected feature is outlined in purple. The selected color is filled. Click icon (or press key for color) to switch ON and off.			
Add Minutiae	minutia		Add minutiae
Add Core	core		Add core
Add Delta	delta		Add delta
… in Green		1	Color for the next placed feature. Green is default.
… in Yellow		2	**NOTE:** Color is for level of feature clarity and examiner confidence in existence and location. Green: Clear feature, high confidence; Yellow: Moderate; Red: Unclear feature, low confidence.
… in Red		3	

7 To edit an existing feature marking:

a. Check the color and select another if needed – press 1 , 2 , or 3 .

b. Edit the feature as follows:

- To move a feature, click the circle and drag to new location.
- To change tail direction, click the tail and drag in new direction.
- To delete a feature, right-click the feature.

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8 To auto-encode: Click **AUTO ENCODE**.
- If you did not add features, you get the message "No interest zone was modified".
- If you added features, you get a pop-up saying: “This action will wipe out existing features. Are you sure you want to continue?” Click Continue or Cancel.

9 To view quality information and change pattern classifications, use the **Tools** tab Print Quality section.
- The info is that same as in the Info Bar for the position. See Info Bar Data on page 17.
- You can change pattern classification. See Change Pattern Classifications on page 21.

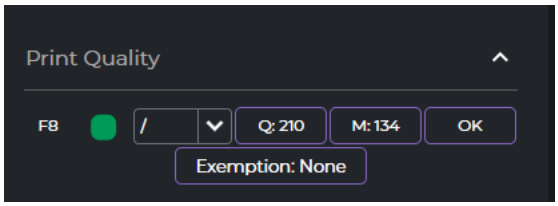

Figure 24. Edit Screen – Tools Tab, Print Quality Controls

NOTE: The Enhance tab is a future capability.

10 When you are done, in the bottom right, click **Save** or **Cancel**.

NOTE: For information on **Type 1 and Type 2** tabs, see Appendix A. QC Type 1 and 2 Tabs.

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End Work on QC Transaction

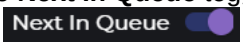
Finish your work on a Quality Control transaction with the action buttons in the lower right of the window.

If you opened the transaction from:

- Quality Control queue, **Next in Queue** toggle lets you choose to continue working the queue or not.
- Tenprint Transactions List, **Next in Queue** is not offered.

To finish working on this QC transaction:

1 Check the **Next In Queue** toggle switch (if shown) to see if it is ON (purple) or off (white).

- On – 

- Off –

To switch it, click the toggle icon (with the cursor).

2 Click the action button of either **Reject**, **Cancel**, **Pause**, and **Save** (or their **… & Next** variations).

Table 4. Action Buttons – Quality Control

Action Button (In Single Mode)	**Action Button** (In Queue Mode)	**Description**
Reject	**Reject & Next**	To reject the transaction record from further submission processing due to lack of quality (removing the transaction record from the Quality Control queue and from any further search processing)
Cancel	**Cancel & Next**	To discard any changes you made and return the transaction record to the Quality Control queue
Pause	**Pause & Next**	To pause work with any changes you made and return the transaction record to the Quality Control queue
Save	**Save & Next**	To save work with any changes you made and submit the transaction record back into the tenprint automated workflow for subsequent processing

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Chapter 3. Tenprint Comparison

This chapter covers the Tenprint Comparison feature. It lets you inspect tenprint incident records returned with match candidates from the automated search (according to set thresholds). Compare each search image side-by-side with its candidate's image. Select finger by Roll or Slap and position; select candidates from record list that you can sort by match score (descending) or Incident ID (ascending).

View minutiae with matching mates in the candidate image and those that are un-mated. Add and edit minutiae. View transaction data and record descriptors. Evaluate candidates as either Ident (ID), Inconclusive (INC), or Non-Ident (NOID). Save the record, removing it from the queue.

To open the Tenprint Comparison screen:

Click the **TENPRINT COMPARISON** tile to open the oldest incident record that was returned with potentially matching candidates requiring examination and evaluation.

NOTE: Alternatively open a specific Compare incident from the Tenprint Transaction List; see page 12.

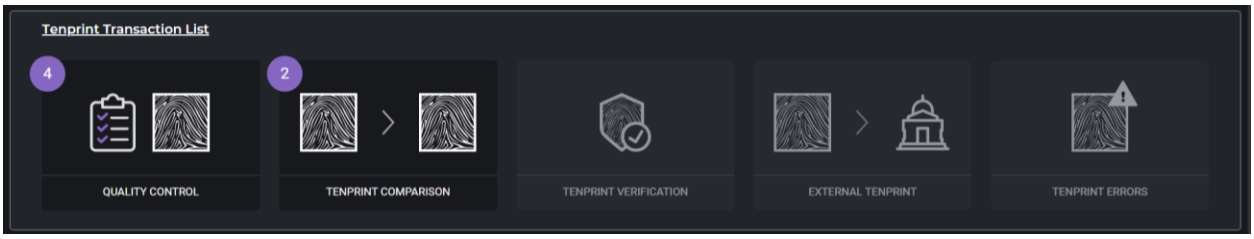

Figure 25. Landing Page – Tenprint Panel

Tenprint Comparison Screen

The Tenprint Comparison screen opens and displays one of the search transaction images on the left and a corresponding candidate image on the right.

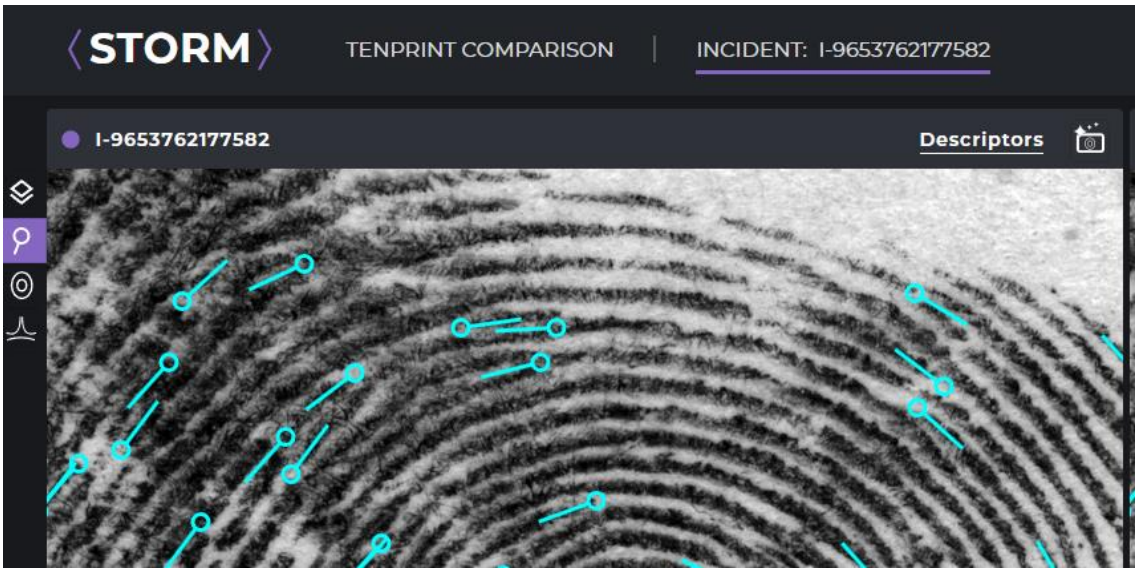

Figure 26. Tenprint Comparison Screen – Top Left

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View and Select Image Type and Candidate

The main part of the Tenprint Comparison screen displays a search image from the search transaction record side-by-side with its first candidate's image.

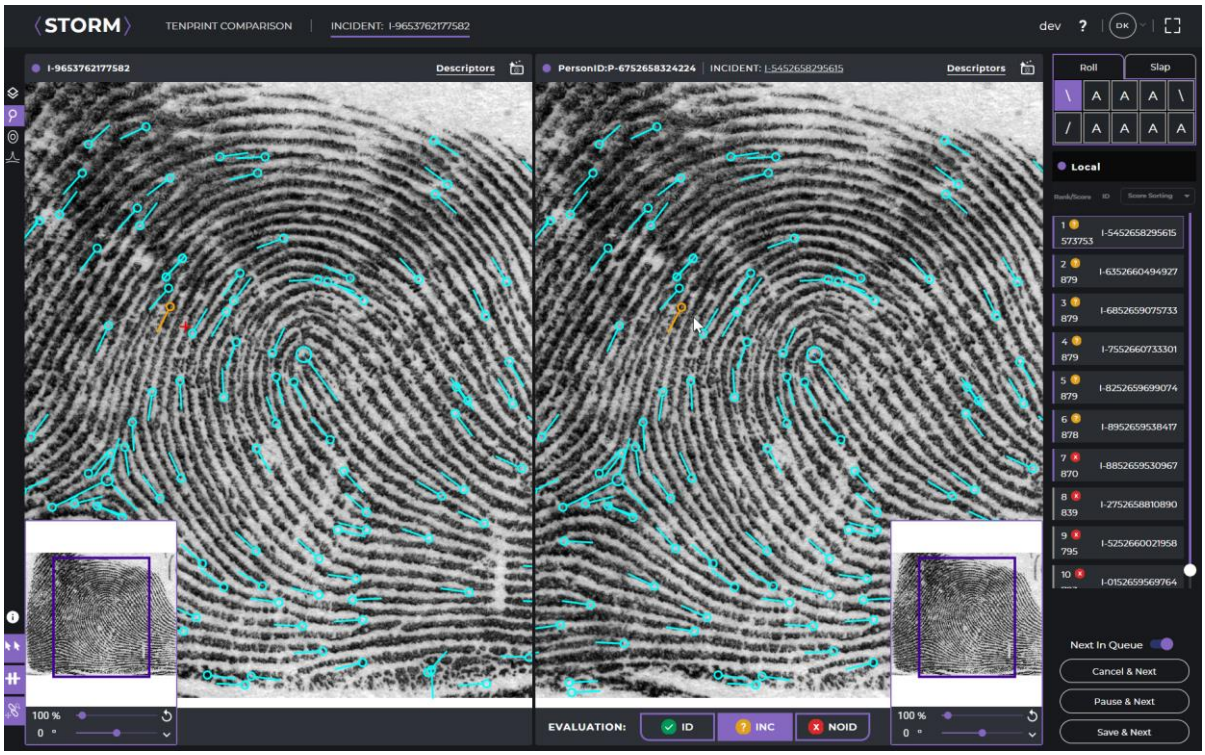

Figure 27. Tenprint Comparison Screen

To view and change images and candidate records:

1 Above each image, you can view its record's identifiers and view descriptors for reference.

2 Identify the image type (roll or slap) and finger position with the image selector in the upper right.

The selected type is outlined in purple. The button for the displayed finger is filled with purple. Fingers are in rows for right and left, and labeled with pattern classification.

- To switch type, click Roll or Slap.
- To change position, click the new finger position.

Figure 28. Tenprint Comparison – Image Type Selector and Position Indicator

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3 To switch to a different candidate record, use the candidate database and record selector on the right. Press Page ▼ and Page ▲ to scroll down and up. Click the candidate.

Figure 29. Tenprint Comparison – Candidate Database and Record Selector

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Image and Feature Controls

Side-by-Side Image Controls

The lower part of the left edge of the Comparison screen has controls for working with the side-by-side layout of the Comparison screen and its two images. They are:

- Show/hide image info –The boxed area showing width, height, and resolution on upper left corner of each image.
- Display double-cursor – When the arrow cursor is in one image, a second cursor (red plus sign +) is shown in the other image in the same relative position.
- Align images – When on, both images are rotated and panned to align the mated minutiae. When off, both images are displayed upright and centered.
- Open Link submenu – To unlink or link the two images for Zoom and/or Pan.

Below each image is a navigation inset control, where you can do the Zoom and/or Pan. Use the Link submenu in conjunction with the navigation inset.

Feature Display and Controls

The upper part of the left edge of the Comparison screen has buttons for feature display options and for selecting the feature to add.

The left edge of the Comparison screen displays these buttons:

- Display options – To filter which feature types, confidence levels, and mated/non-mated statuses to display.
- Feature selectors – To select which feature type to chart (for documentation purposes only): minutiae, core, or delta. Minutiae is the default selection.

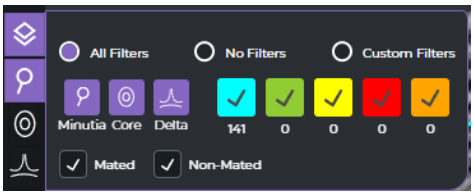

Figure 30. Tenprint Comparison – Display Options and New Feature Selectors

Display Options

The Display options box for the Comparison screen provides the following additional items that are not available in Quality Control:

- Orange display color (Show/hide) – For minutiae added or edited on the Comparison screen
- Mated minutiae (Show/hide) – For matched minutiae (in candidate image, color changes to cyan)
- Un-mated minutiae (Show/hide) – For un-mated minutiae (in candidate, color remains dark blue)

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Table 5. Tenprint Comparison – Feature Display Options

Tool Name	Icon	Keyboard Shortcut	Description
Minutiae		S ***S***	Show/hide minutiae
Core		C ***C** for **C**ore*	Show/hide core
Delta		D ***D** for **D**elta*	Show/hide delta
Auto-Encoded		A ***A** for **A**uto-*	Show/hide auto-encoded features
Green		G ***G** for **G**reen*	Show/hide examiner-encoded features
Yellow		Y ***Y** for **Y**ellow*	
Red		R ***R** for **R**ed*	
Orange		O ***O** for **O**range*	Show/hide features added/edited on Comparison screen
Mated			Show/hide matched minutiae (candidate's show mate's color)
Non-Mated			Show/hide un-mated minutiae (candidate's show dark blue)

New Feature Selectors

NOTE: Features charted on the Comparison screen are for examiner documentation purposes only. Unlike other features manually encoded in earlier stages, these are ***not*** saved for use by search matching algorithms. These are restricted to the color orange.

Table 6. Tenprint Comparison – New Feature Selectors

Tool Name	Icon
NOTE: Only one feature can be selected at a time. The selected feature icon is filled in purple.	
Add Minutiae	
Add Core	
Add Delta	

The color of the markings are always orange.

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Control Images and Add/Edit Features

To view images and add/edit features:

1 On the lower left edge, use the comparison controls to adjust your view and operation of the two images.
   - Show/hide image info.
   - Display double-cursor to locate and place features – When the arrow cursor is in one image, a second cursor (red plus sign +) is shown in the other image in the same relative position.
   - Align images – Keep ON (default) so both images are rotated and panned to align the mated minutiae. Turn off to display both images upright and centered.

2 Use the Link submenu with the navigation inset(s) or with mouse/keyboard Zoom/Pan on main image.

   a. Use the Link submenu to unlink or link the two images for Zoom and/or Pan.

   b. In the navigation insets (one or both, as applicable)

3 To zoom and pan, use a small-scale Navigation inset or, on main image, mouse and keyboard.

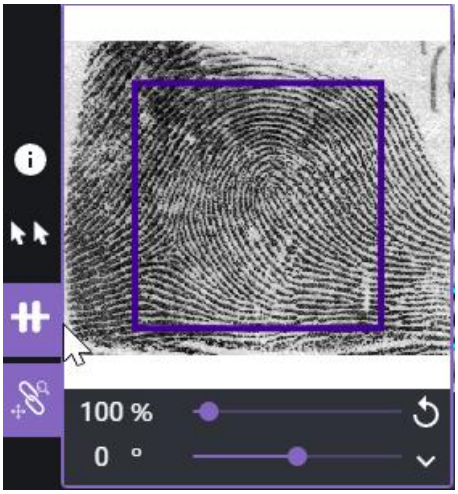

Figure 31. Tenprint Comparison Screen – Image Navigation Inset

   - To pan – Click and drag the image in the Navigation inset.

     Alternatively, on main image, hold down Ctrl and drag the image.
   - To zoom in and out – Drag the percent (%) magnification slider.
     Alternatively, mouse over the main image and scroll the wheel up or down.

4 On the upper left edge, use the Display Options section to fully or selectively show or hide markings.
   - Use Filter Type to set All or No Filters, or the last Custom Filters selections of options and colors
   - Use Display Options to individually hide or show: Interest Zone, Minutiae, Core, and/or Delta

5 To add markings for features you find, use the feature selectors.

6 To edit an existing feature marking:
   - To move a feature, click the circle and drag to new location.
   - To change tail direction, click the tail and drag in new direction.
   - To delete a feature, right-click the feature.

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End Work on Tenprint Comparison Transaction

Finish your work on a tenprint comparison transaction with the action buttons in the lower right of the window.

If you opened the transaction from:

- Tenprint Comparison queue, **Next in Queue** lets you choose to continue working the queue or not.
- Tenprint Transactions List, **Next in Queue** is not offered.

To finish working on this transaction record:

1 Check that the **Next In Queue** toggle switch (if shown) to see if it is ON (purple) or off (white).
   - On –

   - Off –

   To switch it, click the toggle icon (with the cursor).

2 Click the action button that you need from **Cancel**, **Pause**, and **Save** (or their **… & Next** variations).

Table 7. Action Buttons – Tenprint Compare

Action Button (In Single Mode)	**Action Button** (In Queue Mode)	**Description**
Cancel	**Cancel & Next**	To discard any changes you made and return the transaction record to the Tenprint Comparison queue
Pause	**Pause & Next**	To pause work with any changes you made and return the transaction record to the Tenprint Comparison queue
Save	**Save & Next**	To save work with any changes you made and submit the transaction record back into the tenprint automated workflow for subsequent processing

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Related Tenprint Functions

The Tenprint work panel has tiles for these manual work queue functions:

- **Tenprint Verification** (Future capability) – Used for a secondary tenprint comparison by a different tenprint examiner.
- **External Tenprint** (Future capability) – Used for tenprint comparison of candidates returned in responses from external databases (federal and state).
- **Tenprint Errors** (Future capability) – Used for examining Tenprint transaction processing errors.

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Chapter 4. Person Management

This chapter covers the Person Management function. As an examiner, you can use it to select and view incident records to address problems with how they relate to person records after automated processing.

After examination, you might have to move an incident from one person to another existing person record, extract an incident to a new person, merge a person with another, or delete incident or person.

Clicking the Person Management tab opens a search form for listing incident records, whether they have been associated with a current person record or not.

Person Management Search and Results

The screen offers Search Criteria for incident records.

NOTE: The list is not populated initially. You can just click **SEARCH** without entering Search Criteria.

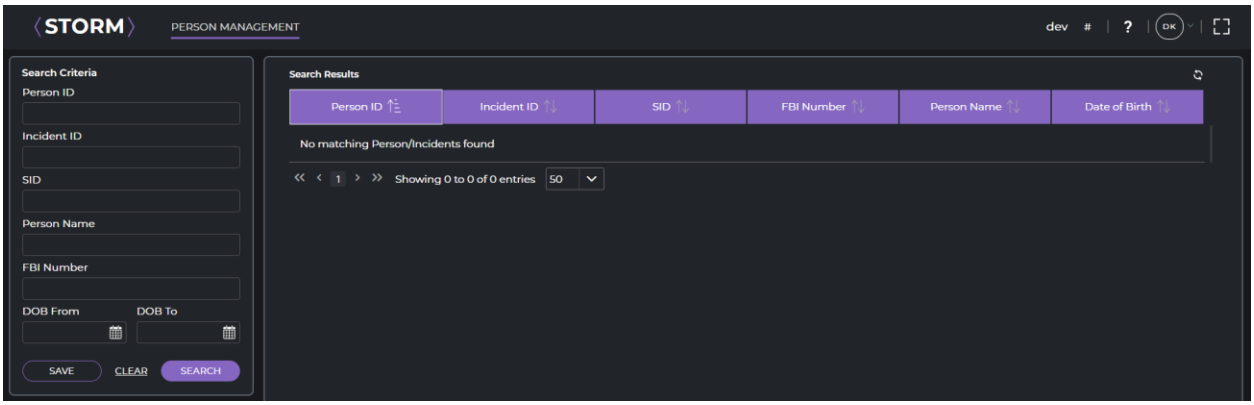

Figure 32. Person Management – Initial View

You can sort results by column heading (ascending or descending) as needed, and refine the search with more specific Search Criteria. For example, you can click the Person ID column heading to switch to descending to see incidents that are associated with persons.

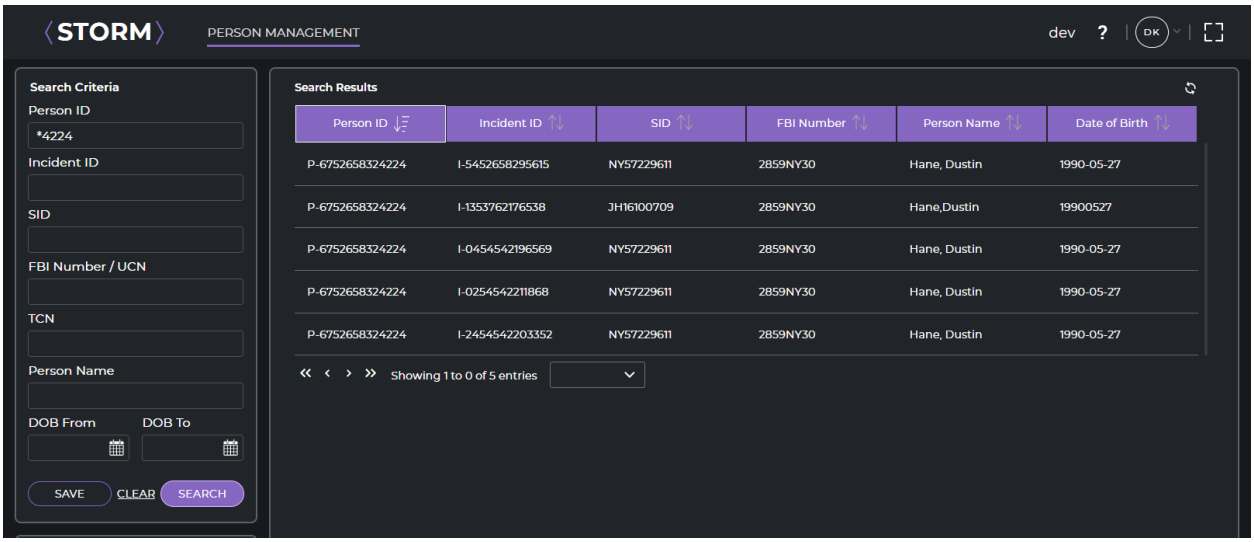

Figure 33. Person Management Search Results

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To display a list of records and open one:

1 Optionally select criteria.

2 Click **SEARCH**.

3 Optionally sort by columns (or add criteria and search again).

4 Scroll to a record and click it to open.

Identifiers / Search Criteria

Incident-level person records feature these key identifiers and data, which can be used for searching (that is, filtering):

- STORM Person identifiers, which are constructed as: **P -** ##########
- STORM Incident identifiers, which are constructed as: **I -** ##########
- SID – State Identification Number
- FBI Number – UCN (Universal Control Number)
- Person Name
- Person Date of Birth

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Incident Screen in Person Management

Clicking an incident from the search results opens the Incident screen.

The Finger images tab of the Incident in Person Management displays ten rolled fingerprint images, and if available, the left slaps, right slaps, and thumb slap images.

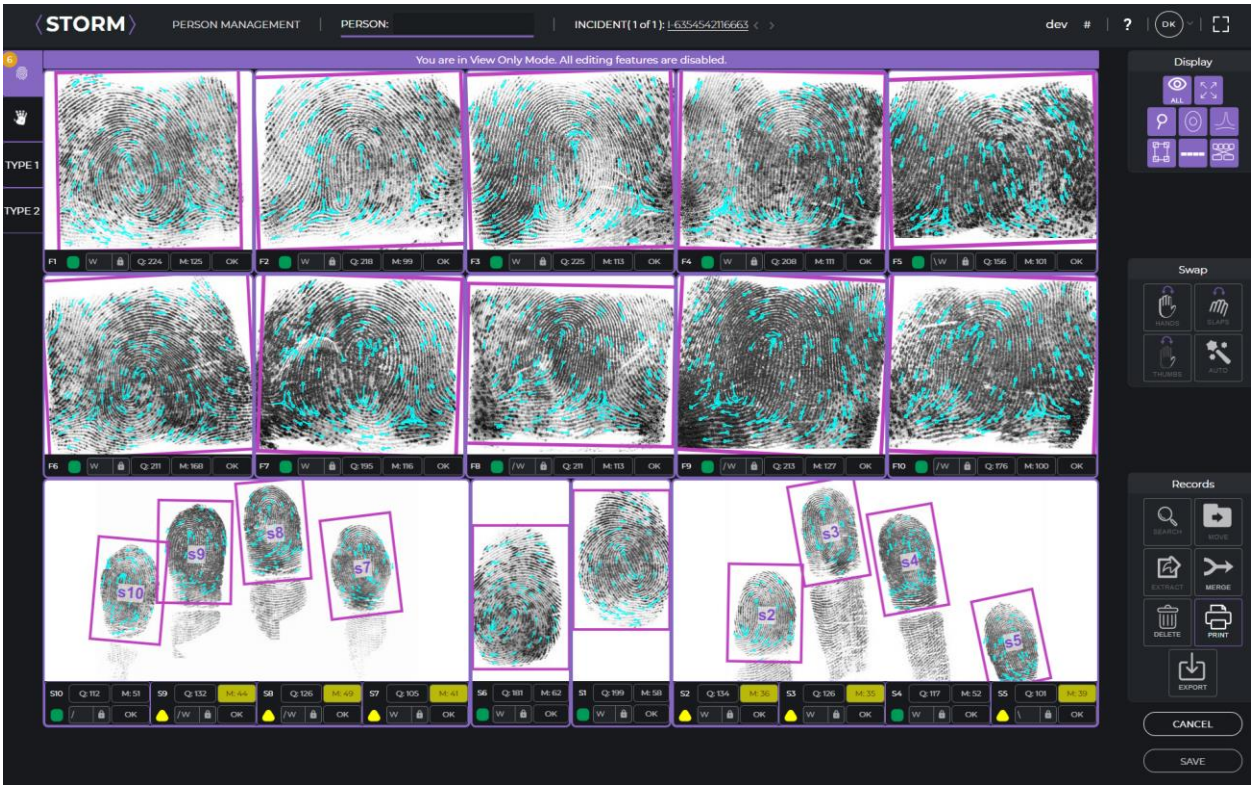

Figure 34. Person Management – Incident

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This looks a lot like the Tenprint Quality Control screen. See Image Layouts on page 16.

An important distinction is that this screen offers the Records tools on the bottom right instead of the transaction or transaction/queue action buttons.

Records – Taking Actions To Fix

If the incident record is under the wrong person record, a duplicate person record, or needs to be deleted (from or along with the person record), you can take these actions with the **Records** tools located on the right at the bottom.

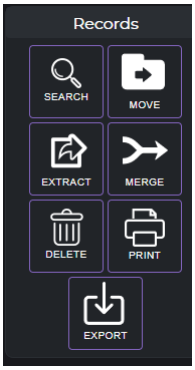

Figure 35. Finger Images – Records Tools

NOTE: Hover over a tool icon to display that tool's name.

Table 8. Finger Images – Records Tools

Tool Icon	Tool Name	Description
SEARCH	**Search**	(Future capability)
MOVE	**Move**	Move Incident from this Person to a different Person (currently in the database)
EXTRACT	**Extract**	Extract Incident from this Person to a new Person (not currently in the database)
MERGE	**Merge**	Merge Person with another Person (because this is a duplicate Person record with different incidents)
PRINT	**Delete**	Delete either just this Incident or the Person
PRINT	**Print**	Print tenprint card
EXPORT	**Export**	(Future capability)

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End Work on Person and Incident Record

Finish your work on a person and/or incident record with the action buttons in the lower right of the window.

To finish working on the person and/or incident record:

Click the action button that you need from **Cancel** and **Save**.

Table 9. Action Buttons – Person Management

Action Button (In Single Mode)	**Description**
Cancel	To discard any changes you made to this incident and/or person record (and any other incident and person records)
Save	To save all changes you made to this incident and/or person record (and any other incident and person records)

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Chapter 5. Latent Case Management

Latent Case Management is the starting point for the first several stages of the user workflow for Latent prints. Latent Case Management also provides the ability to search existing latent cases and open one from the list.

Clicking the Latent Case Management tab opens a page with the **Add A New Case** button as well as a search form and results table for listing existing case records.

Start the Latent Workflow

The Latent Case Management screen is where you **Add A New Case**, **Upload Images**, perform **Latent Analysis** (box out latents), and perform biometric search against the tenprint images of the STORM database.

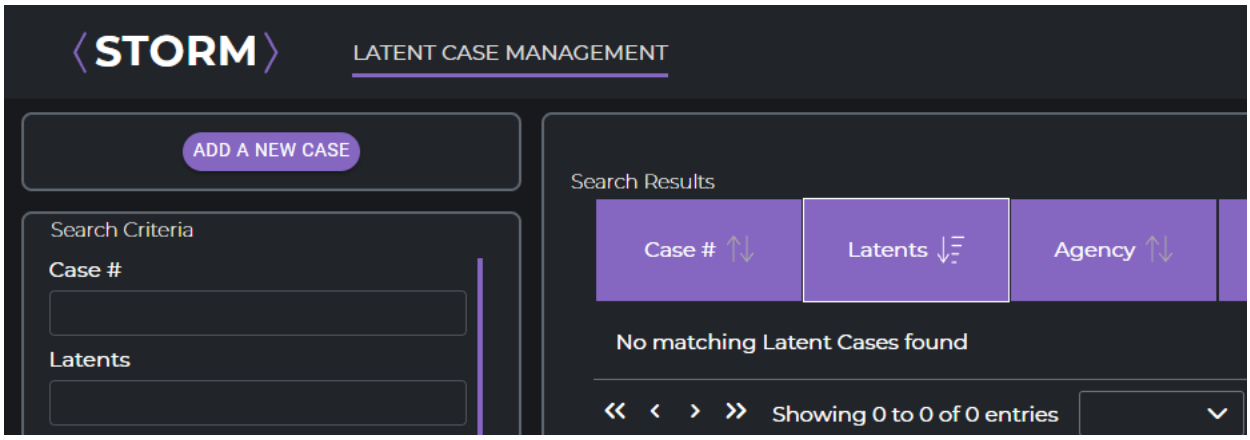

Figure 36. Latent Case Management – Top Left

Add a New Case and Upload Images

To add a case and upload image evidence:

1 Click **ADD A NEW CASE**. This opens the **Create a New Case?** Dialog box.

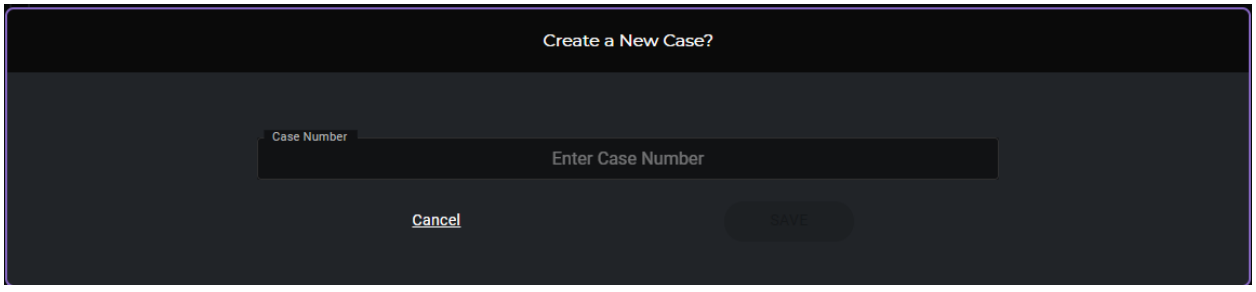

Figure 37. Create a New Case? Dialog Box

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2 Click inside the field and type the Case Number. Click **SAVE**.

This opens the Case screen and its Case Info tab. It provides fields where you can enter case information.

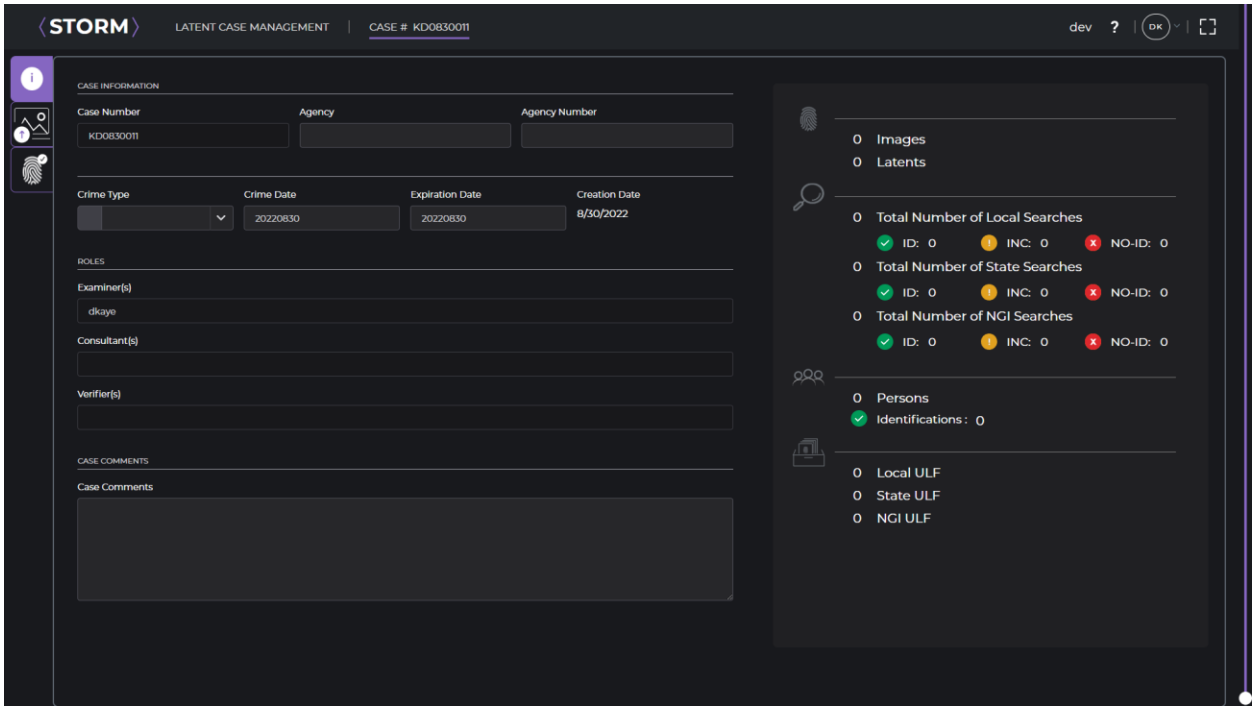

Figure 38. Case Window – Case Info Tab

Navigation buttons on the left are for:

Case Info

Image Upload

Examination Summary (future capability)

3 To upload evidence images, click the Image Upload tab .

This opens the Image Upload tab.

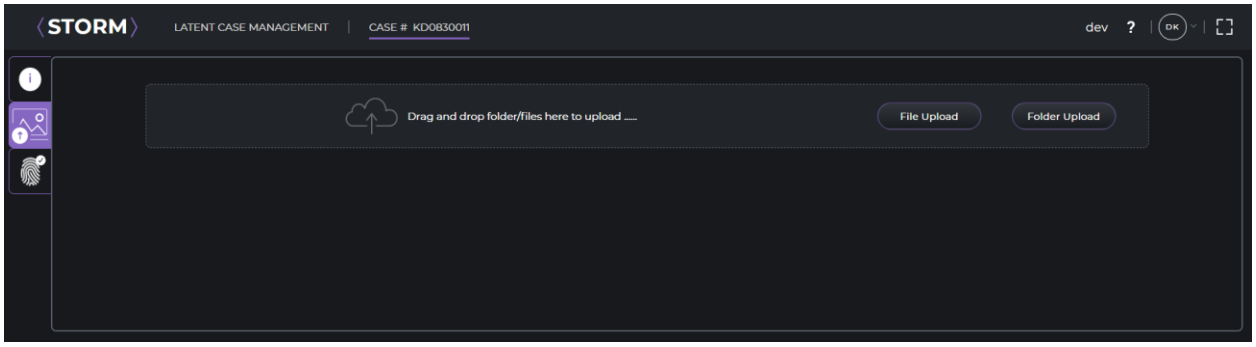

Figure 39. Case Window – Image Upload Tab, Empty

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4 Drag and drop a folder and/or files to the upload box.

Alternatively:

a. Click **File Upload** or **Folder Upload** to browse the filesystem.

b. Select the files or folder to upload and click **Open** or **Upload** (for file or folder, respectively).

The screen processes the upload and displays a gallery and reports the number of uploaded images completed.

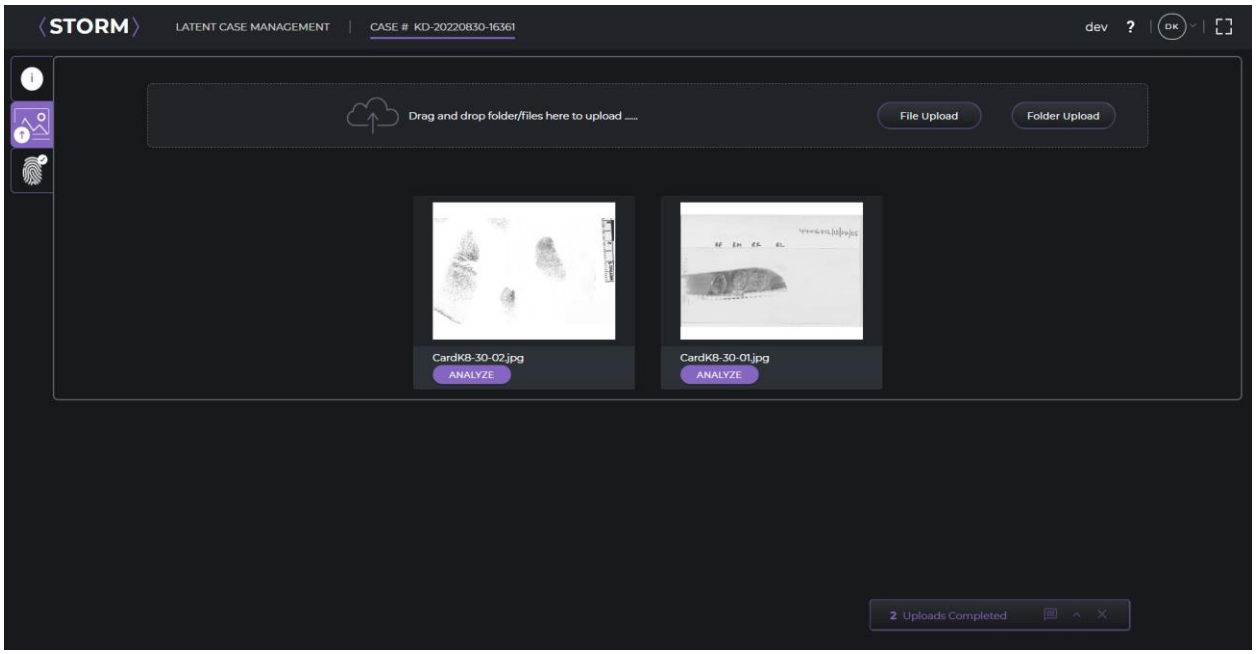

Figure 40. Case Screen – Image Upload Tab, With Images

5 Click **ANALYZE** under any image to perform image analysis for all of the uploaded images.

The Analysis screen opens for all of the Case's uploaded images and their defined latent prints.

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Analysis Screen – Uploaded Images

The Latent Analysis screen is displayed with the uploaded images.

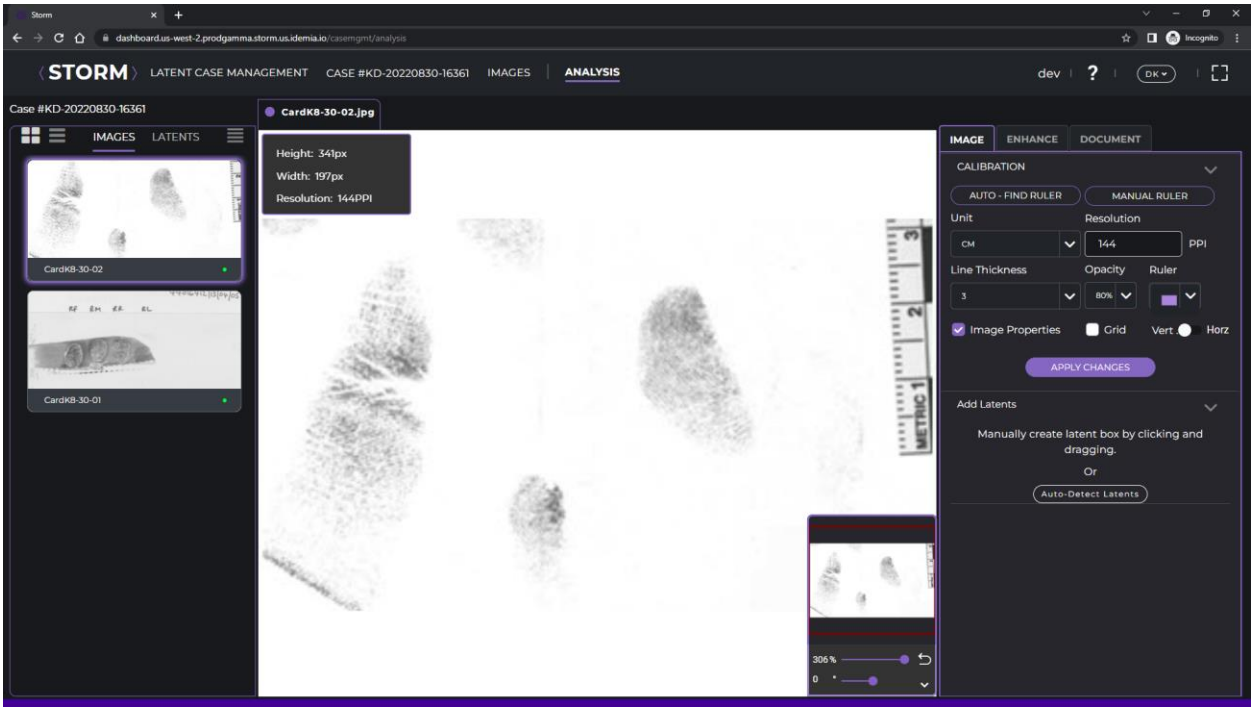

Figure 41. Analysis Screen – Just Uploaded Images

The left pane lists thumbnail pictures and the names of the uploaded Images. One has already been selected and loaded into the main, middle area of the screen.

The tabs in the right pane reflect the type of item (Image or Latent) selected.

Image tabs are:

- Tools – Has the tools for the tasks you need next to perform next:
  - Calibration – Image calibration
  - Add Latents
  - Auto-encoding of friction-ridge features
- Enhance – Future capability
- Document – For case documentation of the evidence image; default image fields include: Item Number, Item Description, Image Suitability, Substrate, Matrix, and Processing Method

NOTE: To go back to the Case screen to read or enter Case Info, click the **Images** tab link. Then click the Case Info tab. (To return to the Analysis screen, click **ANALYZE** under any image.)

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Calibrate the Images

NOTE: Images must have the correct resolution for their size before you create individual latent prints and search. Unless you uploaded correctly sized images, you must perform calibration first.

To perform image calibration:

1. For the first image, in the Image tab under Calibration, click **MANUAL RULER**.
2. Move the Ruler tool above the ruler in the image.
3. Check that **Unit** matches the ruler in the image. If necessary, change it.
4. If you need to:
   - Change Line Thickness, Opacity, and/or Color of the ruler
   - Hide or show the Image Properties, a Grid in the ruler, and the Vert Horz setting.
5. Rotate the Ruler tool to be perfectly parallel to the ruler in the image.

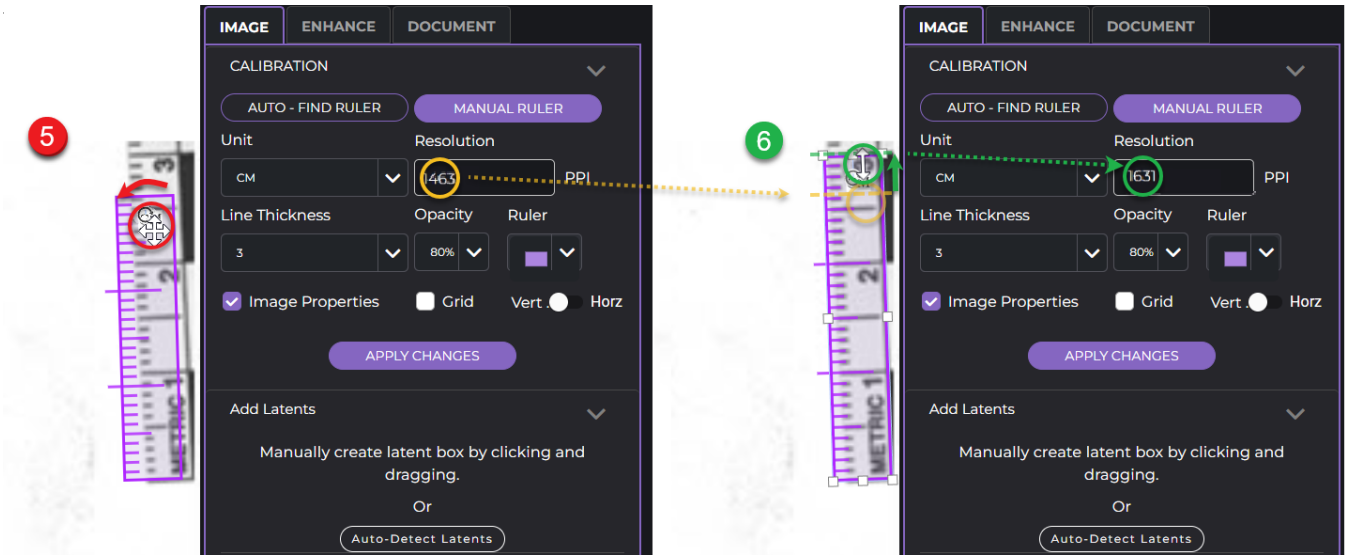

Figure 42. Analysis Screen – Image Calibration

6. Stretch the ends of the Ruler tool so the tick marks perfectly align with the ruler tick marks in the image. The value of **Resolution** adjusts automatically as the ruler is stretched.
7. Click **APPLY CHANGES**.

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Create the Latents

Select the images, one-at-a-time to “box out” the individual Latent prints on the Image. Drag a box – aka Interest Zone (IZ) – around an individual print; resizing, rotating, and positioning as needed. The Latents are extracted, and their thumbnails are listed under the Image thumbnail.

To box out Latents on an Image:

1 On the image in the middle, zoom, pan, and rotate the image as needed. Zooming with the mouse is centered on the cursor location.

2 Find an individual print and point the cursor to a place outside of it, say above it and to the left.

a. Click and hold the mouse, and then drag, to draw a box around an individual print.

Each box, aka Interest Zone (IZ), defines an individual latent print for the case.

Depending on size, the system assigns the box color to either:
- Pink – A finger by default, but when you search, you can select to search palms.
- Blue – A palm; when you search, system searches palms.

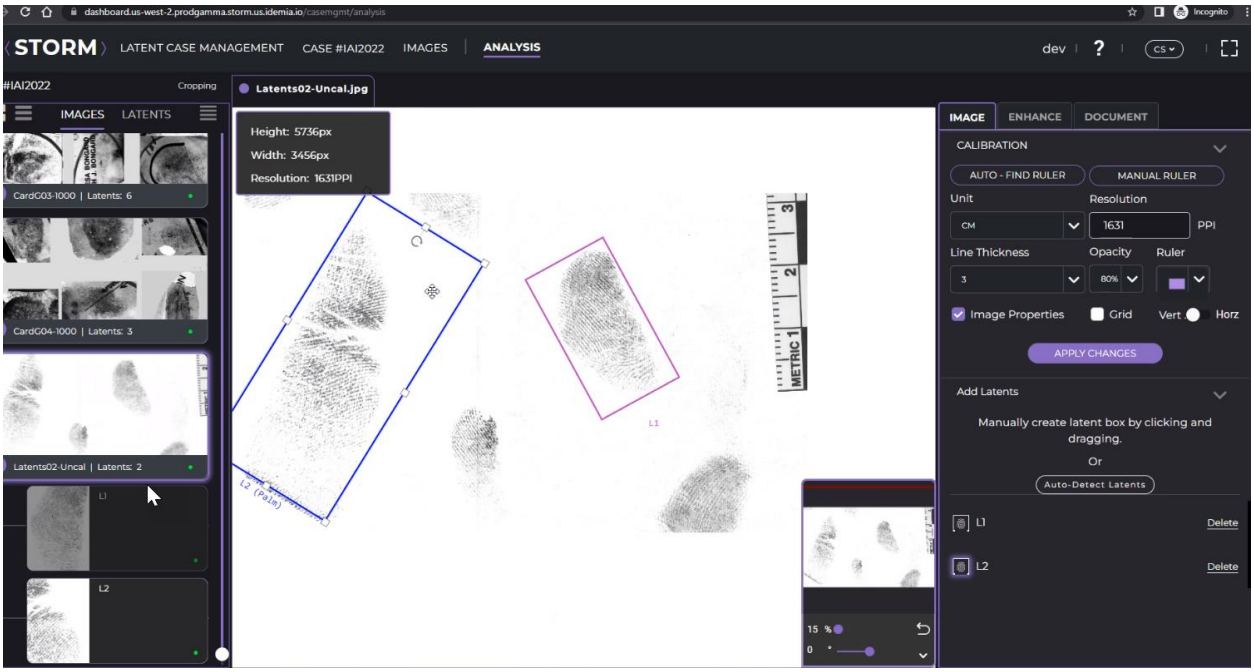

Figure 43. Analysis Screen – Create Latents

This immediately lists the Latent’s thumbnail and name in the left pane under the source Image. It also lists the Latent’s name only in the bottom right panel, along with a Delete option on its right.

NOTE: To delete a Latent, *either* click its *Delete option* **or** select the IZ (box) and press Delete .

b. Resize, rotate, and reposition the IZ as needed:
- Resize it with the handle squares on the sides and corners.
- Rotate it with the rotate icon near the top in the center.
- Reposition it by clicking and dragging it.

3 Repeat for each latent print in the evidence image.

4 Repeat for rest of the images.

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Analysis Screen – Analyze Latents

The Latent Analysis screen is displayed with the created latents.

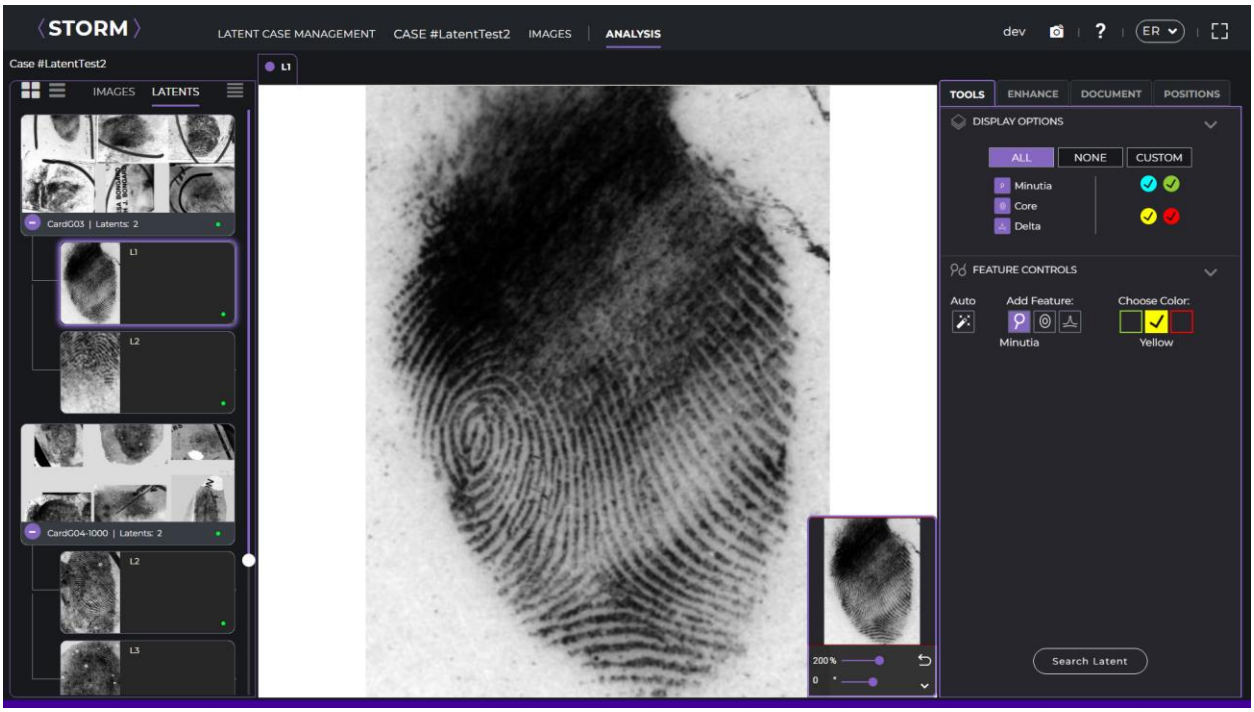

Figure 44. Analysis Screen – Create Latents

The left pane lists thumbnail pictures and the names of the created Latents under their source Images.

NOTE: Click the **+** icon under an Image to expand the tree to show its Latents.

The tabs in the right pane reflect the type of item (Image or Latent) selected.

Latent tabs are:

- Tools – Has the tools for the tasks you need next to perform next:
  - Display Options
  - Feature Controls
    - **Auto** – To auto-encode of friction-ridge features
    - **Add Feature** and **Choose Color** – To manually add features
- Enhance – Future capability
- Document – For documentation of each latent print; default image fields include: Latent Suitability, Latent Quality (category) and Quality Score, Complexity (category), Quality Issues (checklist), and Level 1, 2, 3 details.
- Positions – To set latent search filters (optional)

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Encode the Latents

To select a latent and encode it:

1 Click a Latent on the left.

2 Click

for the system to automatically place cyan-colored minutiae on the latent.

NOTE: When you auto-encode, any existing minutiae are deleted.

After auto-encoding, the Latent Analysis screen is displayed with the created latents.

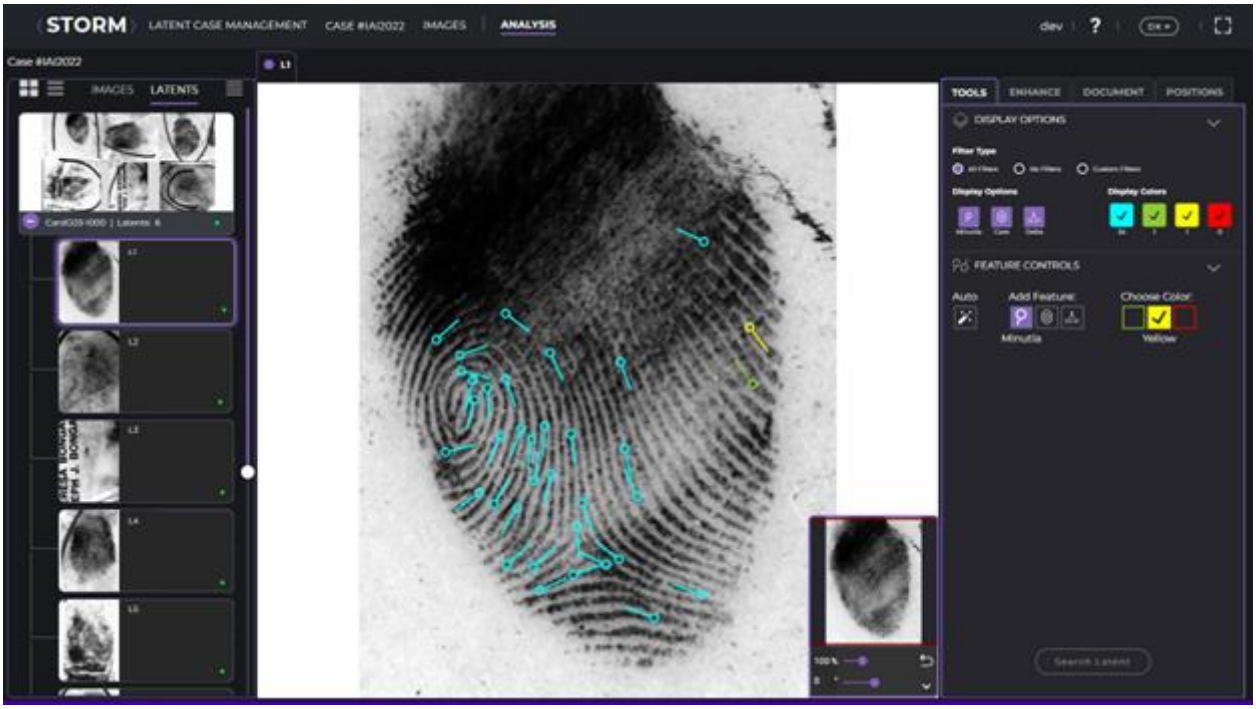

Figure 45. Analysis Screen – Analyze Latents

3 To zoom and pan, use the small-scale Navigation inset or, on main image, use mouse and keyboard.

Figure 46. Analysis Screen – Image Navigation Inset

- To pan – Click and drag the image in the Navigation inset.

  Alternatively, on main image, hold down Ctrl and drag the image.
- To zoom in and out – Drag the percent (%) magnification slider.
  Alternatively, mouse over the main image and scroll the wheel up or down.

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4 Use the **Tools** tab Display Options section to fully or selectively show or hide markings.
- Use Filter Type to set All or No Filters, or the last Custom Filters selections of options and colors
- Use Display Options to individually hide or show: Interest Zone, Minutiae, Core, and/or Delta
- Use Display Colors to hide or show auto-encoded (Cyan) or examiner-encoded confidence levels

Table 10. Tools Tab – Display Options

Tool Name	Tool Icon	Keyboard Shortcut	Description
NOTE: "Filter Type" is an overall control reflecting – and affecting – all the individual filters (options and colors).			
All Filters		Switches between "No Filters" and "Custom Filters" spacebar	ON indicates all filters are on, all features showing. Default setting.
No Filters			ON indicates no filters are on (all features hidden).
Custom Filters			ON indicates *some* filters were switched off, others on. If off, switching back ON restores last individual filters.
NOTE: All the filters below are set to ON – show feature type – by default. If ON, the icon is color-filled, as shown. Click icon (or press key) to switch between ON and off. (If ON/off mix of filters, "Custom Filters" turns ON.)			
Minutiae		S ***S***	Show/hide minutiae
Core		C ***C** for **C**ores*	Show/hide cores
Delta		D ***D** for **D**eltas*	Show/hide deltas
Auto-Encoded		A ***A** for **A**uto-*	Show/hide auto-encoded features
Green		G ***G** for **G**reen*	Show/hide examiner-encoded features
Yellow		Y ***Y** for **Y**ellow*	
Red		R ***R** for **R**ed*	

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To optionally manually encode a latent:

1 To manually encode minutiae, cores, and deltas:

a. Select a feature (Minutiae, Core, or Delta) and a color (Green, Yellow, or Red).

b. On the latent print image, click and hold at the feature location, then drag to set tail direction. Repeat with others of the same type and color.

c. Repeat to add more with different colors and/or types.

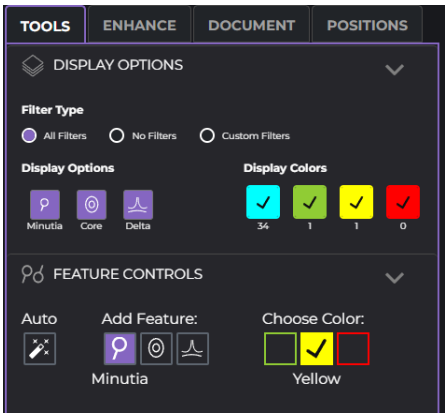

Figure 47. Latent Tools Tab – Display Options, Feature Controls

Table 11. Latent Tools Tab – Feature Controls

Tool Name	Tool Icon	Key	Description
NOTE: Only one feature and one color can be selected at a time. The selected feature is outlined in purple. The selected color is filled. Click icon (or press key for color) to switch ON and off.			
Add Minutiae	minutia		Add minutiae
Add Core	core		Add core
Add Delta	delta		Add delta
… in Green		1	Color for the next placed feature. Green is default. **NOTE:** Color is for level of feature clarity and examiner confidence in existence and location. Green: Clear feature, high confidence; Yellow: Moderate; Red: Unclear feature, low confidence.
… in Yellow		2	
… in Red		3	

2 To optional manually edit an existing feature marking:

a. Check the color and select another if needed – press 1 , 2 , or 3 .

b. Edit the feature as follows:

- To move a feature, click the circle and drag to new location.
- To change tail direction, click the tail and drag in new direction.
- To delete a feature, right-click the feature.

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Set Search Filters

Optionally use the **Positions** tab to set filters for more efficient searching, if applicable and available.

Instead of fully searching across all print orientations and all finger/palm positions, you can choose to selectively search for just:

- Vertically oriented prints
- Certain finger positions
- Certain palm positions

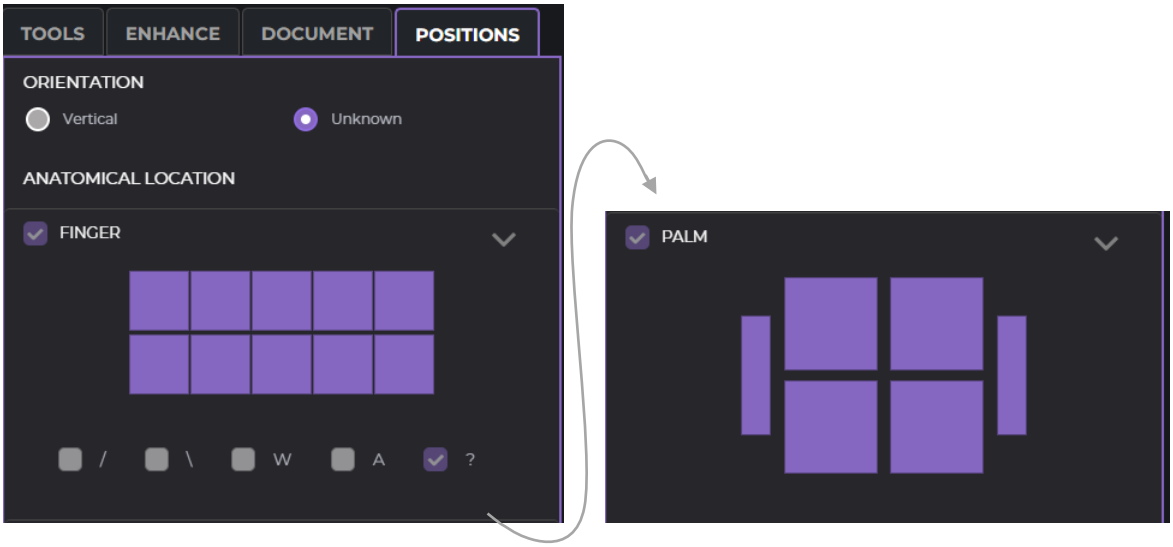

Figure 48. Latent Positions Tab

To optionally set search filters:

1 In the **Orientation** section:
   - Vertical – Click if you are certain the latent print is correctly oriented.
   - Unknown – Default. For when latent print orientation is unknown or ambiguous.

2 In the **Anatomical Location** section, use the **Finger** controls:

   a. Position – Select known finger positions:
      - Select one or more fingers if certain about position (e.g., latent is from a simultaneous impression of multiple fingers).
      - All – Default. Leave all positions selected if finger position is unknown or ambiguous.

   b. Classification – Select finger classification patterns:
      - Select up to three pattern classifications if certain and willing to exclude other patterns.
      - **?** (Unknown) – Default. Leave for when finger classification pattern is unknown or ambiguous.

3 In the **Anatomical Location** section, use the **Palm** controls:

   Position – Select known palm positions:
   - Select one or more palm areas if certain about position (e.g., large impression of a palm print).
   - All – Default. Leave all palm areas selected if position is unknown or ambiguous.

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Launch Latent Search

To launch search for the latent:

1 Click the **Search Latent** button in the bottom right (below all of the tabs) of the Analysis screen for the selected latent.

Figure 49. Search Latent Button

The following “Search For Matching Latents” summary dialog displays over the Analysis screen.

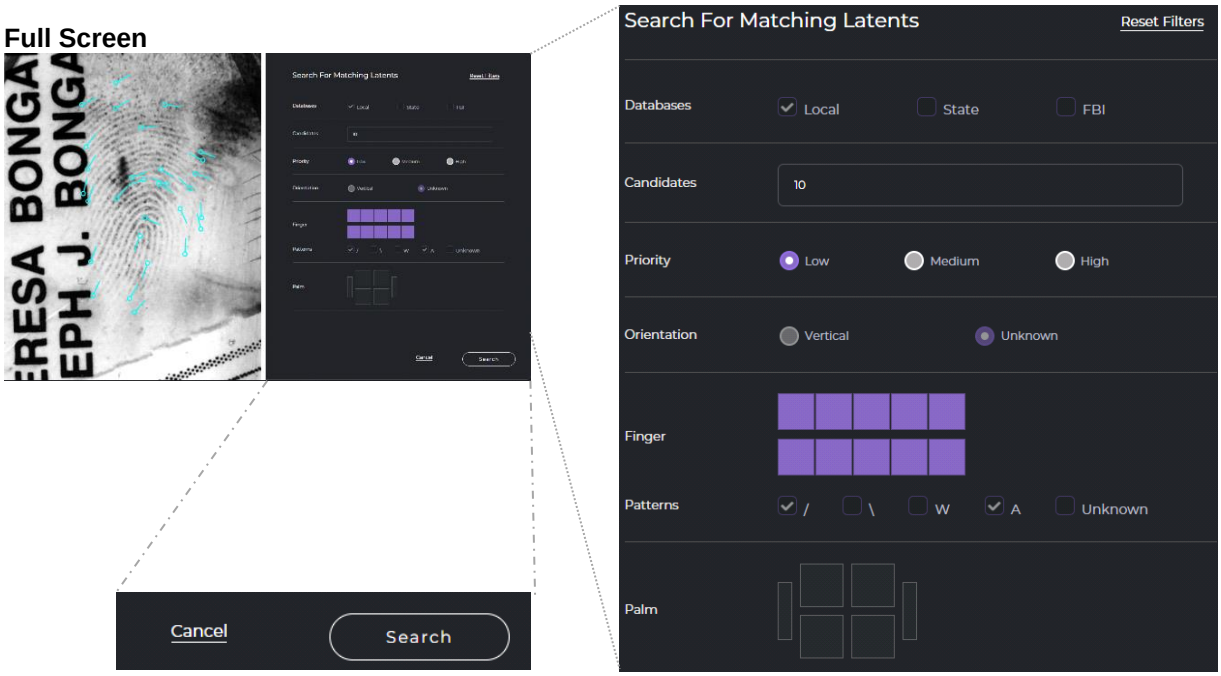

Figure 50. Search For Matching Latents

The left half shows the encoded features; the right shows the selected search filters plus parameters:
- Databases – Target database or databases (currently only “Local” is available and always on)
- Candidates – Maximum number of candidates to return, up to 10 (the default value)
- Priority – Low, Medium, or High (“Low” is the default value)

2 Optionally lower the number of Candidates and/or raise the Priority.

3 Click **Search**. The summary dialog closes and the Latent Analysis screen is visible again.

4 Notice the Latent thumbnail and name tile for the Latent that you searched:
- Lock icon is in the tile’s top right corner
- The search state in the tile’s bottom right updates and turns to a **COMPARE** button when done.

NOTE: Latents in the Compare state are available in queue mode from the Latent Comparison function.

5 Now you can either:
- Select another latent to encode and run search on (see page 52) and repeat for all of the latents.
- Click **COMPARE** to launch the Latent Comparison function for just the one latent. See Chapter 6.

NOTE: After doing Compare, encode another latent; select the Case from the list in Latent Case Management (see the next section), click the **ANALYZE** button under any of the images, and click the **+** under the image with the latent prints you are going to encode.

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Latent Case Management Search and Results

The screen offers Search Criteria for cases.

NOTE: The list is not populated initially. You can just click **SEARCH** without entering Search Criteria.

You can sort results by column heading (ascending or descending) as needed, and refine the search with more specific Search Criteria. For example, you can click Latents column heading and switch to descending to see cases with the most Latents.

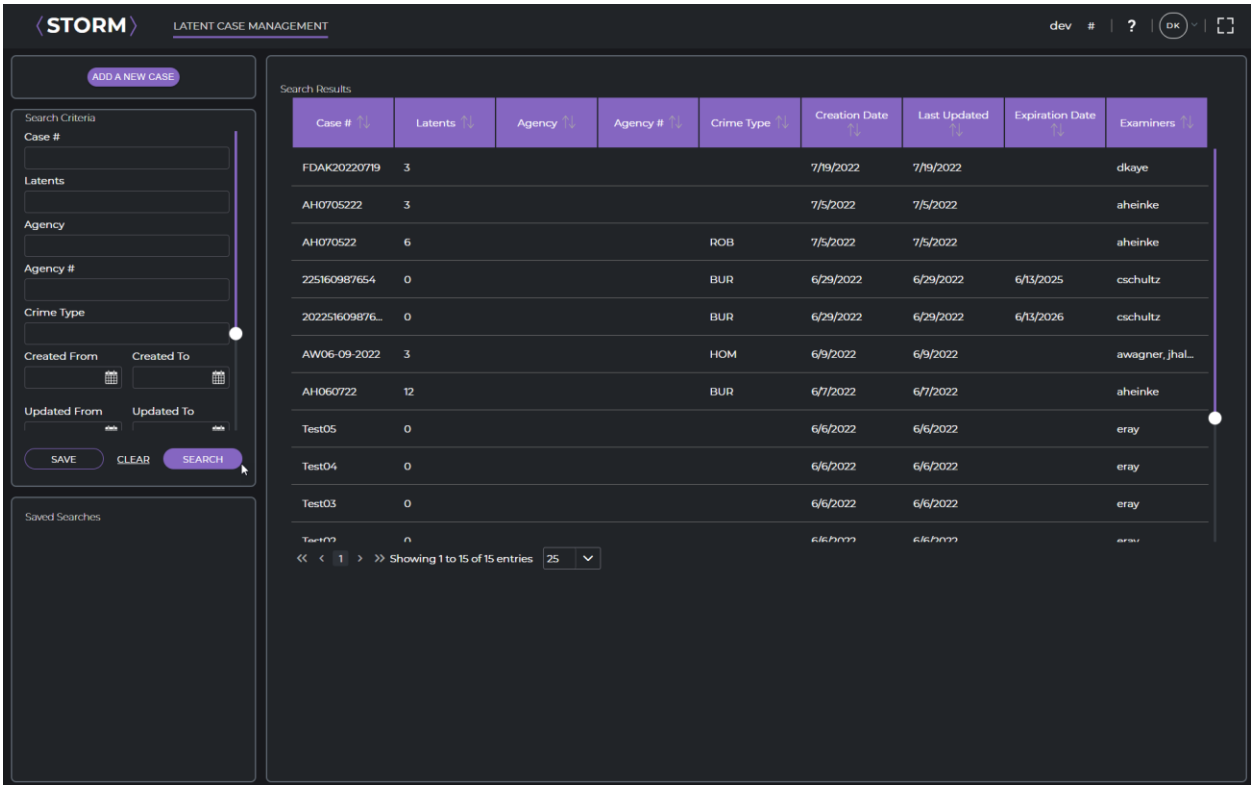

Figure 51. Latent Case Management Search and Results

Identifiers / Search Criteria

Latent Cases feature this key identifier:

- Case Number

Other latent case data includes:

- Latents (count); Agency (Name, Number), Crime Type, Dates (Creation, Last Updated, Expiration), Usernames (Examiners, Consultants, Verifiers), Case Comments
- Statistics: Images (count), individual Latents (count), search counts (local, state, federal), persons identified (count), and Unsolved Latent File (ULF) entry counts (local, state, federal)

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To display a list of cases and open one:

1 Optionally select criteria.

2 Click **SEARCH**.

3 Optionally sort by columns (or add criteria and search again).

4 Scroll to a case and click it to open.

Clicking a case row in the Latent Case Management results list opens the Case screen on the Upload Images tab.

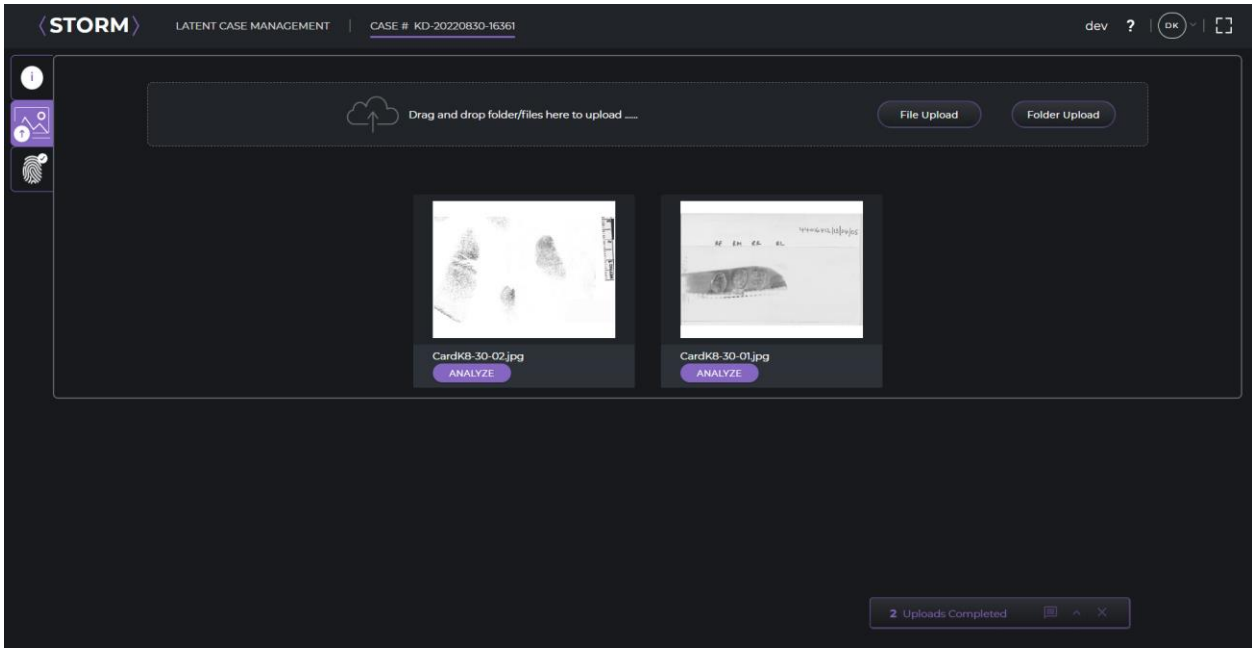
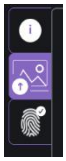


Figure 52. Latent Case Management – Case Screen, Image Upload Tab

Navigation buttons on the left are for:



Case Info

Image Upload

Examination Summary (future capability)

5 Where to go now depends on what you need to do:
- To go back to read or enter Case Info, click the Case Info tab. See Figure 38. Case Window – Case Info Tab on page 46.
- To upload more evidence images, see step 4 on page 47.
- To go to the Analysis screen for all the uploaded images, click **Analyze** under any image.

6 To go to the Analysis screen for all the uploaded images, click **Analyze** under any image.

The Analysis screen opens for all of the Case's uploaded images and their defined latent prints.

NOTE: On the Analysis screen, refresh the latents' search statuses as follows.
Click **Images** tab link at the top of the window, click **ANALYZE** button under any of the images, and click the **+** under the image with the latent prints you are checking.

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Chapter 6. Latent Comparison

This chapter covers Latent Comparison, whether continued queue and the Latent Reverse queue.

- The Latent Comparison queue is used to manually compare the candidates resulting from automatic comparison searches of a latent friction ridge image with tenprint images in one or more databases.
- The Latent Reverse queue is used to manually compare the results of friction ridge comparison searches of a set of tenprint fingerprint images with latent images in one or more databases.

In either search, two images are displayed side-by-side, with the latent image on the left, and the tenprint candidate image on the right. Select finger by Roll or Slap and position; select candidates from record list that you can sort by match score (descending) or Incident ID (ascending).

View minutiae with matching mates in the candidate image and those that are un-mated. Add and edit minutiae. View transaction data and record descriptors. Evaluate candidates as either Ident (ID), Inconclusive (INC), or Non-Ident (NOID). Save the record, removing it from the queue.

Open Latent Queues – Options for Sort Order

There are two queue ordering options when opening either type (Latent Comparison or Reverse Latent):

- From with the highest priority/oldest comparison transaction of that type
- From with the highest scoring comparison transaction of that type

To open the queue in the sequence you want:

- From highest priority/oldest transaction – Click the tile *anywhere except* the lower right corner.
- From highest scoring transaction – Click the tile *in the lower right corner*.

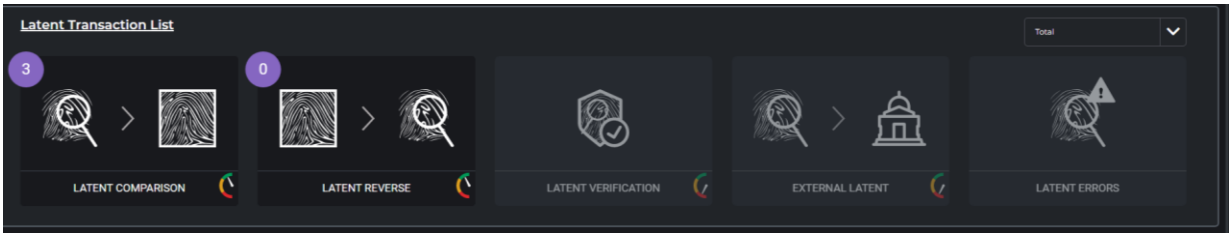

Figure 53. Landing Page – Latent Pane

NOTE: Alternatively open a specific Compare transaction from the Latent Transaction List; see page 13.

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Latent Comparison Screen

The Latent Comparison screen opens and displays the latent image on the left and a corresponding candidate image on the right.

View and Select Image Type and Candidate

The main part of the Latent Comparison screen displays a latent search image side-by-side with its first tenprint candidate's image.

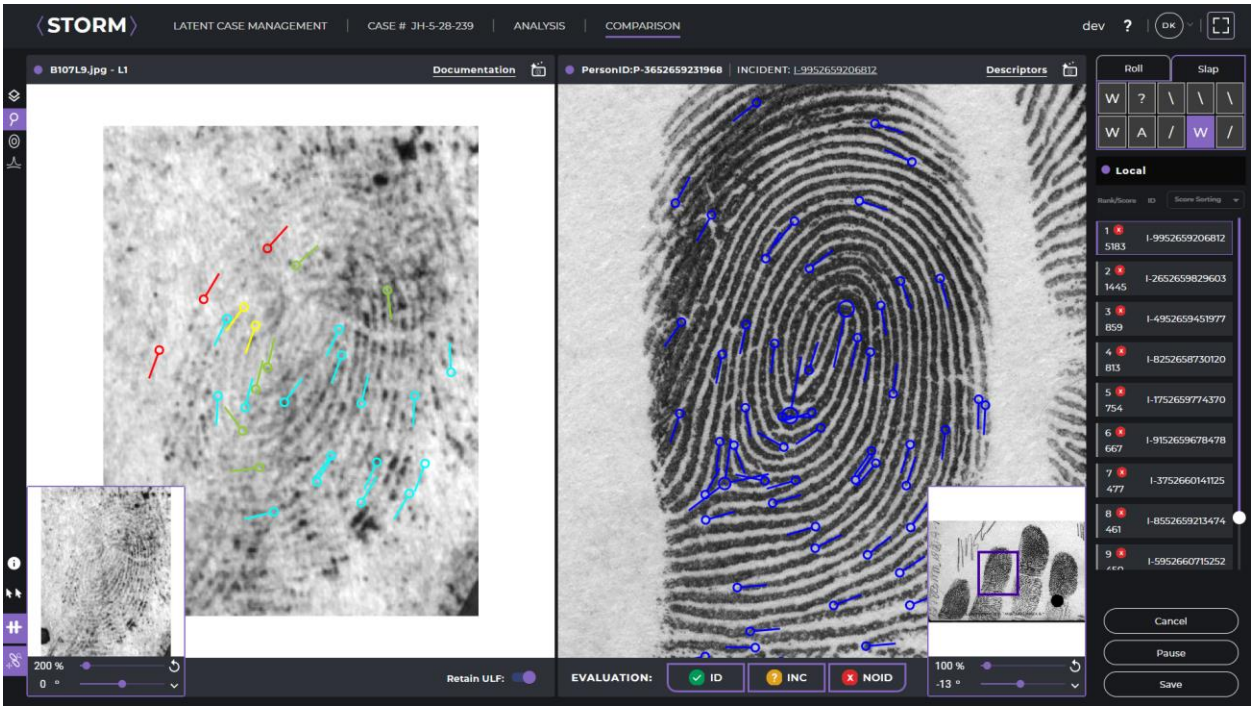

Figure 54. Latent Comparison Screen

To view and change images and candidate records:

1 Above the images:
- Above the latent image, you can view its name, and its documentation (latent print documentation from Latent Analysis screen).
- Above the tenprint image, you can view its record's identifiers and view descriptors for reference.

2 Identify the image type (roll or slap) and finger position with the image selector in the upper right.

The selected type is outlined in purple. The button for the displayed finger is filled with purple. Fingers are in rows for right and left, and labeled with pattern classification.

To switch type, click Roll or Slap.

Figure 55. Latent Comparison – Image Type Selector and Position Indicator

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3 Below the latent image, you can select to Retain or Discard the latent print image from the Unsolved Latent File (ULF) database. By default, all latent print searches are stored in the ULF database.
   - If a candidate is marked as 'ID', the 'Retain in ULF' switch automatically turns off.
   - If the 'Retain in ULF' switch is turned off, the latent print will be discarded from the ULF after the transaction is completed during the disposition phase of the latent print workflow.

4 Below the candidate image, you can select the Evaluation conclusion for the currently displayed candidate.
   - The STORM system may automatically assign conclusions based on candidate score.
   - Optionally, the conclusion for each candidate can start as unassigned.
   - Label terminology (e.g., 'ID') can be configured.

5 To switch to a different candidate record, use the candidate database and record selector on the right. Press Page ▼ and Page ▲ to scroll down and up. Click the candidate.

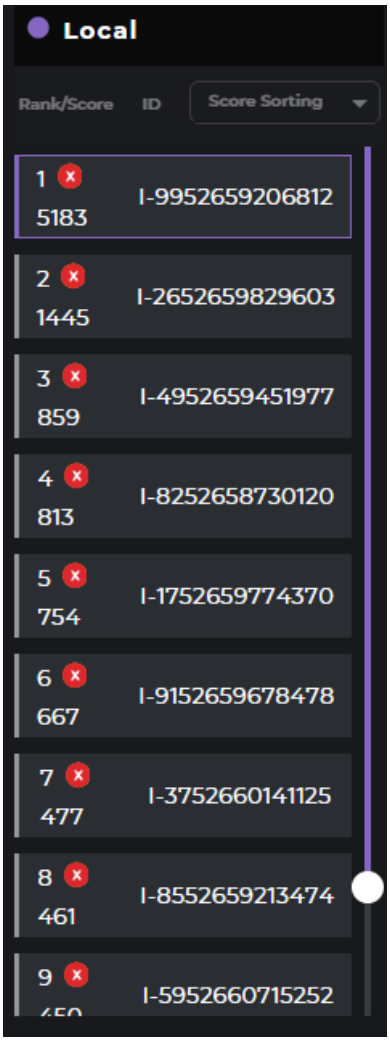

Figure 56. Latent Comparison – Candidate Database and Record Selector

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Image and Feature Controls

Side-by-Side Image Controls

The lower part of the left edge of the Comparison screen has controls for working with the side-by-side layout of the Comparison screen and its two images. They are:

- Show/hide image info –The boxed area showing width, height, and resolution on upper left corner of each image.
- Display double-cursor – When the arrow cursor is in one image, a second cursor (red plus sign +) is shown in the other image in the same relative position.
- Align images – When on, both images are rotated and panned to align the mated minutiae. When off, both images are displayed upright and centered.
- Open Link submenu – To unlink or link the two images for Zoom and/or Pan.

Below each image is a navigation inset control, where you can do the Zoom and/or Pan. Use the Link submenu in conjunction with the navigation inset.

Feature Display and Controls

The upper part of the left edge of the Comparison screen has buttons for feature display options, feature selection, and several controls related to working with side-by-side images.

The left edge of the Comparison screen displays these buttons:

- Display options – To filter which feature types, confidence levels, and mated/non-mated statuses to display.
- Feature selectors – To select which feature type to chart (for documentation purposes only): minutiae, core, or delta. Minutiae is the default selection.

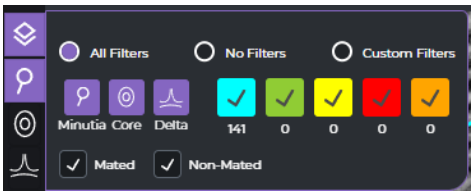

Figure 57. Latent Comparison – Display Options and New Feature Selectors

Display Options

The Display options box for the Comparison screen provides the following additional items that are not available in Quality Control:

- Orange display color (Show/hide) – For minutiae added or edited on the Comparison screen
- Mated minutiae (Show/hide) – For matched minutiae (in candidate image, color changes to cyan)
- Un-mated minutiae (Show/hide) – For un-mated minutiae (in candidate, color remains dark blue)

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Table 12. Latent Comparison – Feature Display Options

	Tool Name	Icon	Keyboard Shortcut	Description
	Minutiae		S ***S***	Show/hide minutiae
	Core		C ***C** for **C**ores*	Show/hide cores
	Delta		D ***D** for **D**eltas*	Show/hide deltas
	Auto-Encoded		A ***A** for **A**uto-*	Show/hide auto-encoded features
	Green		G ***G** for **G**reen*	Show/hide examiner-encoded features
	Yellow		Y ***Y** for **Y**ellow*	
	Red		R ***R** for **R**ed*	
	Orange		O ***O** for **O**range*	Show/hide features added/edited on Comparison screen
	Mated			Show/hide matched minutiae (candidate's show mate's color)
	Non-Mated			Show/hide un-mated minutiae (candidate's show dark blue)

New Feature Selectors

NOTE: Features charted on the Comparison screen are for examiner documentation purposes only. Unlike other features manually encoded in earlier stages, these are ***not*** saved for use by search matching algorithms. These are restricted to the color orange.

Table 13. Latent Comparison – New Feature Selectors

Tool Name	Icon
NOTE: Only one feature can be selected at a time. The selected feature icon is filled in purple.	
Add Minutiae	
Add Core	
Add Delta	

The color of the markings are always orange.

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Control Images and Add/Edit Features

To view images and add/edit features:

1 On the lower left edge, use the comparison controls to adjust your view and operation of the two images.
- Show/hide image info.
- Display double-cursor to locate and place features – When the arrow cursor is in one image, a second cursor (red plus sign +) is shown in the other image in the same relative position.
- Align images – Keep ON (default) so both images are rotated and panned to align the mated minutiae. Turn off to display both images upright and centered.

2 Use the Link submenu in conjunction with the navigation inset(s).

a. Use the Link submenu to unlink or link the two images for Zoom and/or Pan.

b. In the navigation insets (one or both, as applicable) do the Zoom and/or Pan.

3 To zoom and pan, use the small-scale Navigation inset or, on main image, use mouse and keyboard.

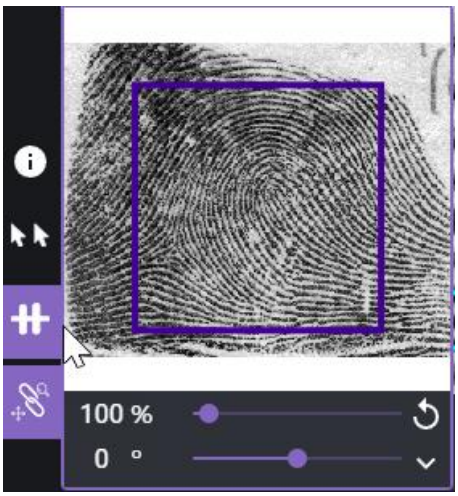

Figure 58. Latent Comparison Screen – Image Navigation Inset

- To pan – Click and drag the image in the Navigation inset.

  Alternatively, on main image, hold down Ctrl and drag the image.
- To zoom in and out – Drag the percent (%) magnification slider.
  Alternatively, mouse over the main image and scroll the wheel up or down.

4 On the upper left edge, use the Display Options section to fully or selectively show or hide markings.
- Use Filter Type to set All or No Filters, or the last Custom Filters selections of options and colors
- Use Display Options to individually hide or show: Interest Zone, Minutiae, Core, and/or Delta

5 To add markings for features you find, use the feature selectors.

6 To edit an existing feature marking:
- To move a feature, click the circle and drag to new location.
- To change tail direction, click the tail and drag in new direction.
- To delete a feature, right-click the feature.

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End Work on Latent Comparison Transaction

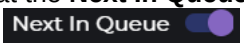
Finish your work on a latent comparison transaction with the action buttons in the lower right of the window.

If you opened the transaction from:

- Latent Comparison queue or Reverse Latent queue, **Next in Queue** lets you choose to continue working the queue or not.
- Latent Analysis or Latent Transactions List, **Next in Queue** is not offered.

To finish working on this transaction:

1 Check that the **Next In Queue** toggle switch (if shown) to see if it is ON (purple) or off (white).

- On – 

- Off –

To switch it, click the toggle icon (with the cursor).

2 Click the action button that you need from **Cancel**, **Pause**, and **Save** (or their **… & Next** variations).

Table 14. Action Buttons – Latent Comparison

Action Button (In Single Mode)	**Action Button** (In Queue Mode)	**Description**
Cancel	**Cancel & Next**	To discard any changes you made and return the latent back to the Latent Comparison queue.
Pause	**Pause & Next**	To pause work with any changes you made and return the latent back to the Latent Comparison queue.
Save	**Save & Next**	To save work with any changes you made and submit the latent back into automated workflow for subsequent processing. (If 'Retain in ULF' is off, the latent print will be discarded from the ULF after the transaction is completed during the disposition phase of the latent print workflow.)

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Latent Verification and Follow-up

(Future capabilities.) This section covers latent work queues for Verification, External Latent responses, and Latent Errors:

- The **Latent Verification** queue will be used for a secondary latent comparison by a different latent examiner. (Future capability)
- The **External Latent** queue will be used to manually compare the candidates resulting from automatic comparison searches of latent friction ridge images or sets of images against the existing tenprint images in one or more external tenprint databases (such as federal and/or state). (Future capability)

NOTE: Reverse search results from external latent databases will be shown in the Reverse Search queue (Future capability) along with the results from the local latent file.

The **Latent Errors** queue will be used to collect Latent processing errors. These are for records that may have been hung-up due to a process failure, including Image transaction error messages and Latent transaction error messages. (Future capability)

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Appendix A. QC Type 1 and 2 Tabs

The left edge of the Quality Control screen displays tabs for transaction data and record descriptors.

Person records have similar screens with this data.

Type 1 – Transaction Data Tab

The Type 1 tab of Quality Control displays the Type-1 Transaction Data. This information describes the type or purpose for the transaction, the transaction control number, the originator or source agency of the record, and the destination agency.

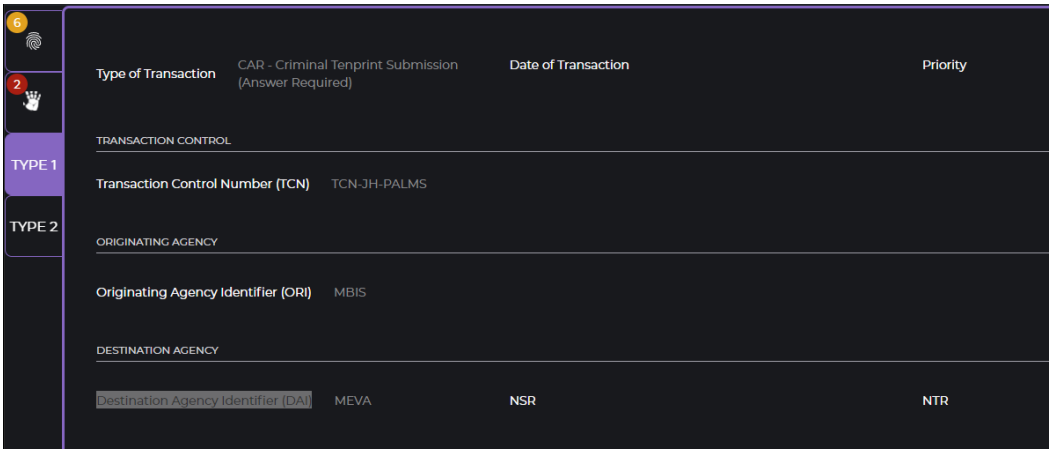

Figure 59. Type 1 Data Tab

Table 15. Type 1 Data Tab

Field	Description
Type of Transaction	The type abbreviation and description, such as: CAN—Criminal Ten-Print Submission (No Answer Necessary) CAR - Criminal Tenprint Submission (Answer Required) CARC—Criminal Ten-Print Card Scanning Service Submission (Answer Required) CNAC—Criminal Ten-Print Card Scanning Service Submission (No Answer Necessary) FNCC—Federal Applicant Card Scanning Service Submission (No Charge) FUFC—Federal Applicant Card Scanning Service Submission (User Fee) IMAP—Internal Miscellaneous Applicant Civil MAP—Miscellaneous Applicant Civil MAPC—Miscellaneous Applicant Card Scanning Service Submission (No Charge) NFFC—Non-Federal Applicant Card Scanning Service Submission (User Fee)
Date of Transaction	
Priority	
Transaction Control Number (TCN)	
Originating Agency Identifier (ORI)	
Destination Agency Identifier (DAI)	
NSR	
NTR	

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Type 2 – Record Descriptors Tab

The Type 2 tab of Quality Control displays the Type 2 Record Descriptors. These are the defined textual fields providing identification and descriptive information associated with the person who is the subject of the transaction.

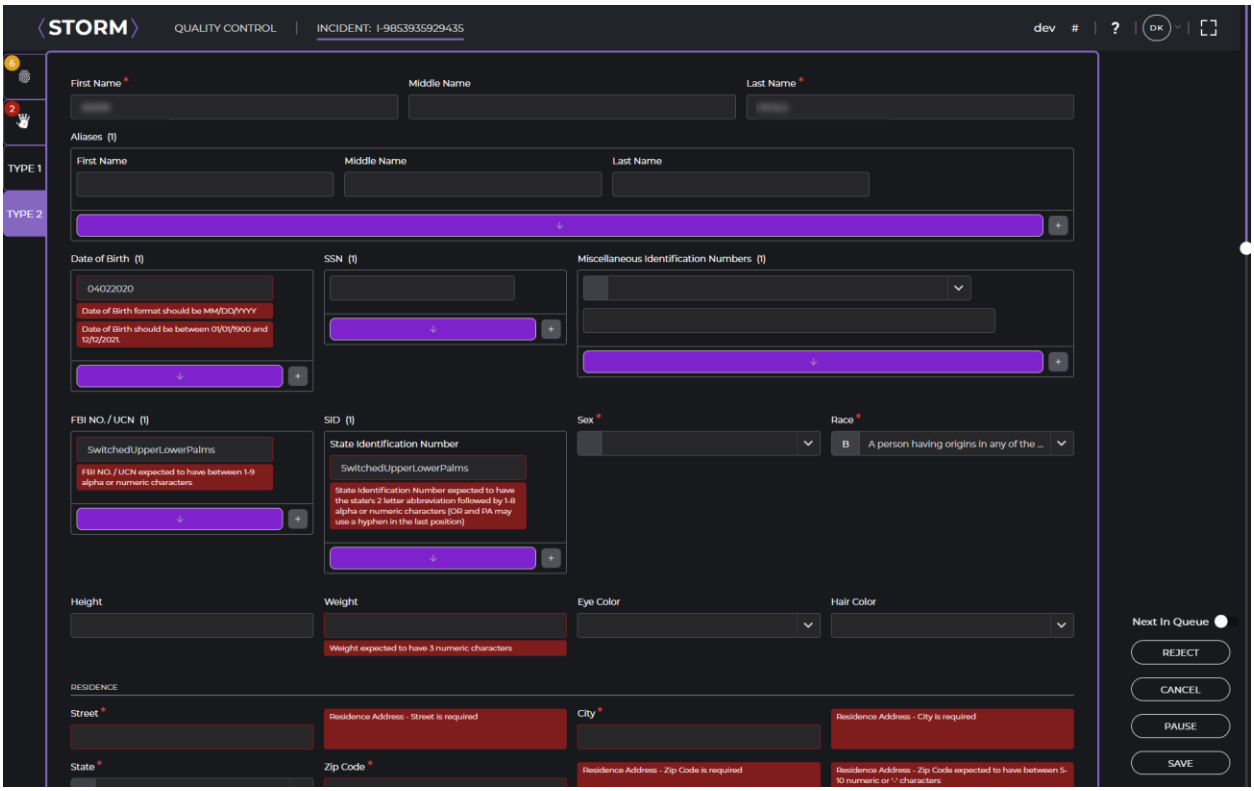

Figure 60. Quality Control – Type 2 Record Descriptors

Table 16. Type 2 Record Descriptors

Field Groups	Description
First Name, Middle Name, Last Name	**First Name** (required), Middle Name, **Last Name** (required).
Aliases (#)	First Name, Middle Name, Last Name. Can be multiple sets of aliases.
Date of Birth (#)	Format: MM/DD/YYYY. Can be multiple.
SSN	Can be multiple.
Miscellaneous Identification Numbers (#)	Can be multiple. Type from selector. Value field.
FBI NO./UCN (#)	Universal Control Number. Unique identifier in NGI. Format: 1-9 alpha or numeric characters. Can be multiple.
SID (#)	State Identification Number. Unique identifier in state's criminal database. Format: State's 2 letter abbreviation followed by 1-8 alpha or numeric characters (perhaps a hyphen in the last position). Can be multiple.

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Field Groups	Description
Sex	From a selector. Required
Race	From a selector. Required
Height	
Weight	Format: 3 numeric characters.
Eye Color	From a selector.
Hair Color	From a selector.
RESIDENCE	Address: **Street**, **City**, **State** (from selector), **Zip Code**; All address fields are required. Place of Birth (from a selector): Country of Citizenship (from a selector)
EMPLOYMENT:	Occupation, Employer Name; Address: **Street**, **City**, **State** (from selector), **Zip Code**; All address fields are required.
ARREST DATA	
(#)	Status Start Date, Status Literal, Date Printed, Send Copy To. Can be multiple sets of status data.
	Originating Agency Case Number; Date of Arrest (format should be MM/DD/YYY); Treat as Adult (Yes or No from a selector); Retention Code (Yes or No from a selector); Custody or Supervisory Status Start Date (MM/DD/YYYY); Custody or Supervisory Status Literal; Identification Comments
Arrest Segment Literal (#)	Date of Offense; Arrest Offense Literal. Can be multiple arrest segments.
Court Segment Literal (#)	Court Disposition Date, Court Disposition (from selector); Court Count Number; Court Offense Literal; Other Court Sentence Provision Literal. Can be multiple court segments.
Controlling Agency Identifier(#)	Can be multiple.
Scars, Marks, and Tattoos (#)	From a selector. Can be multiple.

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Appendix B. Data Identifiers and Descriptors

Table 17. Data Entities, Identifiers, Descriptors

Entity	Identifier	Descriptors	Description
Person, STORM DB	**Person ID**		
Person, Criminal State DB	**SID**		
Person, national DB	**FBI Number (UCN)**		
Person	**SSN**		
		Name **Aliases**	
		Date of Birth **Place of Birth**	
		Gender **Race**	
		Height **Weight**	
		Eyes Color **Hair Color**	
Arrest		**ORI**	
	ORI Case Number		
		NCIC Charge Code/Arrest Offense Number	
LiveScan Transaction	**LiveScanTCN**		
STORM Submission Transaction	**Transaction ID**		
STORM Submission Transaction		**TOT**	Type of Transaction
State Identity History Check Request			
State Identity History Check Response			
NGI Identity History Check Request	**TCN**		Transaction Control Number
NGI Identity History Check Response	**TCR**		Transaction Control Reference
Offender (Criminal) Incident ID			

NOTE: After the images are swapped, STORM performs another automatic sequence check.

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Appendix C. Finger Codes

Table 18. Tenprint Finger Codes

Seq on Screen	Image Block	Description	IZ Box	
Top 1 L	**F1**	Rolled Right Thumb (finger 1)		
Top 2	**F2**	Rolled Right Index (finger 2)		
Top 3 C	**F3**	Rolled Right Middle (finger 3)		
Top 4	**F4**	Rolled Right Ring (finger 4)		
Top 5 R	**F5**	Rolled Right Little (finger 5)		
Mid 1 L	**F6**	Rolled Left Thumb (finger 1)		
Mid 2	**F7**	Rolled Left Index (finger 2)		
Mid 3 C	**F8**	Rolled Left Middle (finger 3)		
Mid 4	**F9**	Rolled Left Ring (finger 4)		
Mid 5 R	**F10**	Rolled Left Little (finger 5)		
Bot 6 CR	**(F13)**	Right Thumb Slap	**S1**	Segmented Slap Right Thumb (finger 1)
Bot 7	**(F11)**	Right Four Finger Slap	**S2**	Segmented Slap Right Index (finger 2)
Bot 8			**S3**	Segmented Slap Right Middle (finger 3)
Bot 9			**S4**	Segmented Slap Right Ring (finger 4)
Bot 10 R			**S5**	Segmented Slap Right Little (finger 5)
Bot 5 CL	**(F14)**	Left Thumb Slap	**S6**	Segmented Slap Left Thumb (finger 1)
Bot 4	**(F12)**	Left Four Finger Slap	**S7**	Segmented Slap Left Index (finger 2)
Bot 3			**S8**	Segmented Slap Left Middle (finger 3)
Bot 2			**S9**	Segmented Slap Left Ring (finger 4)
Bot 1 L			**S10**	Segmented Slap Left Little (finger 5)

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Glossary

This Glossary provides definitions for terms and acronyms used in this document.

Term	Definition	Context
CAR	Criminal Tenprint Submission (Answer Required) CAR contains ten rolled and four plain (slap) impressions of all ten fingers. It may also contain Palmprint Images.	A particular TOT
CCH	Computerized Criminal History	
CHRI	Criminal history record information.	
Comparison	A work queue, user function, or processing state of a tenprint transaction in the Tenprint submission examination workflow. The function enables examiners to manually compare automatic search result candidates to confirm identification.	
Core	A well-defined center or focal point of a fingerprint image.	
Delta	That point on a ridge of a fingerprint image at or nearest to the point of divergence of two type lines and located at or directly in front of the point of divergence	
Encoding	Process used to record minutiae.	
ERRL	Latent Transaction Error If a syntax error is present or there is a problem with image quality.	A particular TOT
ERRT	Tenprint Transaction Error If a syntax error is present or there is a problem with image quality.	A particular TOT
Fingerprint Features	Unique physical characteristics of a fingerprint that are used to perform automated fingerprint searches.	
“lights-out”	Performed without human intervention.	
Latent Print Search	An automated comparison of the fingerprint features extracted from a latent fingerprint, with the fingerprint features contained in a tenprint fingerprint features file, to determine whether a latent fingerprint has a potential mate on file.	

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Term	Definition	Context
Latent Print Submission	A submission of one image and associated descriptor data along with a request for a latent fingerprint search.	
LFFS	LFFS: Latent Friction Ridge Features Search Used for latent feature submission and searches.	A particular TOT
LFIS	LFIS: Latent Friction Ridge Image Search Used for latent image submission and searches.	A particular TOT
Logical Record aka Record Type	See Record Type.	Biometric Transmission Specification
MAP	MAP: Miscellaneous Applicant The MAP transaction type is typically used as part of a background check.	A particular TOT
NCIC	NCIC is a biographic crime data system.	
NGI	Next Generation Identification	
NIEM	National Information Exchange Model An XML-based model for information exchange	
Pattern Classification	Characterization of a fingerprint as containing different patterns. See also, Exceptions, which include scar and amputation.	
Quality Control	The work queue, user function, or processing state of a tenprint transaction in the Tenprint submission examination workflow. The function enables examiners to manually resolve automatic sequence check errors and edit fingerprint minutiae to improve accuracy for identification.	
Record Type aka Logical Record	Data within a single file or transmission is categorized into logical records (also known as “Record Types”).	Biometric Transmission Specification
Search, image or biometric	Automated biometric identification searches of databases using algorithms to find matches.	
SRE	SRE Submission Results -Electronic Response containing an Ident/Non-Ident decision; will contain an electronic rap sheet if requested.	A particular TOT

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Term	Definition	Context
SRL	SRL Submission Results - Latent Latent response including a candidate list comprising names and identifier of each candidate.	A particular TOT
Tenprint Card Submission	A fingerprint card submitted for identification and possible incorporation into the repository.	
Tenprint Image Search	An electronic transaction containing fingerprint images, classification information as required, or remotely extracted fingerprint characteristics, submitted for automated identification search.	
TOT	Type of Transaction	TOT
Type-1	Type-1 Transaction Information	
Type-2	Type-2 User-Defined Descriptive Text	
Type-9	Type-9 Minutiae Data	
Type-10	Type-10 Face, other body part, or scar, mark tattoo (SMT) image	
Type-13	Type-13 Variable-resolution latent friction ridge image	
Type-14	Type-14 Variable-resolution fingerprint image	
Type-15	Type-15 Variable-resolution palmprint image	
Type-17	Type-17 Iris image	
Type-18	Type-18 DNA data	
UCN	Universal Control Number A unique numeric identifier in NGI	

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